Final Programmatic Environmental Assessment

Former Bennett Freeze Area Integrated Resource Management Plan

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The data provided for this analysis were made available either by accessing open-source data repositories or provided voluntarily by government and tribal agencies. Cultural resource and other confidential data were not made available for this analysis. While the data used in this document come from official sources and were believed to be the best available at the time, data in Indian Country can be less accurate than in other areas.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

ACRONYMS AND ABBREVIATIONS

AIARMA	American Indian Agricultural Resources Management Act
ALUP	Agricultural Land Use Permits
ARMP	Agricultural Resource Management Plans
AUM	abandoned uranium mines
BIA	Bureau of Indian Affairs
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLUP	Community Land Use Plans
CO	carbon monoxide
CWA	Clean Water Act
DGC	District Grazing Committee
EA	Environmental Assessment
ESA	Endangered Species Act
FBF DGC	Former Bennett Freeze District Grazing Committee
FBFA	Former Bennett Freeze Area
FR	Federal Register
ID	interdisciplinary
IRMP	Integrated Resource Management Plan
kV	kilovolt
LMD	Land Management District
MOU	Memorandum of Understanding
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESL	Navajo Endangered Species List
NHLC	Navajo-Hopi Land Commission
NHPA	National Historic Preservation Act
NNC	Navajo Nation Code
NNDFW	Navajo Nation Department Fish and Wildlife
NNDWR	Navajo Nation Department of Water Resources
NNEPA	Navajo Nation Environmental Protection Agency
NNHP	Navajo Natural Heritage Program
NO_2	nitrogen dioxide
NRCS	Natural Resource Conservation Service
NRO	Navajo Regional Office
O_3	ozone
Pb	lead
PEA	Programmatic Environmental Assessment
PL	Public Law
PM_{10}	particulate matter up to 10 micrometers in size
$PM_{2.5}$	particulate matter up to 2.5 micrometers in size
RMP	Range Management Plan
ROW	right-of-way
SO_2	sulfur dioxide
SUYL	Sheep Unit Year Long
TCP	Traditional Cultural Properties

US	United States
USACE	US Army Corps of Engineers
USC	United States Code
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service

1. Summary of the Proposed Action

1.1 Background

In 1966, the Commissioner of Indian Affairs, Robert Bennett, issued a series of administrative orders that restricted development on 1.6 million acres of tribal lands in northeastern Arizona. This became known as the Bennett Freeze and was intended to be a temporary measure until a dispute over the lands between the Navajo Nation and Hopi Tribe was settled. In 2006, Navajo and Hopi leaders signed an Intergovernmental Compact, which a federal court approved in 2007, that lifted the Bennett Freeze, clarified the boundaries of the two reservations in Arizona, and ensured access to religious sites of both Tribes. Nine Chapters of the Navajo Nation were impacted by the 40-year Freeze, which all but stopped development in the area and contributed to poor living conditions for many residents.

The proposed federal action is the adoption of an Integrated Resource Management Plan (IRMP) for the Former Bennett Freeze Area (FBFA) as prepared by the Bureau of Indian Affairs (BIA) Navajo Regional Office (NRO) and the Navajo Nation. The Navajo Nation Division of Community Development, Design, and Engineering Services obtained funding and led the development of the Recovery Plan for the FBFA, which was completed in 2008. The IRMP was prepared to update the 2008 Recovery Plan and was developed with assistance from the FBFA interdisciplinary Task Force and Core Teams comprising representatives from the BIA and the Navajo Nation. On November 21, 2015, the Navajo Nation and BIA signed a Memorandum of Understanding (MOU), electing to finalize the development of the FBFA IRMP in partnership with the BIA in accordance with American Indian Agricultural Resource Management Act (AIARMA) (25 United States Code [USC] Chapter 39).

The AIARMA defines an IRMP as a “plan developed pursuant to the process used by tribal governments to assess available resources and to provide identified holistic management objectives that include quality of life, production goals, and landscape descriptions of all designated resources that may include (but not be limited to) water, fish, wildlife, forestry, agriculture, minerals, and recreation, as well as community and municipal resources, and may include any previously adopted tribal codes and plans related to such resources.” (25 USC § 3703(11)). Under the AIARMA “development and management of Indian agricultural lands in accordance with integrated resource management plans will ensure proper management of Indian agricultural lands and will produce increased economic returns, enhance Indian self-determination, promote employment opportunities, and improve the social and economic well-being of Indian and surrounding communities." (25 USC § 3701(4)).

The FBFA IRMP is the Tribe's strategic plan for the management and development of its own resources. The IRMP would serve as a basis for future resource decision-making. The planning process is designed to incorporate all pertinent information into one document to guide the future management of an area or resource. The IRMP sets comprehensive goals for the FBFA, establishes desirable use levels, and identifies types of development and land uses.

This Programmatic Environmental Assessment (PEA) was prepared to thoroughly examine the potential environmental impacts of the proposed action and alternative actions in order to support informed decision-making. This PEA is consistent with the purpose and goals of the National Environmental Policy Act of 1969 (NEPA), 42 USC § 4321 et seq.; the requirements of the Council on Environmental Quality’s

(CEQ) implementing NEPA regulations at 40 CFR Parts 1500-1508 (promulgated September 14, 2020); longstanding federal judicial and regulatory interpretations; the Department of the Interior's NEPA regulations (43 CFR Part 46); the Indian Affairs NEPA Guidebook, 59 IAM 3-H (BIA August 2012); and Administration priorities and polices including Secretary's Order No. 3399 requiring bureaus and offices to use "the same application or level of NEPA that would have been applied to a proposed action before the 2020 Rule went into effect."

This PEA incorporates by reference the information in the FBFA Draft IRMP (NNDNR/BIA 2020). This information incorporated includes more detailed baseline data used to describe the affected environment such as soils characteristics, vegetation types, and water sources, among others.

1.2 Purpose and Need for Action

The proposed federal action is the adoption of the IRMP for the FBFA prepared by the BIA NRO and Navajo Nation. The purpose of the IRMP is to meet the social, cultural, economic, and long-term sustainability needs of the residents of the FBFA. The IRMP is a strategic, vision-based, long-range management plan based on Navajo Nation members' interests, needs, and concerns for their lands, and natural and cultural resources.

The need for the action is the BIA's responsibilities for the management of Indian agricultural lands under the AIARMA. "The BIA is responsible for conducting all land management activities on Indian agricultural land in accordance with goals and objectives set forth in the approved agricultural resource management plan, in an integrated resource management plan, and in accordance with all tribal laws and ordinances…" (25 USC § 3712(a)). Land management activities include but are not limited to:

- preparation of soil and range inventories, farmland and rangeland management plans, and monitoring programs to evaluate management plans
- soil and range conservation management techniques
- integrated pest management programs to control noxious weed or agricultural pests
- administration and supervision of agricultural leasing and permitting activities, including determination of proper land use, carrying capacities, and proper stocking rates of livestock, appraisal, advertisement, negotiation, contract preparation, collecting, recording, and distributing lease rental receipts
- technical assistance to individuals and tribes engaged in agricultural production or agribusiness; and
- educational assistance in agriculture, natural resources, land management and related fields of study, including direct assistance to tribally controlled community colleges in developing and implementing curriculum for vocational, technical, and professional course work.

1.3 Land Involved in the Analysis

The FBFA encompasses over 1.6 million acres in the northeast corner of Arizona and forms the westernmost portion of the Navajo Nation (Appendix A, Map A-1). Nine Chapters are included within the FBFA boundary: (1) Bodaway-Gap, (2) Cameron, (3) Coalmine Canyon, (4) Coppermine, (5) Kaibeto, (6) Leupp, (7) Tolani Lake, (8) Tonalea, and (9) Tuba City. The Kaibeto Plateau borders the FBFA to the north, the Colorado River and Coconino Plateau to the west, the Painted Desert to the south, and the

Moenkopi Plateau to the east. The Little Colorado River traverses through the FBFA, starting in the south and meandering west and eventually meeting up with the Colorado River at the confluence along the western border of the FBFA.

1.4 Scoping and Public Involvement

1.4.1 Community Input Received during the IRMP Planning Process

Community input was received, compiled, and considered from multiple sources.

1. Community Land Use Plans (CLUPs) from all nine affected Chapters
   a) Overview of IRMP on November 13, 2014, Tuba City Chapter, Tuba City, Arizona.
   b) Coalmine Canyon Chapter House Meeting March 9, 2016, Coalmine Canyon, Arizona.
   c) Workshop on March 16, 2016, in Tuba City to inform Chapter members on the IRMP and the IRMP process, Tuba City, Arizona.

2. 2008 Former Bennett Freeze Recovery Plan
   a) Community members, youth, Chapter officials, and administration staff participated in two community workshops to develop the 2008 FBFA Recovery Plan from May 28 to June 22, 2008.
   b) Community members, youth, tribal officials, and Chapter administration staff participated in two community workshops to update each CLUP.

3. 2018 Former Bennett Freeze Area Economic and Market Feasibility Study

CLUPs are prepared by a community-appointed committee and reflect community members' vision and goals with concern for the development and protection of Chapter lands. These plans serve as a strategic guide for Chapter administrators when considering development within their respective Chapter service areas. For the IRMP, these CLUPs were considered the most comprehensive collection of community-identified goals available and were extensively utilized in the planning process.

1.4.2 Scoping

CEQ regulations do not require a scoping process for a PEA but provide that "[a]gencies shall involve the public, State, Tribal, and local governments, relevant agencies, and any applicants, to the extent practicable in preparing environmental assessments" (40 CFR § 1501.5[e]). Similarly, Department of the Interior regulations implementing NEPA provides that bureaus "must, to the extent practicable, provide for public notification and public involvement when an environmental assessment is being prepared. However, the methods for providing public notification and opportunities for public involvement are at the [BIA's] discretion" (43 CFR § 46.305[a]). BIA, therefore, chose to include a scoping period to potentially identify new issues, capture the tribal membership's voice, and maximize opportunities for public input and participation in the PEA process.

Scoping activities included an opportunity for both tribal members and the non-tribal public to provide input on what should be studied, analyzed, and considered in drafting the PEA. The 45-day scoping

period began on November 16 and ended on December 30, 2020. The methods below were used to notify and inform interested parties.

A scoping fact sheet containing information on the Draft IRMP, the purpose and need for the action, NEPA planning process, the dates and times for the scoping meetings, and comment submittal information were sent to 50 addressees consisting of the nine affected chapters, individual stakeholders, business owners, and tribal and federal representatives and elected officials.

The BIA issued the press release on the project-specific website (https://www.bia.gov/fbfa-ea). The website became "live" with project information on November 16, 2020. The BIA social media platform on Facebook is https://www.facebook.com/BureauIndAffrs/. The Facebook page included information on the public meetings and became "live" on November 16, 2020. The press release was also published in the Navajo-Hopi Observer and Navajo Times between October 18 and November 26, 2020. Public service announcements in the Navajo language were broadcast on KUYI, out of Keams Canyon, Arizona, which covers the FBFA.

Individuals were provided several methods to share their comments with the BIA, including a project-specific email address and a facsimile number. Both the fact sheet and press release highlighted the opportunity to comment and the times and dates of the virtual scoping meetings.

Five 2-hour outreach meetings were convened during the scoping period. The meetings were conducted using webinars on the Zoom platform to adhere to COVID-19 pandemic Public Health Orders. Interested parties could also call into the meetings using a toll-free number. The meetings were held on:

- December 1, 2020, Tuesday, 10:00 a.m. to 12:00 p.m.
- December 1, 2020, Tuesday, 6:00 p.m. to 8:00 p.m.
- December 2, 2020, Wednesday, 10:00 a.m. to 12:00 p.m.
- December 3, 2020, Thursday, 10:00 a.m. to 12:00 p.m.
- December 3, 2020, Thursday, 4:00 p.m. to 6:00 p.m.

Under normal circumstances, the BIA would have conducted the public scoping meetings in person at four different locations within the FBFA. However, Public Health Orders restricted gatherings of more than five, and the Navajo Nation had been under daily curfews and weekend lockdowns since March 2020.

During the scoping period, the BIA received 13 comment submittals during the virtual meetings and via email. These submittals contained 26 individual comments. Following the close of the public scoping period, comments were compiled and analyzed to identify issues and concerns.

1.4.3 Draft Programmatic Environmental Assessment Public Comment Period

CEQ and Department of the Interior regulations do not require publication of a draft EA for public review and comment. However, Department of the Interior regulations provide that "[b]ureaus may seek comments on an environmental assessment if they determine it to be appropriate, such as when the level of public interest or the uncertainty of effects warrants, and may revise environmental assessments based on comments received without need of initiating another comment period."43CFR § 46.305(b).

The draft PEA was made available for public review on May 24, 2021, when it was posted on the BIA's project-specific website (https://www.bia.gov/fbfa-ea). The dates, times, and information on how to register for the public comment meetings were also posted on the website.

The BIA prepared a public notice containing information on the draft PEA, the dates and times for the public meetings, and comment submittal information. The notice was sent to 50 addressees consisting of the nine affected chapters, individual stakeholders, business owners, tribal and federal representatives, and elected officials. The public notice identified the 30-day public comment period as beginning on May 24 and ending on June 23, 2021.

Public service announcements in the Navajo language were broadcast on KNDN, out of Farmington, New Mexico; KTNN out of Window Rock, Arizona; and KGAK out of Gallup, New Mexico. A total of 103 announcements were broadcast twice a day between 6:00 a.m. and 6:00 p.m. from May 17 to June 5, 2021. The public notice was also published several times in the Farmington Daily Times, Navajo-Hopi Observer, and Navajo Times between May 20 and June 5, 2021.

Four 2-hour outreach meetings were convened during the public comment period. The purpose of each meeting was to provide information about the draft PEA, answer questions, and hear comments and suggestions about the environmental analysis in the draft PEA. The meetings were conducted using webinars on the Zoom platform to adhere to COVID-19 pandemic public health orders. Interested parties could also call into the meetings using a toll-free number. The meetings were held on the following dates:

- June 02, 2021, Wednesday, 10:00 a.m. to 12:00 p.m.
- June 03, 2021, Thursday, 10:00 a.m. to 12:00 p.m.
- June 03, 2021, Thursday, 6:00 p.m. to 8:00 p.m.
- June 05, 2021, Saturday, 10:00 a.m. to 12:00 p.m.

Interested parties had the opportunity to submit comments by attending the virtual public meetings, through the project website, or via mail, fax, or email. During the comment period, the BIA received seven comment submittals. These submittals contained 15 individual comments. None of these comments resulted in additional analysis in the PEA. The comments received, and the BIA's responses are included in Appendix C.

1.4.4 Issues

The project interdisciplinary (ID) team included specialists from the BIA and the Navajo Nation Division of Natural Resources. The ID team was integrally involved in the internal scoping to identify potential issues, understand the proposal, develop the purpose and need, and develop the Proposed Action.

The key issues identified during agency scoping are summarized in Table 1-1. The impact indicators provided are used to describe the affected environment for each issue in Chapter 3, measure the change in the issue for the different alternatives, and assess the effects (or impacts) of implementing the alternatives.

Table 1-1. Issues Identified for Evaluation

Issue Statement	Impact Indicator
How would implementing the Proposed Action affect air quality?	▪ Fugitive dust and emissions from construction and development, and other surface disturbance ▪ Potential increased population and related increased emissions ▪ Management actions designed to reduce soil erosion and improve rangeland health
How would implementing the Proposed Action affect soils?	▪ Soil disturbance from development, commercial agriculture, livestock grazing, restoration projects— acres of highly erodible soils in the FBFA ▪ Maintaining and improving soil conservation and health—acres of highly erodible soils in Conservation Areas ▪ Management actions that include restoration projects
How would implementing the Proposed Action affect water resources?	▪ Changes in water quality from development, agriculture, and livestock grazing ▪ Changes in water quality from the restoration of wetlands, riparian areas, and natural springs, streams, and streambank stabilization projects ▪ Water quantity—increased population and related increased water use
How would vegetation be affected by implementing the Proposed Action?	▪ Vegetation removal for construction and development, or other surface disturbance—acres in Development Focus Areas ▪ Noxious weed/invasive species management ▪ Restoration projects
How would wildlife be affected by implementing the Proposed Action?	▪ Retaining wildlife habitat—acres in Conservation Areas ▪ Habitat loss, modification, disturbance from development—acres in Development Focus Areas ▪ Increased potential for wildlife encounters and/or vehicle collisions ▪ Habitat restoration projects
How would implementing the Proposed Action affect agriculture?	▪ Continued agriculture—acres in Agriculture Areas ▪ Restoration projects and preservation of productive areas
How would implementing the Proposed Action affect livestock grazing?	▪ Continued livestock grazing—acres in Agriculture Areas ▪ Potential reduction of available forage—Acres in Development Focus Areas; limiting riparian areas for grazing ▪ Enforcement of grazing regulations ▪ Improving or repairing water features and structures, such as ponds, tanks, and windmills ▪ Range unit fencing installation/repair
How would implementing the Proposed Action affect special status species?	▪ Ground disturbance ▪ Noxious weed/invasive species management ▪ Water quantity—increased water use from the expansion of water distribution systems

Using input from the ID team, a list of issues this PEA analyzed in detail was developed in accordance with guidelines set forth in the Indian Affairs NEPA Guidebook, 59 IAM 3-5 and the CEQ regulations

implementing NEPA. Consistent with 40 CFR 1501.9(f)(1), BIA identified and eliminated from detailed study the issues that are not significant or that have been covered by prior environmental review. Table 1-2 briefly discusses why these issues would not have a significant effect on the human or natural environment.

Table 1-2. Issues Eliminated from Further Evaluation

Resource	Rationale for Not Discussing in Further Detail
Topography	Implementing the Proposed Action would not approve any site-specific development. Any subsequent proposed development would be subject to tribal permitting processes and site-specific analysis. Any subsequent proposed development would also be subject to federal approval if required. Effects to topography or unique topographical features would be evaluated when a project is proposed, and design features or other mitigation measures would be implemented to limit or avoid potential effects.
Geology	Implementing the Proposed Action would not approve any site-specific development. There are no reasonably foreseeable environmental trends or planned actions that would affect the geological setting in the FBFA. In the future, should development be proposed that could affect geology (e.g., oil and gas extraction), that development would be subject to site-specific analysis, and design features or other mitigation measures would be implemented to limit or avoid potential effects.
Minerals	Implementing the Proposed Action would not approve any site-specific development. There are no reasonably environmental trends or planned actions that would affect the mineral estate in the FBFA. In the future, should development be proposed that could affect minerals (e.g., sand and gravel mining, oil and gas extraction), that development would be subject to site-specific analysis, and design features or other mitigation measures would be implemented to limit or avoid potential effects.
Cultural Resources	Implementing the Proposed Action would not approve any site-specific development. All development projects across the Navajo lands are culturally inventoried (archaeologically surveyed) for compliance with Section 106 (36 CFR 800) under the National Historic Preservation Act (NHPA). Any future proposed development would be inventoried for cultural resources and Traditional Cultural Properties (TCP). Navajo Nation Heritage and Historic Preservation Department would issue a Cultural Resource Compliance Form for final approval or disapproval for the future proposed development. Under this evaluation and approval process, there would be no adverse effects to significant cultural resources or TCPs in the FBFA.
Environmental Justice	Executive Order 12898 (59 Federal Register [FR] 7629), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that federal agencies identify and address, as appropriate, disproportionately high, and adverse human health or environmental effects of their programs and activities on minority and low-income populations. With respect to the Proposed Action, environmental justice issues would concern either socioeconomic conditions or health risk exposures. The Proposed Action's impact on the area economy would be beneficial and is not expected to adversely affect minority or low-income populations disproportionately. Proposed management actions would not produce hazardous waste or conditions that might affect human populations, nor result in other disproportionately adverse effects.
Hunting, Fishing, Gathering	Implementing the Proposed Action would not restrict tribal members access to hunting, fishing, or gathering areas. Tribal and non-tribal members would continue to be subject to the regulations for hunting, trapping, and fishing activities as provided in 17 Navajo Nation Code (NNC) 500, et seq. As determined by the Resources and Development Committee of the Navajo Nation Council, areas prohibited from hunting would remain the same. The Proposed Action would have no adverse effects on hunting, fishing, or gathering within the FBFA.

Resource	Rationale for Not Discussing in Further Detail
Timber Harvesting	Woodlands are forestlands not included within the timberland classification. Woodlands comprise approximately 17 percent of the nine Chapters in the FBFA, some of which are not within the exterior boundary of the FBFA. There are no commercial forestlands in the FBFA. The Proposed Action would not affect timber harvesting.
Recreation	The Little Colorado River Tribal Park and Marble Canyon Tribal Park are in the FBFA. These parks would continue to be managed by the Navajo Nation Parks and Recreation Department. There are plans to develop these parks further and possibly designate other tribal parks in the FBFA. These plans are being formalized in the Western Area Parks General Management Plan, and the effects of implementing that plan would be evaluated in a separate NEPA analysis. The Proposed Action would have no adverse effects on recreation.
Transportation Use Network	While future development in the FBFA includes improving transportation corridors, there are no plans to develop new highways or major roads. Some minor roads may be constructed to access scattered homesites or other developments, but these would not be expected to modify the transportation network substantially. In the future, should development be proposed that could substantially affect the transportation network, that development would be subject to site-specific analysis, and design features or other mitigation measures would be implemented to limit or avoid potential effects. The Proposed Action would have no adverse effects on the transportation network or use.
Indian Trust assets	Indian Trust Assets, or resources, are defined as legal interests in assets held in trust by the US Government for Native American Indian tribes or individual tribal members. Examples of Indian Trust Assets are lands, minerals, water rights, other natural resources, money, or claims. Congress has recognized and reaffirmed that the United States' federal trust responsibility includes a duty to promote tribal self-determination regarding governmental authority and economic development (Indian Trust Asset Reform Act, 25 USC § 5602). Implementing the Proposed Action would have no adverse effects on Indian Trust assets.
Socioeconomics	Implementing the Proposed Action would not affect socioeconomics in the FBFA. The Proposed Action supports environmentally and culturally responsible growth and economic development. However, adopting the IRMP would not authorize any development. Future actions identified in the nine CLUPs and the Navajo Thaw Regional Recovery Plan (Native Builders, LLC 2020) are expected to be developed whether or not the Proposed Action is approved and the IRMP implemented. The IRMP includes robust integrated management techniques for protecting environmental and cultural resources in the FBFA. An *Economic Impact and Socioeconomic Analysis of the Former Bennett Freeze Area* was prepared by Triple Point Strategic Consulting to estimate the economic impacts within the FBFA that would result from implementing the Navajo Thaw Regional Recovery Plan and is provided as Appendix B. Future growth and development in the FBFA as identified in the nine CLUPs and the recovery plan would have beneficial socioeconomic impacts to area residents.
Wilderness	There are no Wilderness areas in the FBFA. Implementing the Proposed Action would have no effect on Wilderness areas.
Noise	Implementing the Proposed Action would not affect noise levels in the FBFA. In the future, should development be proposed which could substantially affect the noise levels in noise-sensitive areas, that development would be subject to site-specific analysis, and design features or other mitigation measures would be implemented to limit or avoid potential effects.
Visual Setting	Implementing the Proposed Action would not approve any site-specific development. Future development in the FBFA could affect the visual setting, particularly for viewers along roads and highways; however, these effects would be minimized by design features and other mitigation measures, if needed, as determined during the site-specific analysis.

Resource	Rationale for Not Discussing in Further Detail
Climate Change	Implementing the Proposed Action would not approve any site-specific development. Future development in the FBFA may result in greenhouse gas emissions, mainly during the construction of buildings or other infrastructure. There are no reasonably foreseeable actions that would be expected to result in appreciable increased levels of greenhouse gases. The incremental contribution to global greenhouse gases from future development cannot be translated into global climate change in the FBFA.
Hazardous Materials	Implementing the Proposed Action would not involve the use of hazardous chemicals. Hazardous materials would continue to be managed pursuant to federal and tribal regulations.
Public Health and Safety	Implementing the Proposed Action would not affect public health and safety. Each Chapter has identified the need for projects such as water, powerline, and other utility infrastructure; improved access to health services; increased housing; and sanitation services such as solid waste transfer stations, landfills, and wastewater treatment facilities. However, the Proposed Action would not authorize any site-specific projects and would have no adverse effect on public health and safety.

1.5 Consistency with other Plans, Permits, Authorizations, and Approvals

The AIARMA obligates the Secretary of the Interior to "conduct all land management activities on Indian agricultural land in accordance with goals and objectives set forth in the approved agricultural resource management plan, in an integrated resource management plan, and in accordance with all tribal laws and ordinances." (25 USC § 3712(a)). Therefore, the development, adoption, and implementation of the IRMP is in accordance with AIARMA and its implementing regulations (25 CFR Section 166.311, NNC Title 3) that require cooperation between the BIA and/or tribal governments to manage Indian agricultural and rangelands.

Title 2 of the NNC Section 501 (b) (7) authorizes the Resources and Development Committee of the Navajo Nation Council to report studies of natural resources for the protection and efficient utilization, management, administration, and enhancement of the Navajo Nation's resources. The Resources and Development Committee is the approval body for the IRMP. This law specifies that an integrated approach to resource management is necessary. The BIA consulted with the Resources and Development Committee to ensure the IRMP accurately reflects the Navajo Nation's policy and vision for the FBFA.

Title 26 of the NNC authorizes the Navajo Nation Chapters under the Local Governance Act to develop community-based land use plans using the standard guidelines to receive funding and address all community needs. The IRMP would be consistent with the Chapter Community Land Use Plans for the nine chapters in the FBFA.

The Navajo-Hopi Land Commission (NHLC) was codified by NNC Title 2, and the Office of Navajo and Hopi Indian Relocation was established by PL 93-531, as amended. In 1972, the NHLC office and Navajo Nation Land Commission (consisting of Navajo Nation Council Delegates under the Legislative Branch) were established. A plan of operation defines the roles and responsibilities of the offices and is updated periodically for both NHLC and Land Commission.

The BIA carries out its land management activities under AIARMA in accordance with applicable federal laws and regulations as well as tribal laws and regulations. Accordingly, adoption and implementation of the IRMP would be consistent with those applicable laws and regulations, which include, but are not

limited to, the list on the following pages. The Navajo Nation is currently developing an Agricultural Resource Management Plan through a self-determination agreement pursuant to AIARMA (25 USC § 3711(b)(1)(A)).

The level of detail and analysis in this PEA is broad in scope. Therefore, additional environmental analyses under the NEPA will be required for all future site-specific project proposals in the FBFA. When specific actions are considered, additional environmental evaluations would incorporate by reference the general discussions in this PEA and concentrate on the site-specific issues. This approach is known as "tiering" (40 CFR § 15001.11). The necessary environmental clearances and permits will be obtained before initiating construction activities of any subsequent development.

The environmental planning, consultation, and impact assessment processes have been integrated to comply with applicable federal and tribal regulations. The applicable laws that would need to be reviewed for consistency or required for environmental clearance for future ground-disturbing projects are listed below

- Agricultural Risk Protection Act of 2000 (PL 106-224)
- American Indian Agricultural Resource Management Act (PL 103-177; 25 USC Chapter 39)
- American Indian Religious Freedom Act (PL 95-341; Stat. 469 42 USC § 1996)
- Archaeological Resources Protection Act (PL 96-95; 16 USC § 470aa et seq.)
- Biological Resource Land Use Clearance Policies and Procedures (RCS-44-08)
- Carlson-Foley Act (PL 90-583)
- Clean Air Act (CAA) (PL 88-206; 42 USC § 7401)
- Clean Water Act (Federal Water Pollution Control Act) (PL 92-500; 33 USC §§ 1251-1151)
- Comprehensive Environmental Response, Compensation, and Liability Act (PL 96-510; 42 USC § 9601)
- Emergency Planning and Community Right-to-Know Act (PL 99-499; 42 USC § 11001 et seq.)
- Endangered Species Act (ESA) (PL 93-205; 16 USC §§ 1531-1544)
- Federal Insecticide, Fungicide, and Rodenticide Act (PL 61-152; 7 USC § 136 et seq.)
- Federal Land Policy and Management Act (PL 94-579; 43 USC Chapter 35)
- Federal Noxious Weed Act of 1974 (PL 93-629; 7 USC Chapter 61)
- Food, Conservation, and Energy Act (PL 110-234; 7 USC § 1926)
- Golden and Bald Eagle Nest Protection Regulations (RCS-42-08)
- Indian Affairs Manuals
- Indian Self-determination and Education Assistance Act, as amended (PL 93-638; 25 CFR Part 900)
- NEPA and CEQ regulations implementing NEPA
- National Historic Preservation Act (PL 89-665; 16 USC § 470(f) et seq.)
- National Indian Forest Resources Management Act (PL 101-630; 25 USC § 3101, et seq.; 25 CFR Part 163]
- Native American Graves Protection and Repatriation Act of 1990 (PL 101-601; 25 USC § 3001)

- Navajo Nation Air Pollution Prevention and Control Act (4 NNC 11)
- Navajo Nation Conservation and Wildlife Regulations (23 NNC 501)
- Navajo Nation Cultural Resources Protection Act (19 NNC 1001 et seq.)
- Navajo Nation Environmental Policy Act (4 NNC 9)
- Navajo Nation Fish and Wildlife Regulations (17 NNC 21)
- Navajo Nation Pesticide Act (4 NNC 3)
- Navajo Nation Policy to Protect Traditional Cultural Properties (2010)
- Navajo Nation Safe Drinking Water Act (22 NNC 1115)
- Navajo Nation Water Code (22 NNC 1101)
- Noxious Weed Control and Eradication Act (PL 108-412; 7 USC § 7781)
- Noxious Weed Coordination and Plant Protection Act (PL 106-224; 7 USC § 7701)
- Plant Protection Act (PL 106-224; 7 USC §7701 et seq.
- Resource Conservation and Recovery Act (PL 94-580; 42 USC § 6901 et seq.)
- Safe Drinking Water Act (PL 93-523; 42 USC § 300)
- Toxic Substances Control Act (PL 94-469; 15 USC Chapter 53)

1.5.1 Plan Implementation

A critical outcome of the FBFA IRMP planning process is that it results in a framework for managing the multitude of resources available within the FBFA. The framework developed through this process would be utilized by Navajo Nation and BIA resource managers to develop lower-level resource management plans such as Agricultural Resource Management Plans (ARMPs), Range Management Plans (RMPs), and/or Cropland Management Plans (Figure 1-1).

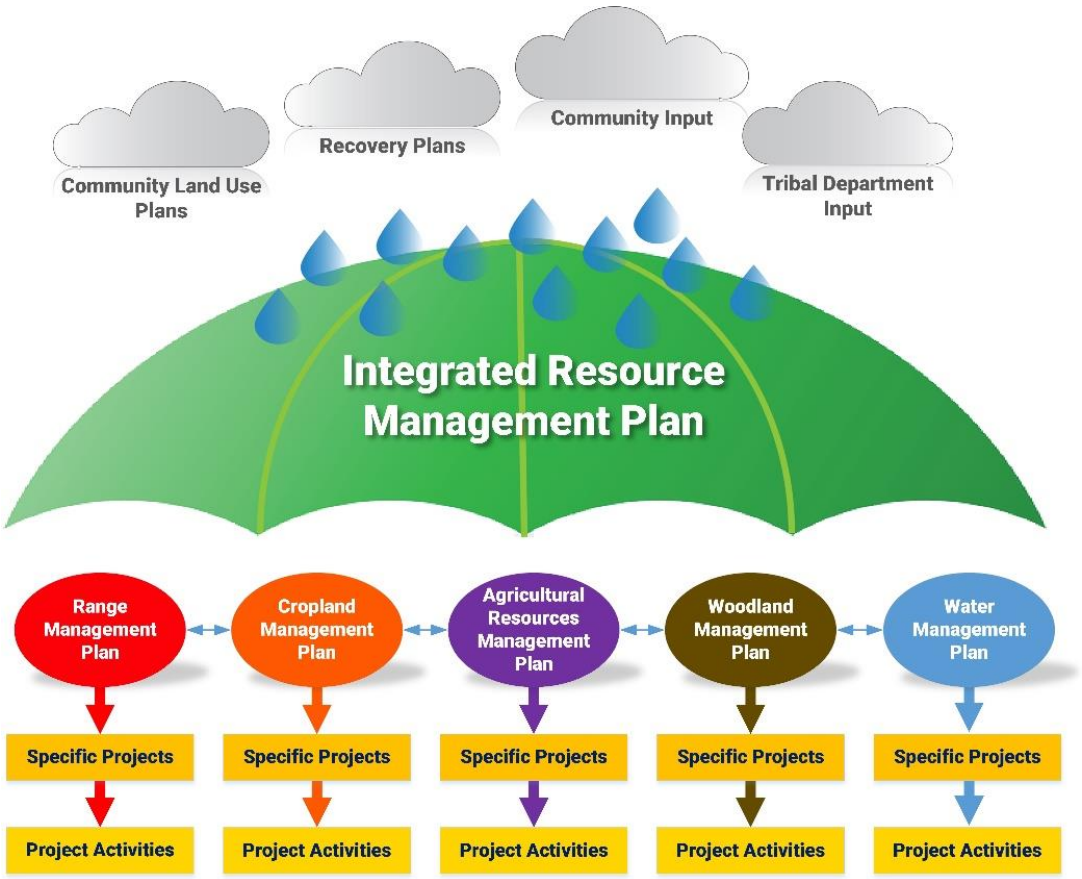

Figure 1-1. Integrated Resource Management Planning Process

The Navajo Nation and BIA would prepare and implement appropriate management actions consistent with the IRMP (e.g., range management plans, additional NEPA actions, conservation plans, annual work plans, etc.). The implementation process also includes the Navajo Nation's review of its existing regulations and codes to determine conformance with the IRMP. The IRMP is a living document and would be updated as determined by the Navajo Nation.

2. Proposed Action and Alternatives

This PEA is not the final review upon which approval of all actions in the FBFA would be based. Site-specific environmental analyses and additional NEPA compliance (i.e., Determination of NEPA Adequacy, Environmental Assessment (EA), or Categorical Exclusion) would be required for all site-specific actions. The scope of this additional approval process would be facilitated by the programmatic evaluation of the effects contained in this PEA. A list of eligible actions covered under Categorical Exclusions is provided in Appendix D.

2.1 No Action

Under the no action alternative, the IRMP would not be adopted and implemented to meet the FBFA goals and objectives for resource management. The BIA would not have a guiding document for the Secretary's land management activities carried out under AIARMA. Current land use and resource management activities would continue under existing laws and policies, land-use practices, management plans, and agreements. FBFA-wide planning and direction for desired development and land management would not occur, and Land Management Areas would not be delineated. There would be no long-range management plan based on Navajo Nation members' interests, needs, and concerns for their lands and natural and cultural resources.

2.2 Proposed Action – Balanced Growth Emphasis Alternative

The Proposed Action is the adoption of IRMP under the Balanced Growth Emphasis Alternative. This alternative supports environmentally and culturally responsible growth and economic development. The Balanced Growth Emphasis Alternative considers current Navajo Nation protection zones and restrictions on development and requires the more robust integrated management techniques identified in the IRMP. Development on FBFA land would conform to the goals and objectives of the IRMP. This alternative focuses on balancing growth and economic development with minimal impact on environmental and cultural resources.

The Balanced Growth Emphasis Alternative was developed to incorporate community goals and objectives of the affected communities while considering natural and cultural resources and existing infrastructure in the FBFA.

The IRMP will be a guiding document for the Secretary's land management activities pursuant to AIARMA. The IRMP serves as a guide and reference for land managers and Tribal members to direct and implement natural resource management. It is a planning tool to aid in FBFA recovery while effectively holistically managing natural resources. Each Chapter affected has unique goals and objectives for their community. The following is a summary of FBFA community goals based on the 2008 Recovery Plan and the nine CLUPs (WHPacific 2008a-j):

- Quality housing with dependable power and reliable potable water in both developed (urban centers) and rural areas within the FBFA
- Ability to foster safe communities with strong growth potential in the direction that each community sees fit

- Ability to provide gainful employment opportunities within the community for community members
- Provide lifelong educational opportunities to community members
- Economic opportunity that fosters education, training and provides jobs that support community desire to be self-sustaining and independent
- Easy access to health, medical, and social services
- Respect and honor for traditional values such as livestock grazing and agriculture while balancing the needs for growth and development within the community
- Protection of natural and cultural resources, historic properties, sacred sites, and sacred species

Each Chapter has identified both specific and general resource management and infrastructure development needs for their communities to address their goals and objectives. The types of infrastructure and development some or all Chapters identified in the 2008 Recovery Plan and their respective CLUPs include:

- Infrastructure/Utilities
- Transportation
- Housing
- Public Health and Safety
- Community Facilities
- Economic Development
- Education
- Open Space, Areas of Avoidance, and Grazing

2.2.1 Land Management Areas

The public clearly identified the need to protect natural and cultural resources and retain the rural nature of the FBFA for livestock grazing and agriculture while balancing the need for growth and development. The Land Management Area recommendations developed under the Balanced Growth Emphasis Alternative identify Conservation Areas, Development Focus Areas, Restricted Development Areas, and Agricultural Areas. These areas were derived from existing Navajo Nation policies and regulations, such as the Biological Resource Land Use Clearance Policies and Procedures. The analysis process used to determine the Land Management Areas is provided in Appendix E. The Land Management Areas are shown on Maps A-2 through A-6 in Appendix A.

Table 2-1 lists the proposed Land Management Areas, their approximate acreages, and percent of the total Navajo Nation land in the FBFA. The total acreage in Table 2-1 does not include any private land or other tribal inholdings such as Moenkopi or the San Juan Southern Paiute Area.

Table 2-1. Acreage of Proposed Land Management Areas in the Former Bennett Freeze Area

Land Management Area	Acres	Percent
Restricted Development	7,987	0.50
Development Focus	97,439	6.08
Conservation	576,314	35.98
Agricultural	919,850	57.43
Total	**1,601,590**	

Note: All acreages are approximations calculated using the best available data in geographic information systems software.

Conservation Areas

Conservation Areas are shown in blue on Maps A-2 through A-6 in Appendix A. These areas were derived to protect resources such as threatened or endangered species, biological preserves, and highly sensitive areas based on the Navajo Nation Department of Fish and Wildlife (NNDFW) and Wildlife Biological Resource Land Use Clearance Policies and Procedures. They are also designed to protect water quality in streams and other water sources based on a 0.25-mile buffer on primary streams and wetlands and a 0.5-mile buffer on springs, wells, and windmills.

Cultural resources, TCPs, and Navajo-Hopi Intergovernmental compact areas are not included in the Conservation Land Management Areas. Under the Proposed Action, these resources would continue to be protected through the existing permitting system, which requires cultural clearance for any proposed action.

While development is restricted in Conservation Land Management Areas, some developments such as scattered homesites, water, or other utility infrastructure may be approved on a case-by-case basis. Any development would continue to be subject to cultural and biological clearances, and additional best management practices (BMPs) or other mitigation measures to avoid or minimize effects to conservation resources may be identified during the permitting process.

Conservation Areas would also allow for permitted livestock grazing and agriculture.

Development Focus Areas

Development Focus Areas are shown in purple on Maps A-2 through A-6 in Appendix A. These areas include a 0.5-mile-wide corridor (0.25 mile on each side) along primary and secondary highways and roads, and buffers around communities such as Cameron and Tuba City, where development is proposed or expected to occur. Commercial and residential development in this Land Management Area would be easy to access, and other similar infrastructure such as water and utility lines would parallel existing roads and other disturbances. A priority for these areas would be the maintenance and development of water resources. Development Focus Areas would also allow for permitted livestock grazing and agriculture. The goals for Development Focus Areas would be to provide dependable, safe, and sustainable water, to improve the quality of life in tribal and native communities.

Restricted Development Areas

Restricted Development Areas are shown as orange on Maps A-2 through A-6 in Appendix A. These areas include abandoned uranium mines, floodplains, or other safety hazards where development or agriculture is discouraged. While these areas would not be suitable for residential or most commercial development, there is the potential for limited commercial development such as solar power generation facilities or other similar infrastructure. A priority for these areas would be monitoring and ensuring the long-term stability of uranium tailings sites.

Agricultural Areas

Agriculture Areas are shown in yellow on Maps A-2 through A-6 in Appendix A. Grazing, agriculture, scattered homesites, and open space land uses are recommended for these areas. The Little Colorado River and Marble Canyon Tribal Parks are within the boundaries of the FBFA. The Navajo Nation 2016 Homesite Leasing regulations restrict scattered homesite development within Tribal Parks. The goals for these areas would be to keep Navajo producers (ranchers and farmers) in compliance with the current Navajo Nation agriculture and grazing regulations; maximize development, productivity, and economical use of local farmland and irrigation water systems while ensuring their protection, conservation, and sustainability; and to implement integrated management activities that maintain or improve the ecological health of Navajo rangeland.

2.2.2 Management Actions

The goal of the IRMP is to create balanced natural resource management actions that reflect the social, cultural, economic, and natural resource values of FBFA residents. The IRMP supports community and Navajo Nation goals and promotes the sustainable development of FBFA resources by encouraging integrated resource management decision-making. Many of the management actions developed in the IRMP are related to improved interdisciplinary and interdepartmental communication protocols, data sharing, planning, organization, and public outreach and education.

This section lists the management actions that could result in surface disturbance and/or environmental effects. These management actions are applicable to the entire FBFA and not specific to any proposed Land Management Area. Future project-specific management actions that will result in surface disturbance will require additional site-specific environmental analyses under the NEPA.

Water

1. Quantify consumptive water use and demand in the FBFA based on current and future water demands to better identify water infrastructure deficiencies. Update annually.

2. Annually update existing inventories of water resources such as windmills, wells, storage tanks, stock ponds, and reservoirs.

3. Identify and monitor water sources that are safe for human and livestock consumption.

4. Identify and quantify system water loss and implement strategies to prioritize and combat system losses.

5. Conduct and prepare water availability studies and hydrologic assessments that can identify the best locations for well placement, surface water diversion, and water catchment systems.
6. Update, expand, and maintain water distribution systems to improve access to clean potable water.
7. Provide viable water supply alternatives.
8. Implement adequate protective buffers along Dobson Pond, Pasture Canyon Reservoir, lakes, streams, wetlands, and riparian zones and maintain the buffer zone identified by NNDFW to enhance and preserve water quality.
9. Limit access to riparian areas for grazing.
10. Inventory, conserve, restore wetlands, riparian areas, and natural springs.
11. Identify reaches along streams, rivers, and washes that need bank stabilization and other erosion mitigation.
12. Evaluate soil properties and determine best management practices and functions based on Natural Resource Conservation Service (NRCS) Ecological Site Descriptions.
13. Develop and implement sand dune migration mitigation where appropriate.

Agriculture

1. Develop different types of irrigated and dryland farming practices to maximize production and improve air, water, plant, and soil quality using US Department of Agriculture (USDA) NRCS conservation practices.
2. Identify areas of concern, implement restoration projects, and preserve productive areas.
3. Monitor, maintain, and evaluate specific conservation projects.

Noxious/Invasive Weeds

1. Coordinate weed removal efforts with adjacent landowners or managers, including state, local, and federal agencies, to prevent the further spread of weed populations.

Rangeland

1. Identify areas of concern, implement restoration projects, and preserve productive areas.
2. Restrict development such as solar and wind projects to areas where grazing is not conducive.
3. Use available technology to evaluate and monitor the condition of rangeland.
4. Continue to conduct and complete range inventories and monitoring every 10 years.

Woodlands

1. Inventory land to target priority areas that have denuded vegetation and loss and need restoration.
2. Conduct forest thinning activities within forestlands to provide room for tree growth, to help diversify vegetation base for wildlife species and reduce the risk of catastrophic wildland fire.
3. Reduce feral cows in forestlands.

Fish and Wildlife

1. Continue current monitoring efforts for sensitive wildlife and big game species and conduct habitat improvement projects to provide quality habitat where it has deteriorated.

3. Affected Environment and Environmental Consequences

This Chapter describes the environment that would be affected by implementing the alternatives described in Chapter 2 and the potential effects expected to result from implementing those alternatives. The affected environment described in this section focuses on the relevant major resources or issues that have the potential to be affected by the Proposed Action and the No Action Alternative. Affected environment descriptions reference and summarize the information in the Draft IRMP. For more information on the resources discussed in this Chapter, refer to the Final IRMP (NNDNR/BIA 2021).

It is important to note that the purpose of the IRMP is improved management and protection of natural resources on the FBFA. As such, the management activities are intended to have beneficial consequences for natural resources with minimal adverse effects.

3.1 Methodology for the Analysis

Programmatic environmental documents analyze effects on a broad scale, such as those resulting from proposed policies, plans, programs, or projects where subsequent specific actions will be implemented. NEPA analyses for subsequent actions are tiered to the programmatic NEPA review. Effects from implementing the Proposed Action in this Chapter are analyzed quantitatively where possible, and when necessary, qualitatively. The analysis considers the effects of the Proposed Action on the potentially affected environment and whether these effects are significant (40 CFR 1501.3(b). All future activities in the FBFA would be evaluated in detail on a site-specific basis when each project is proposed.

Effects can be either long term (permanent, residual) or short term (incidental, temporary) (40 CFR 1501.3(b)(2)(i). Short-term effects are sustained for only a limited time, and the environment usually reverts rapidly to the pre-construction condition. Effects may also be beneficial or adverse (40 CFR 1501.3(b)(2)(ii).

3.2 Past Actions, Reasonably Foreseeable Environmental Trends, and Planned Actions

Development within the FBFA was restricted for 40 years under the Bennett Freeze. The Freeze stopped the development of new homes, businesses, roads, schools, or utility infrastructure, and no structural maintenance could occur. Two exceptions to the ban were allowed. One was for the placement/development of water wells, which were to be approved by both Tribes, and the second was the inclusion of administrative safe zones where development could occur. These administrative safe zones were in Tuba City and Moenkopi, Arizona. Agriculture and livestock grazing permits were not canceled and continued in the FBFA during the Freeze. The Freeze was lifted in 2006.

The following reasonably foreseeable environmental trends and planned actions are considered in this analysis. The planned actions discussed in this section are not part of the Proposed Action but are reasonably foreseeable. Many projects outlined in the CLUPs for chapters located in the FBFA are either conceptual, in the study phase, or the preliminary design stage. Some projects have already been completed or are in the process of being permitting and completed. Because the exact project locations, types, and specifics are generally unknown, this analysis is programmatic. Additional details on

reasonably foreseeable environmental trends and planned actions may be found in Appendix B in the *Economic Impact and Socioeconomic Analysis of the Former Bennett Freeze Area* or in the Navajo Thaw Regional Recovery Plan available online at navajothaw.com (Native Builders, LLC 2020).

Population

In 2000, the collective population of the nine Chapters in the FBFA was 19,718. By 2010, the collective population of all nine chapters was 22,928, and the population within the boundaries of the FBFA was 7,874. In 2020, the nine Chapters' collective population in the FBFA was 20,425, and the population within the FBFA itself was 6,872. Rather than increasing, the population has decreased by 12.6 percent within the nine Chapters and by 12.7 percent within the FBFA (Appendix B). An increase in population in the FBFA would be expected with the development of new housing, community facilities, and commercial establishments.

Utility Infrastructure

While some utility infrastructure exists in the FBFA, additional water, electricity, and natural gas infrastructure is planned for all nine Chapters as outlined in each CLUP. Sewer lines (wastewater treatment facilities) and water and power upgrades for existing homes are also proposed by Chapters for some communities. Improved telephone, cell phone, and internet service are also needed in the FBFA. The Navajo Nation Water Management Branch is planning regional water infrastructure projects, including the Western Navajo pipeline and C-aquifer Leupp to Dilcon pipeline (Native Builders, LLC 2020).

Energy Development

Navajo Power is proposing to develop the Painted Desert Solar Project—a 750-megawatt photovoltaic solar-generating and battery energy storage system facility in the Cameron and Coalmine Canyon chapters, approximately 4 miles east of Cameron, Arizona. The Navajo Tribal Utility Authority is also proposing a solar facility near Cameron; there are no details on this project currently.

In March 2020, Pumped Hydro Storage, LLC filed an application with the Federal Energy Regulatory Commission (FERC) for a preliminary permit proposing to study the feasibility of Big Canyon Pumped Storage Project. The application was accepted for filing and soliciting comments, motions to intervene, and competing applications. A preliminary permit does not authorize the permit holder to perform any land-disturbing activities or otherwise enter upon lands or waters owned by others without the owner's express permission. The feasibility of the project is still being evaluated. The project could consist of the following: (1) a 450-foot-long, 200-foot-high concrete arch dam (Upper West Dam), a 1,000-foot-long, 150-foot-high earth filled dam (Middle Dam), and a 10,000-foot-long, 200-foot-high concrete arch dam (Upper East Dam), each of which would impound three separate upper reservoirs with a combine surface area of 400 acres and a total storage capacity of 29,000 acre-feet at a normal maximum operating elevation of 5,390 feet average mean sea level (msl); (2) a 600-foot-long, 400-foot-high concrete arch dam (Lower Dam) that would impound a lower reservoir with a surface area of 260 acres and a total storage capacity of 44,000 acre-feet at a normal maximum operating elevation of 3,790 feet msl; (3) three 10,000-foot-long, 30-foot-diameter reinforced concrete penstocks; (4) a 1,100-foot-long, 160-foot-wide, 140-foot-high reinforced concrete powerhouse housing nine 400-kilowatt pump-turbine generators; (5) a 1,000-foot-long, 120-foot-wide, 40-foot-high reinforced concrete tailrace; (6) three water supply wells

with a capacity of 700 horsepower each and a 1,800-foot-long, 36-inch diameter well water supply pipeline; (7) two new double circuit 500-kilovolt (kV) electric transmission lines that connect the project switchyard to the existing 500-kV and 345-kV transmission lines located 14 miles east of the proposed project; and (8) appurtenant facilities. The estimated annual power generation at the Navajo Nation Big Canyon Pumped Storage Project would be 7,900 gigawatt-hours. This project is not affiliated with the Navajo Nation (FERC 2020).

Transportation

Two United States (US) Highways (US 89 and US 160) and two Arizona State Highways (Highway 64 and Highway 264) traverse through the FBFA. No new highways or other transportation corridors are reasonably foreseeable. However, maintenance and improvement of existing routes in the FBFA have been proposed by each Chapter. Roads identified for improvement in the CLUPs include Route N10, Route N20, Route N609/N614, Route N619, Route N6331/N6330, and other roads within each Chapter. The 2020 Recovery Plan references the Tuba City Airport Layout Plan, which calls for $13.3 million in airport improvements (Native Builders, LLC 2020).

Housing

Each Chapter is planning new and renovated housing as outlined in their CLUPs. Housing will include clustered single-family homes, scattered single-family, and multi-family dwellings. Depending on the individual Chapter needs, women's shelters, group residential, and assisted living facilities are also planned.

Community Facilities

Reasonably foreseeable planned community facilities include educational facilities such as daycares, head start facilities, kindergarten through twelfth grade, and lifelong learning centers. Recreational facilities include playgrounds, parks, sports ballfields, picnic grounds, rodeo grounds, and recreation/wellness centers. There is also a need for multipurpose centers, senior centers, Chapter House renovations, animal shelters, post offices, veterans' centers, health care facilities, fire and police stations, and a tribal court. Medical facilities such as clinics and urgent care services and renovation and expansion of the Tuba City Regional Hospital are also planned by the Navajo Nation to improve public health.

Commercial Development

Commercial development expected to occur in the FBFA includes retail stores and restaurants, motel/hotel lodging facilities, tourism centers/museums, the Tuba City Business Information Center, and other Navajo-owned enterprises.

Agriculture and Grazing

Agriculture and livestock grazing would continue within the FBFA. Future trends include improving irrigation, repairing windmills, earthen dams, tanks, and developing other water sources for livestock. Bodaway Gap is working to develop primary water lines for livestock and agriculture to serve Cedar Ridge, Twin Hill, Pillow Hill, Tooth Rock, and Sam Willie.

The Little Colorado River Valley Farms Plan proposes to cultivate from 100 to 4,000 acres of fertile, irrigable soils adjacent to the river's alluvial aquifer.

The proposed Cameron Farm Enterprise would create a 133-acre enterprise farm to serve as a model for the Little Colorado River. The Cameron Chapter has received funding in a partnership with Tolani Lake Enterprises for this project. The project entails building infrastructure (fences, wells, solar power, pipes, and irrigation systems), developing policies for farming and community garden plots, hiring staff and recruiting youth growers, offering garden plots to families, planting and tending crops, offering beginning farmer training at an incubator farm, harvesting crops for market and community giveaways, celebrating the land, and learning to share with other communities.

Climate

Due to the region's arid climate, drought has been and will continue to be a major concern to the Navajo people (Navajo Nation Department of Water Resources 2003). Drought affects a wide variety of ecological processes vital to aquifer recharge, water quality, and other dynamics critical to the hydrologic environment.

Climate variability is likely to result in changes to the climate (e.g., temperature, precipitation timing, duration, intensity, and frequency), hydrology (e.g., snowmelt timing, streamflow), and ecosystems (e.g., species geographic distributions and population sizes) of the Navajo Nation. Much of the Navajo Nation economy and lifestyle are based on traditional practices such as livestock grazing (e.g., sheep, cattle, goats) and craft-making (e.g., weaving, jewelry production, artistry), all of which are likely to be impacted by climatic changes (Nania et al. 2014).

In the Navajo Nation, a long-term decrease in regional winter precipitation and regional annual precipitation has been observed starting in the 1930s (Redsteer et al. 2014). Warmer temperatures can influence evapotranspiration rates, leading to an overall decrease in available surface water features when combined with less annual precipitation. More than 30 percent of historical perennial water features on the reservation have disappeared or are ephemeral (Redsteer et al. 2014). Decreasing surface water availability translates to a decrease in water available for cities, agriculture, and ecosystems across the entire Navajo Nation, and drought and increased warming foster wildfires and increased competition for scarce water resources for people and ecosystems (Pryor et al. 2014).

3.3 Air Quality

3.3.1 Affected Environment

The Navajo Nation Environmental Protection Agency (NNEPA) has the authority to regulate sources of air pollution in the Navajo Nation through its Navajo Air Quality Control Program. The United States Environmental Protection Agency (USEPA) regulates criteria pollutants using the National Ambient Air Quality Standards (NAAQS), which establish ambient levels for each criteria pollutant using health and welfare-based criteria. The NAAQS are regulated to protect human health and the environment. The USEPA has set NAAQS for seven principal pollutants (“criteria” air pollutants): carbon monoxide (CO); nitrogen dioxide (NO_2); ozone (O_3); particulate matter equal to or less than 10 microns in diameter (PM_{10}); particulate matter equal to or less than 2.5 microns in diameter ($PM_{2.5}$); sulfur dioxide (SO_2); and

lead (Pb). There are two series of NAAQS. The “primary” standards are designed to provide an adequate margin of safety essential to protecting public health. The “secondary” standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of a criteria pollutant in the ambient air. The primary standards protect public health, and secondary standards protect public welfare by preventing property damage such as farm crops and buildings, visibility impairment in national parks and wilderness areas, and the protection of ecosystems.

The Navajo Nation monitors four criteria air pollutants: $PM_{2.5}$, O_3, SO_2, and NO_2. Two monitoring sites are currently operated on the Navajo Nation; one at Shiprock, New Mexico, and the other at Nazlini, Arizona. Neither of these monitoring sites are in the FBFA. The Navajo Nation is designated as Class II status and therefore is designated as "unclassifiable/attainment" for NAAQS for criteria air pollutants within Arizona, New Mexico, and Utah (NNEPA 2021). A Class II designation allows some deterioration of air quality, while a Class I designation allows significantly less air quality deterioration.

Air quality in the FBFA is affected by construction, vehicle and equipment emissions, fugitive dust (particulate matter) from traffic on unpaved roads, wood/coal burning stoves, open burning, wildfires, and wind-blown sand. Recurring drought and land management practices have caused reactivation and renewed growth of sand dunes in the FBFA and the Navajo Nation. Diminished vegetation cover and an increasingly arid environment have resulted in an increase in the extent of sand susceptible to mobilization. Additionally, regionally significant sand and dust storms are becoming commonplace during the spring (Hiza 2002).

3.3.2 Effects from the Proposed Action Alternative

The NNEPA would continue to regulate air pollution sources in the FBFA through its Navajo Air Quality Control Program, in accordance with the CAA, as amended. Implementing the IRMP would not approve any site-specific development. In the future, should development be proposed which would result in emissions requiring an air quality permit, it would be subject to site-specific analysis. Ground disturbance to construct homes, install utilities, improve roads, implement restoration projects, and other development may result in short-term increases in particulate matter ($PM_{2.5}$ and PM_{10}) and vehicle or equipment emissions during construction. BMPs would be implemented during construction to limit fugitive dust. These actions would be proposed individually over time and scattered throughout the FBFA and would not be expected to result in exceedances of NAAQS for criteria pollutants.

A population increase in the FBFA would be expected from building renovations and new housing, community facilities, commercial establishments, and other development, as well as installing utilities and other basic amenities. A goal for many Chapters is to increase tourism. More traffic would be expected to increase vehicle emissions resulting in long-term air quality effects. However, these emissions are not expected to result in exceedances of NAAQS for criteria pollutants.

Scattered homesites would continue to be leased in the FBFA outside of Tribal Parks. Residents may use coal or wood-burning stoves for heat which would adversely affect air quality. Over time, increased access to electricity from expanding power lines or standalone residential wind or solar power generation units may offset coal/wood burning impacts. However, based on the number of scattered homesites expected to be approved, these effects would likely be immeasurable and not expected to result in

exceedances of NAAQS for criteria pollutants. The development of solid waste disposal facilities would likely result in a long-term reduction in open burning and beneficial air quality effects.

Air quality may also be beneficially affected by the Proposed Action; however, these effects are not likely to be significant. Integrated management of soils, water, agriculture, and livestock grazing would improve rangeland ecological health by stabilizing soils and reducing wind-blown sand. Management actions such as developing and implementing sand dune migration mitigation would also serve to reduce wind-blown soil. No significant adverse or beneficial effects on air quality are expected from implementing the Proposed Action.

3.3.3 Effects from the No Action Alternative

Under the No Action Alternative, the IRMP would not be implemented. The NNEPA would continue to regulate air pollution sources in the FBFA through its Navajo Air Quality Control Program, per the CAA, as amended. Should a future development be proposed, which would result in emissions requiring an air quality permit, it would be subject to site-specific analysis and permitting through the NNEPA and USEPA, as required.

Effects on air quality from development and increased population would be the same as those described under the Proposed Action. However, integrated management of soils, water, agriculture, and livestock grazing as outlined in the IRMP would not occur. The management actions identified to improve rangeland ecological health by stabilizing soils and reducing wind-blown sand would not be implemented. Any beneficial long-term impacts on air quality from integrated resource management would not be realized.

3.4 Soils

3.4.1 Affected Environment

Soil management in the FBFA utilizes the USDA/ NRCS Soil Surveys and Ecological Site Descriptions as resources to guide decision making. Soils in the FBFA have formed from several different types of parent material (including shale, sandstone, and limestone) and alluvial, residual, and eolian sources.

Soil properties influence the development of building sites, the selection of sites, the design of the structure, construction, maintenance, and performance after construction. Most soils in the FBFA are rated as having very limited potential for small commercial development; however, some areas within the Bodaway-Gap, Coppermine, Kaibeto, Tonalea, Tuba City, and Coalmine Canyon Chapters, contain soils that would better support small commercial building development. The potential for traditional roadway (asphalt or concrete) development is similarly limited in the region. There are far more areas within the FBFA that are suitable for natural surface road systems or chemically treated (lithified) natural surface road systems than there are for traditional road systems (NNDNR/BIA 2021).

Soils are rated by the NRCS based on their susceptibility to degradation with the Fragile Soil Index (USDA/NRCS 2021). Fragile soils tend to be highly susceptible to erosion and can have a low capacity to recover after degradation has occurred. They are characterized by low organic matter, low water-stable aggregates, and an absence of structure. They occur on sloping ground, in arid and semi-arid regions,

have sparse vegetative cover and low biodiversity. Ratings are, from least fragile to most fragile: Not Fragile, Slightly Fragile, Moderately Fragile, Fragile, Highly Fragile, and Extremely Fragile (USDA/NRCS 2021). Of the 1.6 million acres of soils in the FBFA, 1.4 million are rated as Fragile or Highly Fragile (Table 3-1).

Table 3-1. Acres of Fragile Soils in the Former Bennett Freeze Area

Soil Type	Acres
Moderately fragile	9,855
Fragile	1,199,542
Highly fragile	193,067

Soil erodibility comprises the inherent properties of a soil that play a major role in soil erosion, including texture, structure, organic matter content, and permeability (USDA/NRCS 2011). The soil erodibility factor K quantifies the susceptibility of soil to erosion: soils high in clay have low K values, about 0.05 to 0.15, because they are resistant to detachment. Coarse textured soils, such as sandy soils, have low K values, about 0.05 to 0.2, because of low runoff even though these soils are easily detached. Medium textured soils, such as the silt loam soils, have moderate K values, about 0.25 to 0.4, because they are moderately susceptible to detachment and produce moderate runoff. Soils having a high silt content are the most erodible of all soils. They are easily detached, tend to crust, and produce high rates of runoff. Values of K for these soils tend to be greater than 0.4 (USDA/NRCS 2011). In the FBFA, 511,655 acres of soils have moderate or higher K values (Appendix A, Map A-7).

While most soils in the FBFA are not conducive to development or road construction based on soil limitations and erodibility—development can occur with soil reclamation, special design, or installation procedures.

3.4.2 Effects from the Proposed Action Alternative

Implementing the Proposed Action would not approve any site-specific development. The locations of future actions and exact area of disturbance is not known. Soils within the FBFA, particularly in the Development Focus Land Management Areas, presumably could be impacted depending on the nature of future actions. Development Focus Land Management Areas comprise approximately 6 percent (or 97,439 acres) of the FBFA and are where most surface disturbing activities are expected to occur—although surface disturbance could occur anywhere in the FBFA, depending on the type of development (e.g., waterlines or electric lines may cross multiple Land Management Areas). It should be noted that not all the acreage within Development Focus Land Management Areas is expected to be disturbed.

Approximately 26,000 acres of soils in the Development Focus Land Management Area have moderate or higher K values, as shown in Table 3-2. Soils with higher K values are highly erodible and subject to greater potential wind and water erosion.

Table 3-2. Acres of Highly Erodible Soils (Higher K Values) in the Former Bennett Freeze Area

Land Management Areas	K Greater than or Equal to 0.25 (Acres)
Development Focus	26,444
Conservation	163,682
Agricultural	315,402
Restricted Development	6,126

Soil stability and water infiltration capacity are dependent on vegetation cover (Meeuwig 1970). Surface disturbance exposes topsoil and other soil material to increased wind and water erosion. Soil disturbance may result in soil mixing and compaction. Once disturbed areas are stabilized—with permanent infrastructure (e.g., buildings, gravel, pavement) or revegetated—the potential for soil erosion is greatly reduced. Permanent infrastructure would increase the amount of impermeable surface and reduce infiltration, creating conditions for increased erosion and stormwater runoff. Future actions would implement BMPs before and after construction to minimize the impacts of erosion both in the short and long term. Long-term adverse effects on soils would be minimized by measures such as retaining native vegetation to the greatest extent possible and by reclaiming and replanting disturbed areas outside of permanent infrastructure.

Commercial agriculture can affect soils. Repeated tillage and heavy equipment operation cause the development of a compaction layer beneath the soil surface, which acts as a water infiltration barrier, increasing runoff. Tillage also disturbs soil microbial life, which is important for healthy native plant communities and increases soil loss through deflation (i.e., wind erosion). The Proposed Action would implement management actions to encourage the development and use of different types of irrigated and dryland farming practices to improve soil quality using NRCS conservation practices.

Rangeland overutilization by both authorized and unauthorized livestock, wildlife, and Navajo free-ranging horses can diminish vegetation cover, exposing soils to erosive forces (USDA/NRCS 2003). Drought and climate change may also contribute to soil erosion, and loss as vegetation cover and water availability are diminished. The Proposed Action would implement integrated rangeland, soil, water, and vegetation management actions to meet the goal of reducing the impacts from erosion, sustaining and improving soil quality, retaining plant and animal/microbial life above and below the soil surface, and rehabilitating soil damaged by land degradation.

Under the Proposed Action, NRCS soil survey reports and Ecological Site Descriptions would be used to identify BMPs based on soil classification and content. These BMPs would stabilize soils and reduce the potential for soil erosion.

Designating Conservation Land Management Areas in the FBFA would maintain and improve soil conservation and health by limiting development and requiring additional mitigation measures on a case-by-case basis. Approximately 36 percent (576,314 acres) of the FBFA would be designated as Conservation Land Management Areas. These areas are already subject to conservation practices under the NNDFW Wildlife Biological Resource Land Use Clearance Policies and Procedures. The designation of Conservation Land Management Areas is not likely to have significant beneficial effects. As shown in

Table 3-2, approximately 163,682 acres (28 percent) within the proposed Conservation Land Management Areas are classified as having highly erodible soils.

Integrated management actions implemented under the Proposed Action that would preserve and restore habitats would beneficially affect soil stability and reduce runoff and erosion. The Proposed Action would implement management actions to identify reaches along streams, rivers, and washes that need bank stabilization and other erosion mitigation. These restoration projects would result in long-term beneficial effects on soils in the FBFA; however, these effects are not likely to be significant. No significant adverse effects on soils are expected from implementing the Proposed Action.

3.4.3 Effects from the No Action Alternative

Under the No Action Alternative, the IRMP would not be implemented. Soils in the FBFA would continue to be subject to disturbance, mixing, and compaction from a suite of development, agriculture, livestock grazing, and the effects from drought resulting in continued wind and water soil erosion. The effects on soils from development, ongoing land use, and drought would be the same as those described under the Proposed Action.

However, integrated management of soils, water, agriculture, and livestock grazing as outlined in the IRMP would not occur. Integrated management actions identified to preserve and restore habitats that would beneficially affect soil stability and reduce runoff and erosion would not be implemented. There would be no coordinated effort to implement integrated rangeland, soil, water, and vegetation management actions to meet the goal of reducing the impacts from erosion, sustaining and improving soil quality, retaining plant and animal/microbial life above and below the soil surface, and rehabilitating soil damaged by land degradation.

3.5 Water Resources

3.5.1 Affected Environment

All water resources on the Navajo Nation are subject to the Navajo Nation Water Code and are managed by the Navajo Nation Department of Water Resources (NNDWR). The Navajo Nation has enacted the Navajo Nation Clean Water Act and Water Quality Standards and the Navajo Nation Safe Drinking Water Act. The NNEPA Public Water Systems Supervision Program has been delegated authority from the USEPA Region 9 to regulate Public Water Systems on the Navajo Nation through the Navajo Nation Safe Drinking Water Act. The NNEPA Public Water Systems Supervision Program is responsible for ensuring owners and operators of drinking water facilities provide safe drinking water to Navajo Nation residents through inspection, monitoring, and enforcement. The Navajo Nation Safe Drinking Water Act and the Navajo Nation Primary Drinking Water Regulations ensure drinking water protection by establishing appropriate drinking water quality standards called Maximum Contaminant Levels. The NNEPA Public Water Systems Supervision Program also provides technical assistance in determining protection zones around drinking water wells. Wellhead protection ensures communities are aware of the drinking water source or “wellhead” quality. This program ensures communities consider the environment when conducting development activities (NNDWR 2011).

The NNEPA administers Water Quality Certification (Clean Water Act [CWA] Section 401) on the Navajo Nation. Section 401 requires that any applicant pursuing a permit to conduct an activity that may result in a discharge of a pollutant must obtain a water quality certification (or waiver). Water quality certification requires evaluating water quality considerations associated with dredging or placement of fill materials into waters of the US and imposes project-specific conditions on development.

The USEPA administers the National Pollutant Discharge Elimination System (CWA Section 402) on tribal lands to protect the quality of water resources on the reservation. Construction activities that disturb more than 1 acre are regulated under the National Pollutant Discharge Elimination System General Permit for Discharges of Storm Water Runoff Associated with Construction Activity (General Construction Permit). Coverage under the General Construction Permit requires preparing a Storm Water Pollution Prevention Plan and Notice of Intent.

The United States Army Corps of Engineers (USACE) authorizes dredge and fill permits in waters of the US (CWA Section 404). Section 404 regulates the discharge of dredged and fill materials into waters of the US, which include oceans, bays, rivers, streams, lakes, ponds, and wetlands. Before any actions that may affect surface waters are implemented, a delineation of jurisdictional waters of the US must be completed, following USACE protocols, to determine whether a project area contains wetlands or other waters of the US that qualify for CWA protection. Project proponents must obtain a permit from USACE for discharges of dredged or fill material into jurisdictional waters of the US before proceeding with a proposed activity.

Watersheds within the FBFA boundaries include the Lower Colorado-Marble Canyon, Moenkopi Wash, Lower Little Colorado, and the Dinnebito Wash. Surface water resources within the FBFA consist of perennial streams, ephemeral streams, springs, and wetlands. The major surface water features within the FBFA are the Colorado River and the Little Colorado River. Utilizing these resources is complicated by many factors, including legal, environmental, flow variability, and quality (e.g., total dissolved solids concentrations). Water resources in the FBFA are shown on Map A-8 in Appendix A.

Other smaller sources of surface water in the FBFA are wholly ephemeral in nature and hardly considered reliable for municipal or domestic use. However, the ephemeral water bodies do play a role in water supplied for irrigation and livestock purposes.

Water quality issues associated with abandoned uranium mines (AUMs) in the Bodaway-Gap, Cameron, Coalmine Canyon, and Tuba City Chapters. These issues are in local pockets of alluvium and colluvium near the mine sites. No significant level of radionuclide contamination has been detected in the major source aquifers of the area. It is not clear if hydrologic connections exist between these localized aquifers and the deeper groundwater sources (NNDNR/BIA 2021). However, there have been levels of uranium, arsenic and other contaminants above the maximum contaminant levels detected in waters produced from aquifers in the FBFA (Ingram et al. 2020).

Other areas of concern for water quality include a lack of vegetation, overgrazing, road building, and trash dumping. Due to lack of landfills, trash dumping leads to widespread contamination of both surface and groundwater sources. Lack of vegetation, overgrazing, and roadbuilding contribute to erosion—one of the largest environmental factors affecting water quality in the area. Soil erosion leads to increased pollution and sedimentation in streams and rivers, causing declines in fish and other species.

The lack of infrastructure exacerbates water quality issues and creates higher risks to public health where livestock windmills may be more conveniently located than regulated drinking water sources. One of the most pressing needs is the expansion of infrastructure throughout the FBFA. The lack of infrastructure establishes the most significant water resource issue on the Navajo Nation that also contributes to poor economic development and a sustained poverty level. It is estimated that approximately 30 to 40 percent of households in the FBFA lack connection to a municipal and domestic water system (NNDWR 2011). This forces individuals and communities to depend upon low-quality water sources or water hauling for everyday uses.

Groundwater is more plentiful in the FBFA than surface water and has served as the primary source of drinking water supply for many years. Major groundwater supplies include the Coconino Sandstone (C-Aquifer), Navajo Sandstone (N-Aquifer), Dakota Sandstone (D-Aquifer), and the alluvium. Water quality in the D-Aquifer is generally poor and extends only into the Tuba City region in a small portion; the C-Aquifer is located at a considerable depth and overlain by the D- and N-Aquifers in most of northeastern Arizona (Brown and Caldwell 2016a).

In 2016, Brown and Caldwell prepared the Master Public Water System Plan for Tuba City Chapters. According to the plan, future demand for potable water in the Tuba City region—which includes the FBFA—was anticipated to grow at similar water use rates in surrounding communities in Arizona and based on anticipated residential, commercial, and industrial growth within the Chapters. Projected future potable water demand for the Chapters was developed based on current population estimates, the estimated population growth rate over the planning horizon, and projected future per capita water demand (Brown and Caldwell 2016b). Table 3-3 shows the project potable water demand growth for the nine chapters in the FBFA to 2040.

Table 3-3. Projected Tuba City Nine Chapters Region Average Annual Daily Water Demand

Year	Range of Average per Capita Daily Demand[1]	Projected Chapter Population	Average Chapter Daily Demand (gallons/day)
2013	34-114	22,723	1,805,200
2020	66-121	24,874	2,274,400
2030	90-131	28,302	3,073,100
2040	113-141	32,026	4,048,800

[1] Per capita demand was calculated from Navajo Tribal Utility Authority customer billing data for each of the 10 water systems in the study. The range listed represents the water system with the lowest per capita demand and the water system with the highest.

Source: Brown and Caldwell 2016b.

Currently, there is high unmet demand for potable water in the FBFA, and demand is expected to increase; however, not at the rates projected in the Brown and Caldwell (2016b) report since those projections were based on estimated population increases that have not materialized. In fact, the population in the FBFA has decreased since 2010. Should living conditions improve within the FBFA, population increases may reach those projected in the future.

3.5.2 Effects from the Proposed Action Alternative

3.5.2.1 Water Quality

One of the primary goals of the IRMP is to ensure projects prepare and implement surface water management as part of the project development in accordance with the tribal and federal water quality regulations. Implementing the Proposed Action would not approve any site-specific development.

While reasonably foreseeable planned actions may result in effects to water quality, these are not reasonably foreseeable effects from the Proposed Action. Surface water quality presumably could be affected during future development by increased sedimentation and/or the introduction of industrial fluids (e.g., diesel, gasoline, or oil) into local waterways. Ground disturbance would expose soils leading to an increase in an undetermined amount of sediment transport, particularly during and following storm events. Slight alterations in area drainage patterns may also lead to an increase in sediment transport. These effects would persist until areas are temporarily or permanently stabilized. There would be a potential for accidental spills or release of fluids that could impact local water quality. Reasonably foreseeable development in the FBFA could lead to an overall increase in runoff which, in some cases, could carry contaminants related to human activity such as excess nutrients from agricultural land and petrochemicals into local waterways. The potential for these effects would vary based on the type and location of an activity and would be avoided or minimized by implementing BMPs or other mitigation measures identified on a case-by-case basis when a specific project is proposed. Future actions may require CWA permitting, which would be identified at the time a project is proposed.

More agriculture in the FBFA could affect surface water quality caused by increased sedimentation in runoff. Long-term agriculture operations can create a compacted layer beneath the soil surface, which acts as a water infiltration barrier and increases runoff. Runoff from farms can carry soluble pollutants such as pesticides, herbicides, and chemical fertilizers downstream. The Proposed Action includes management actions to encourage the development of different types of irrigated and dryland farming practices to improve water quality using NRCS conservation practices. Rangeland overutilization affects water quality by reducing vegetative cover and exposing soils to erosion. Effects on water quality from continued agriculture and livestock grazing are not expected to result in exceedances of NNEPA or USEPA Water Quality Standards with the implementation of BMPs or other mitigation measures and the requirements for CWA permitting.

The Proposed Action includes management actions such as implementing protective buffers along Dobson Pond, Pasture Canyon Reservoir, lakes, streams, wetlands, and riparian zones to enhance and preserve water quality; limiting access to riparian areas for grazing; installing and maintaining structural BMPs during surface disturbance, and water quality monitoring. Implementing these management actions would have long-term beneficial effects on water quality; however, these effects are not likely to be significant.

Under the Proposed Action, reaches along streams, rivers, and washes that need bank stabilization and other erosion mitigation would be identified. Wetlands, riparian areas, and natural springs would be inventoried, restored if needed, and conserved. There would be short-term effects on water quality during stabilization and restoration efforts, mainly due to increased turbidity from sediment transfer. Effects on water quality from restoration and stabilization projects are not expected to result in exceedances of

NNEPA or USEPA Water Quality Standards as BMPs would be implemented to avoid adverse effects. Long-term insignificant beneficial impacts on water quality would result from stabilized soils and enhanced riparian habitats.

Restoration activities at springs or other groundwater sources could have short-term adverse effects on water quality but long-term beneficial effects on groundwater quality and availability. Ongoing efforts to monitor and ensure long-term stability of AUMs would continue and are not expected to affect groundwater quality. Illegal dumping would be expected to decrease by developing landfills and providing more solid waste transfer stations where residents can dispose of solid waste appropriately. Installing wastewater systems in communities or clustered developments would have beneficial long-term effects on groundwater quality. While the Proposed Action may result in beneficial effects, they are not likely to be significant. No significant adverse effects on water quality are expected from implementing the Proposed Action.

3.5.2.2 Water Quantity

Improved water distribution systems and better access to potable water would improve FBFA residents living conditions by reducing water hauling and reliance on poor-quality water sources used to meet daily needs. Increased population and economic growth in the FBFA would correlate to increased water use. Table 3-3 lists the average Chapter daily demand projected for the period between 2020 and 2040 (Brown and Caldwell 2016b). Based on these projections, estimated water demand would increase by 124 percent between 2013 and 2040. This is probably an overestimation since the projections were based on population growth estimates that are much greater than what is likely. Between 2010 and 2020, the population decreased in the FBFA rather than increased. Planned agriculture projects would also increase water use. However, there are no agricultural water demand projections.

The IRMP does not identify any specific projects that would use measurable amounts of water. Potable water demand is expected to increase whether the IRMP is implemented or not. Reasonably foreseeable planned actions in the FBFA, not contemplated in the IRMP, are expected to result in increased water use. While reasonably foreseeable planned actions may result in effects to water quantity, these are not reasonably foreseeable effects from the Proposed Action.

Potential effects on water quantity from increased use for reasonably foreseeable planned actions would result in long-term and irretrievable effects on the resource. Increased potable water demand may be met by surface or groundwater sources. However, it is unknown when, where, or from what source or the actual water quantity needed to meet future demand or actions. In the future, when a project is proposed, it would be subject to site-specific NEPA analysis, and the effects from water depletion or withdrawals would need to be analyzed at that time.

Under the Proposed Action, management actions would serve to minimize effects on water quantity. The actions include quantifying consumptive water use and demand in the FBFA based on current and future water demands to better identify water infrastructure deficiencies and identifying and quantifying system water loss and implementing strategies to prioritize and combat system losses. The Proposed Action is not expected to result in significant effects on water quantity.

3.5.3 Effects from the No Action Alternative

Under the No Action Alternative, the IRMP would not be implemented. Effects on water quality would be similar to those described under the Proposed Action. Ongoing efforts to monitor and ensure long-term stability of AUMs would continue and are not expected to affect groundwater quality.

However, management actions such as protective buffers along ponds, reservoirs, lakes, streams, wetlands, and riparian zones enhance and preserve water quality; limiting access to riparian areas for grazing; installing and maintaining structural BMPs during surface disturbance, and water quality monitoring would not be implemented. Reaches along streams, rivers, and washes that need bank stabilization and other erosion mitigation would not be identified. Wetlands, riparian areas, and natural springs would not be inventoried, restored, or conserved. Any long-term beneficial effects on water quality from these actions would not occur.

Under the No Action Alternative, effects on water quantity would be similar to those described under the Proposed Action because these effects would primarily occur from reasonably foreseeable environmental trends and planned actions. In the future, when a project is proposed it would be subject to site-specific NEPA analysis, and the effects from water depletion or withdrawals would be analyzed at that time. However, the management actions outlined in the IRMP designed to minimize water quantity effects would not be implemented. These actions include quantifying consumptive water use and demand to better identify water infrastructure deficiencies, identifying and quantifying system water loss, and implementing strategies to prioritize and combat system losses.

3.6 Vegetation

3.6.1 Affected Environment

The IRMP identifies and details five vegetation communities in the FBFA: woodland, desert shrubland, grassland, riparian forest, and wetland/open water. The majority of vegetation in the FBFA is classified as Great Basin desert scrubland (NNDNR/BIA 2021).

Noxious weeds have impacted every habitat on the Navajo Nation, which has affected the Navajo people's economic, historic, and cultural livelihood. Because of noxious weeds on rangelands, the overall capacity of the land to support livestock and wildlife has been reduced (Lym and Kirby 1987). Noxious weeds can alter soil temperature, soil salinity, water availability, nutrient cycles and availability, native seed germination, water infiltration, and precipitation runoff (DiTomaso 2000; Lacey et al. 1989). Monocultures of noxious weeds can cause greater risk of catastrophic fires, causing further declines in native shrubs and grasses. Species such as camelthorn can cause economic damage to infrastructure. This species and others can grow through surfaces impenetrable to other plants, including pavement, concrete, and the foundations of houses and buildings (USFS 2017).

The expansion of noxious weeds within riparian areas is also a concern. Woody noxious species such as tamarisk and Russian olive have formed dense monocultures within many riparian areas on the Navajo Nation, limiting biodiversity. The introduction of the tamarisk leaf beetle and its subsequent migration in the Navajo Nation's riparian corridors has left many areas devoid of living plant material. The monocultures of the dead, standing tamarisk in riparian areas increase the risk of wildfire.

The BIA Noxious Weed Control program was initiated in December 1988 in response to congressional directives for improved management on Indian lands. The Noxious Weed Eradication program's primary function is to provide resource protection on trust lands in compliance with the AIARMA and the Plant Protection Act.

The BIA NRO has initiated efforts to control specific target noxious weeds on the Navajo Nation using various methods. In 2009, the BIA NRO created a list of target noxious weed species to prioritize weed management projects. There are 15 High Priority (A) species, two Medium Priority (B) species, and four Low Priority (C) species on the list. High Priority (A) weeds have a potential for widespread expansion and are weeds that the BIA and Navajo Nation consistently request funding for treatment. Medium Priority (B) species are non-native noxious weeds that may occur in isolated patches. Emphasis for these weeds is on immediate control, prevention of seed spread, and eradication. Low Priority (C) species are normally widespread and well established but are not a high priority due to limited weed funding.

The BIA Noxious Weed Control Program has continued to assist land users but without a coordinated and systematic approach towards addressing weed issues. The current approach is driven by consent from the land user through project coordination with the local BIA Noxious Weed Coordinator and resolutions from the local Chapter. This approach has resulted in responsive efforts as opposed to a strategic approach to weed management. Current weed management projects also do not adequately provide treatment methods for preventing and controlling the spread of current populations into non-impacted sites. This leaves many Navajo Nation areas vulnerable to infestation, especially along roads or waterways or in agricultural and development areas.

In 2012, the BIA NRO determined the need for an integrated and coordinated management plan that utilized methodical, science-based strategies to actively monitor and control noxious weeds. In conjunction with developing a weed management plan, NRO determined that compliance with the NEPA was necessary to facilitate discussions with the public regarding the potential impacts of weed management. The BIA is currently preparing a Programmatic Environmental Impact Statement to evaluate the effects of implementing the Integrated Weed Management Plan prepared in 2013.

3.6.2 Effects from the Proposed Action Alternative

Ground disturbance would have both short- and long-term effects on vegetation. Removal of vegetation could alter macro- and micro-vegetation elements, stimulation of the seed bank, and the establishment of annual plant communities dominated by exotic or invasive species, changes to soil structure, soil compaction, and increased erosion (Lovich and Bainbridge 1999). Development Focus Land Management Areas comprise approximately 6 percent (97,439 acres) of the FBFA. They are where most surface-disturbing activities are expected to occur—although surface disturbance could occur anywhere in the FBFA, depending on the type of development (e.g., waterlines or electric lines may cross multiple Land Management Areas). Future projects would use BMPs to limit vegetation removal, reseeding, or chemical/mechanical noxious weed treatments before and after construction to minimize adverse effects on vegetation.

Under the Proposed Action, management actions would have long-term beneficial effects on vegetation in the FBFA. Establishing conservation areas, improving woodland management practices, preserving and restoring riparian and wetland ecosystems, and employing integrated noxious weed management would

benefit vegetation community health. The Proposed Action would implement integrated rangeland, soil, water, and vegetation management actions to meet the goal of limiting the spread of invasive noxious weeds and other undesirable vegetation. Under the Proposed Action, no significant adverse or beneficial effects on vegetation are likely.

3.6.3 Effects from the No Action Alternative

Effects on vegetation from the No Action alternative would be similar to those described under the Proposed Action. However, management actions to establish conservation areas, improve woodland management practices, preserve and restore riparian and wetland ecosystems, and integrated weed management would not be implemented. Integrated rangeland, soil, water, and vegetation management actions to meet the goal of limiting the spread of invasive noxious weeds and other undesirable vegetation would not be implemented.

3.7 Wildlife

3.7.1 Affected Environment

The NNDFW has prepared a development planning tool to avoid biologically sensitive areas throughout the Navajo Nation. Areas in the Navajo Nation are categorized according to the potential impact of development on wildlife and their habitats in those areas. This designation is part of the Biological Resource Land Use Clearance Policies and Procedures. The six wildlife areas include:

1. **Highly Sensitive Areas**—contain the best habitat for endangered and rare plant, animal, and game species, and the highest concentration of these species on the Navajo Nation. The purpose of this area is to protect these valuable and sensitive biological resources to the maximum extent practical.

2. **Moderately Sensitive Areas**—This area has a high concentration of rare, endangered, sensitive, and game species occurrences or has a high potential for these species to occur throughout the landscape. The purpose of this area is to minimize impacts on these species and their habitats and to ensure the habitats in Area 1 do not become fragmented.

3. **Less Sensitive Areas**—This area has a low, fragmented concentration of species of concern. Species in this area may be locally abundant on "islands" of habitat; however, islands are relatively small, limited in number, and well-spaced across the landscape. However, the NNDFW recognizes that lands within Area 3 may not be completely surveyed for the potential occurrence of sensitive species or habitats.

4. **Community Development Areas**—The NNDFW has determined that areas around certain communities do not support the habitat for species of concern, and therefore development can proceed without further biological evaluation. Whenever possible, the NNDFW recommends that project sponsors attempt to locate their projects within Community Development Areas.

5. **Biological Preserve Areas**—These areas contain excellent, or potentially excellent, wildlife habitat and are recommended by the NNDFW for protection from most human-related activities, and in some cases, are recommended for enhancement. To date, only a few of these areas have been identified or

designated. Future areas will be identified on a case-by-case basis. A variety of protection and enhancement techniques are available, and the NNDFW is interested in working with the Chapter and land user to protect/enhance these habitats by providing technical assistance and possibly materials and labor. The NNDFW is interested in receiving proposals from Chapters and land users for these types of areas. Ultimately, the NNDFW maintains the authority for designating and managing biological preserves. However, the NNDFW may delegate certain management responsibilities to the local level under their oversight.

6. **Recreation Areas**—These areas are used for recreation that involves wildlife or has potential for development for this purpose. Recreation can involve consumptive and/or non-consumptive uses of wildlife resources and is often a part of a broader outdoor experience. Examples include fishing lakes, camping and picnic areas, and hiking trails. Several areas have been identified as Recreation Areas. Future areas will be identified on a case-by-case basis. A variety of management techniques are available, and the NNDFW is interested in working with the Chapter and land user to develop and/or manage these areas. The NNDFW is also interested in receiving proposals from Chapters and land users for these types of areas. Ultimately, the NNDFW maintains the authority for designating and managing recreational areas that involve wildlife. However, the NNDFW may delegate certain management responsibilities to the local level under NNDFW oversight. The NNDFW encourages Chapters to plan development in this area compatible with the purpose, for example, nature trails, interpretive displays, and picnic areas.

In 2011, the NNDFW began developing a long-term strategic plan to guide wildlife management in the Navajo Nation. Given the limited resources for managing and monitoring species and ecosystems, a set of highest-priority species, ecosystems, or vegetation communities were selected to focus on future NNDFW management activities (NNDNR/BIA 2021).

The 11 highest priority wildlife species identified by the NNDFW are:

1. American black bear (*Ursus americanus*)
2. bobcat (*Lynx rufus*)
3. Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*)
4. coyote (*Canis latrans*)
5. desert bighorn sheep (*Ovis canadensis nelsoni*)
6. golden eagle (*Aquila chrysaetos*)
7. Gunnison's prairie dog (*Cynomys gunnisonii*)
8. Merriam's wild turkey (*Meleagris gallopavo merriami*)
9. mountain lion (*Puma concolor*)
10. mule deer (*Odocoileus hemionus*)
11. Rocky Mountain elk (*Cervus elaphus nelson*)

The Navajo Natural Heritage Program (NNHP), a division of the NNDFW, has implemented management plans to protect nesting ferruginous hawk (*Buteo regalis*) and Mexican spotted owl (*Strix occidentalis lucida*) populations on the Navajo Nation. Both species are of cultural significance to the Navajo Nation. The ferruginous hawk guidelines limit the level of human activity and development near occupied and unoccupied nests. The guidelines also establish a system of cataloging nest locations and criteria for

removing dilapidated nests from the catalog (NNHP 2021). Other regulations protecting species of cultural significance include the NNDFW Bald and Golden Eagle Nest Protection Regulations.

3.7.2 Effects from the Proposed Action Alternative

Under the Proposed Action, 36 percent or (576,314 acres) in the FBFA would be designated as Conservation Land Management Areas. These areas incorporate Biological Preserves, Highly Sensitive Areas, and Moderately Sensitive Areas identified in the NNDFW Wildlife Biological Resource Land Use Clearance Policies and Procedures; therefore, these areas are already subject to conservation practices. The designation of Conservation Land Management Areas is not likely to have significant effects. There would be no change in the Biological Resource Land Use Clearance Policies and Procedures and how they are implemented in the FBFA. Continued management under this policy would serve to avoid or mitigate impacts on wildlife. There would be no change to existing regulations to protect species of cultural significance.

Under the Proposed Action, Development Focus Land Management Areas would comprise approximately 6 percent (or 97,439 acres) of the FBFA and are where most surface-disturbing activities would be expected to occur—although surface disturbance could occur anywhere in the FBFA, depending on the type of development (e.g., waterlines or electric lines may cross multiple Land Management Areas). Implementing the Proposed Action would not approve any site-specific development.

Land disturbance and vegetation removal would result in wildlife habitat loss. Vegetation removal reduces the extent or quality of wildlife habitat in terms of food and cover, resulting in direct habitat loss. The effectiveness of habitat is lost when a species abandons or avoids an area. Because avoided areas meet no survival needs, the areas are no longer considered effective habitat. Periodic human activity and noise from development activities and along roads could cause animals to shift activity away from disturbed areas (Watson 2005; Hebblewhite 2011). Ground disturbance could also result in the introduction or spread of weeds that can alter habitat use and effectiveness.

Effective habitat loss can result in habitat fragmentation and interference with movement. By consolidating development near existing roads and infrastructure in Development Focus Land Management Areas, adverse effects on wildlife are reduced by minimizing habitat fragmentation. Habitat fragmentation alters wildlife distribution across the landscape and can affect many of their life functions such as feeding, courtship, breeding, and migration. The severity of impacts on wildlife would vary based on each species' life history requirements and characteristics. Species with more extensive home ranges such as mule deer, or species able to exploit a range of habitats such as small rodents, would generally be less affected by habitat loss than those with more specialized habitat requirements.

As human activities increase in the FBFA, the potential for human-wildlife encounters and conflicts increases. Possible conflicts could include human encounters with large predators, such as black bears and mountain lions. Wildlife could be injured or killed from vehicle collisions or other activities.

Potential changes to water quality and quantity could adversely affect wildlife. Disturbed soils could result in increased sedimentation in waterways. There would be the potential for accidental spills or releases, which, if substantial and near surface waters, could result in reduced water quality. Surface water quality changes could result in direct mortality of fish or depletion of food sources (e.g., aquatic

macroinvertebrates and periphyton). Changes to water quality from spills, leaks, or sedimentation would be short term since dilution would occur during downstream transport through the system. While sediment increases would also dilute during transport, slowing velocities would allow particles to settle, which could result in short- to long-term impacts to stream channel substrate composition, texture, and chemistry (Osmundson et al. 2002). Sedimentation could indirectly impact fish by reducing the quality of habitat for invertebrates that inhabit interstitial spaces of gravel streambeds and spawning habitat.

Under the Proposed Action, wildlife and habitat would be beneficially affected in the long term by integrated resource management. Management actions would include implementing protective buffers along ponds, reservoirs, lakes, streams, wetlands, and riparian zones to enhance and preserve water quality; limiting grazing access in riparian areas; restoring wetlands, riparian areas, and natural springs; conducting habitat improvement projects to provide quality habitat where it has deteriorated; and continuing monitoring efforts for sensitive wildlife and big game species. These effects are not likely to be significant.

Implementing the Proposed Action would not approve any site-specific development. Future activities or development would be permitted on a case-by-case basis and would follow the existing Biological Resource Land Use Clearance Policies and Procedures. Best management practices or additional mitigation measures would be implemented to avoid or minimize effects on wildlife and their habitats. With adherence to the existing policy and implementing BMPs and mitigation measures, no significant effects on wildlife are anticipated.

3.7.3 Effects from the No Action Alternative

Effects on wildlife from the No Action alternative would be similar to those described under the Proposed Action. There would be no change in the Biological Resource Land Use Clearance Policies and Procedures and how it is implemented in the FBFA. Continued management under this policy would serve to avoid or mitigate impacts on wildlife. There would be no change to existing regulations to protect species of cultural significance.

Development would continue to occur in the FBFA under existing tribal regulations and policies. Wildlife and their habitats would continue to be affected by habitat loss, modification, disturbance, human/wildlife encounters, and vehicle collisions.

However, under the No Action alternative, there would be no long-term beneficial effects to wildlife and habitat by implementing integrated resource management. Management actions such as implementing protective buffers along ponds, reservoirs, lakes, streams, wetlands, and riparian zones to enhance and preserve water quality; limiting grazing access to riparian area; restoring wetlands, riparian areas, and natural springs; conducting habitat improvement projects to provide quality habitat where it has deteriorated; and continuing monitoring efforts for sensitive wildlife and big game species would not be applied.

3.8 Agriculture

3.8.1 Affected Environment

The Navajo Nation and the BIA are responsible for managing all agricultural activity on the Navajo Nation as regulated by the AIARMA (25 USC §§ 3711, 3712, and 3715; 25 CFR Part 167; and NNC Title 3. These regulations are designed to preserve natural resources in the Navajo Nation. The management of rangeland resources and dryland farms is supported by the Navajo District Grazing Committees, Navajo Nation Resource Development Committee, and the Navajo Nation Western Farm Board supports the irrigated farms/croplands. These two entities comprise local elected members of the community that serves as a conduit between the government and the agricultural producers.

There are numerous cropland areas where a variety of traditional crops are grown. The Tuba City/Moenkopi Irrigation project is in the Kerley Valley area of the FBFA. The irrigation area is utilized by the Navajo and Hopi tribal members. This irrigation project is considered an intermittent water source, as its source is diverted from the Moenkopi Wash by a historic diversion dam. In the croplands, west of Tuba City, are small spring-fed irrigation projects and orchards and vineyards. Most of the crops grown in these areas are for seasonal consumption and personal use by the families who grow the crops. Crops not used by the immediate families are marketed locally along roadways and at flea markets and seasonal farmers' markets (NNDNR/BIA 2021).

Primary crops in the FBFA are corn, vegetables, melons, and squash, with a small number of farms producing hay and silage for livestock feed (USDA 2019). Of the nine chapters in the FBFA, Bodaway-Gap, Tonalea, Tuba City, and Kaibeto reported the largest number of farms in the 2017 USDA Agricultural Census, respectively. Cameron, Tolani Lake, and Leupp reported the fewest farms, respectively, with Cameron reporting zero farms in 2017 (USDA/NASS 2019).

Agricultural Land Use Permits (ALUPs) were established on the Navajo Nation for the purposes of:

- Demonstrating methods of agricultural production, farm management and crop marketing, irrigation management, and other measures
- Promoting accurate agricultural product and land management recordkeeping
- Monitoring and preventing plant disease
- Protecting the Navajo Nation’s food supply and agricultural markets

There are two types of ALUPs depending on whether the land is irrigated or not. ALUPs enable permit holders to use specific land areas for agricultural use, such as crop cultivation, greenhouses, irrigation, and related agricultural activities.

Administration and processing of ALUPs are authorized by 25 USC § 3715 and NNC Title 3 Farm Board Sections 61-69, 151-154, 171-176 (clustered farmlands). The BIA management of Navajo ALUPs is authorized under Article V of the Treaty with the Navajo Tribe of Indians of June 1, 1868.

The District Grazing Committees oversee scattered/dryland farmlands across the Navajo Nation. The District Grazing Committee and Major Irrigation Farm Board have the authority to enforce and carry out the management duties and responsibilities for small, irrigated projects and scattered farm acreage within

their districts. Whereas the applications for irrigated farmlands for the Tuba City/Moenkopi Irrigation Project (i.e., historic Vanzee and Moenave farmlands) are submitted through the Western Agency's Major Irrigation Farm Board (NNDNR/BIA 2021).

In the FBFA area of Western Navajo Agency, 201 ALUPs have been issued, encumbering 1,190 acres of Tribal Trust land (NNDNR/BIA 2021).

3.8.2 Effects from the Proposed Action Alternative

Under the Proposed Action, the main goal is to maximize development, productivity, and economical use of local farmland and irrigation water systems while ensuring their protection, conservation, and sustainability. Agriculture Land Use Permits would continue to be maintained and permitted in the FBFA. Less than 0.01 percent of the FBFA is currently encumbered under active ALUPs. With the addition of future planned actions such as the Cameron Chapter Cameron Farm Enterprise, approximately 3 percent of the FBFA would be actively farmed. The Agricultural Land Management Areas identified under the Proposed Action include open space for agriculture and livestock grazing and comprise approximately 57 percent of the FBFA. Conservation Areas and Development Focus Areas would also allow for ALUPs or other agriculture.

Under the Proposed Action, agricultural areas of concern would be identified for restoration to preserve productive areas. Restoration or conservation projects would be monitored and maintained. Best management practices would also be initiated to identify and prevent the expansion of existing infestations of target weed species and quickly prevent the spread of new high-priority weed species in the FBFA. In the future, an Agricultural Resource Management Plan, Cropland Management Plan, and individual conservation plans would be developed to address site-specific BMPs and other actions to ensure resource protection and sustainability. The Proposed Action does not approve any restoration/conservation projects or management plans. Those will be subject to separate NEPA analyses.

The Proposed Action would implement integrated management actions related to soils, water, noxious/invasive weeds, and other resources to meet land management goals. Additional management actions related to agriculture identified under the Proposed Action include:

- Inventorying/managing ALUPs and monitoring annually for adherence
- Developing different types of irrigated and dryland farming practices to maximize production and improve air, water, plant, and soil quality using USDA NRCS conservation practices
- Utilizing NRCS-approved conservation practices to promote best management practices to Navajo farmers
- Utilizing management strategies to increase crop yields based on USDA NRCS and Cooperative Extension programs

Applying these management actions would have beneficial long-term effects on agriculture in the FBFA. These effects on agriculture are not likely to be significant.

3.8.3 Effects from the No Action Alternative

Agriculture Land Use Permits would continue to be maintained and permitted in the FBFA. However, the integrated management actions related to soils, water, noxious/invasive weeds, and other resources to meet land management goals would not be applied. The beneficial long-term effects on agriculture from implementing these management actions would not occur.

3.9 Livestock Grazing

3.9.1 Affected Environment

Livestock production is an important industry in terms of economic benefit and a cultural way of life for the Navajo people. Maintaining the long-term viability of rangelands is essential for supporting the long-term health of livestock, and the long-term financial gains of permit holders, many of whom depend on grazing as an important source of livelihood. Viable rangelands also provide for the continued health of the environment by supporting healthier air, water, and soil resources.

Land Management Districts (LMDs), also known as Grazing Districts, were established for the Navajo Nation in 1937 (NNDNR/BIA 2021). The LMDs in the FBFA are shown on Map A-9 in Appendix A. In addition, the LMDs were established so administrators could better address Navajos' problems and interests on a smaller scale than the Navajo Nation as a whole. The FBFA is situated in three Land Management Districts—1, 3, and 5. Livestock grazing on the Navajo Nation requires an individual to possess a valid grazing permit issued by the BIA based on a Navajo Nation District Grazing Committee's recommendation.

Stocking rates are correlated with carrying capacities in the LMDs to prevent overgrazing. The carrying capacities within the LMDs in the FBFA were determined by rangeland inventories which are based on Ecological Site Descriptions utilizing NRCS methodology. Livestock, wildlife, and feral Navajo free-ranging horses graze different forage species and have different manners of grazing. Navajo Nation grazing permit holders must reserve 25 percent of available forage in their customary use areas for wildlife (NNDNR/BIA 2021). NRCS and local range management experts recommend reserving 50 percent of the available forage to provide adequate leaf and root mass to produce more forage, maintain plant health, protect the soil, and for wildlife (NNDNR/BIA 2021). The rangeland inventories were conducted for LMD 5 in 2007 and 2016, LMD 1 and 3-2 in 2008 and 2015, and LMD 3 in 2014. Range inventories are used to determine range trends and conditions.

If a site has too many animals on it for too long, desired forage species for each animal will become overgrazed. Over-stocked rangeland can become overgrazed, which weakens the ability of preferred forage species to reproduce and regrow on a site, resulting in a reduction of their percent composition. If such losses continue, noxious weeds and other disturbance-prone plant species can re-colonize, reducing the forage availability.

In the FBFA, 723 Navajo Grazing Permits allow for 43,024 Sheep Units Year Long (SUYL) (NNDNR/BIA 2021). Each SUYL is defined as one ram, or one ewe and her un-weaned lamb. An annual grazing permit compliance check found a total of 57 grazing permits in the FBFA were non-compliant

(over-stocked), and 90 permits were in dispute at the time of the check (NNDNR/BIA 2021). Table 3-4 lists the Land Management District 3 livestock tally count records.

Table 3-4. Land Management District 3 Livestock Tally Count Records for 2019 and 2020

	2019/Sheep	2019/Cattle	2019/Horses	2020/Sheep	2020/Cattle	2020/Horses
LMD 3-1	439	578	84	482	677	97
LMD 3-2	1,006	1,334	69	627	1,179	47
LMD 3-3	1,457	867	48	1,093	518	32
LMD 3-4	762	454	65	830	458	53
Total	**3,664**	**3,233**	**266**	**3,032**	**2,832**	**229**

3.9.2 Effects from the Proposed Action Alternative

The Draft IRMP identifies several goals to better manage rangeland and livestock grazing. These include implementing integrated management activities that maintain or improve the ecological health of Navajo rangeland. Another goal is to keep Navajo producers (ranchers and farmers) in compliance with the current Navajo Nation Standard Operating Plan, Plan of Operation and Procedures, and Navajo Grazing Regulations by ensuring the enforcement of Navajo Nation grazing regulations and permit requirements.

Open rangeland for grazing, wildlife, and overall ecological health would be retained under the Proposed Action. The Agricultural Land Management Areas identified under the Proposed Action include open space for agriculture and livestock grazing and comprise approximately 57 percent of the FBFA. Grazing would also continue in Conservation Land Management Areas as permitted. Additionally, while Development Focus Land Management Areas are identified for development—livestock grazing would continue in those areas as development is not expected to encompass all the areas classified for this use. The Proposed Action would also restrict large developments such as solar and wind projects to areas where grazing is not conducive to retain functional rangeland for grazing.

Future actions in the FBFA would include land withdrawals for development, scattered homesites, or agriculture. Grazing may also be restricted from riparian areas, restoration areas, or lands identified for preservation. The amount and location of this acreage are unknown, but these actions would decrease the amount of land and forage available for livestock grazing and could result in changes to stocking rates for current grazing permits. Under the Proposed Action, procedures would be established to determine if adjusting stocking rates and/or carrying capacities is necessary based on land withdrawal data and to communicate changes to stakeholders (25 CFR Part 167 Section 167.9 A-E). LMDs would be evaluated to determine if they need to be revised to protect rangelands in the Navajo people's best interest.

Under the Proposed Action, a Former Bennett Freeze District Grazing Committee (FBF DGC) would be established to pass resolutions and make decisions on grazing and dryland farming and provide recommendations to the BIA and the Navajo Nation Department of Agriculture. The BIA and Navajo Nation Department of Agriculture, in coordination with the FBF DGC, would establish a Livestock Management Program to directly manage all livestock within the FBFA within 2 calendar years from the Navajo Nation’s adoption of the IRMP. Unauthorized livestock includes, but is not limited to, unbranded, unpermitted, and free-ranging livestock, such as Navajo free-ranging horses. This program would conduct

a comprehensive, accurate, and independent livestock tally for use as a tool to reduce the number of unauthorized livestock. Implementing the Proposed Action does not establish a Livestock Management Program, which would require action by the FBF DGC and additional NEPA analysis.

The Proposed Action would apply management actions to improve or repair livestock water features and structures, such as ponds, tanks, windmills, and actions to install or repair range unit fencing. Available technology would continue to be used to evaluate and monitor the condition of rangeland and range inventories, and monitoring would continue to be completed every 10 years. The Rangeland Health Monitoring Handbook (NNDA 2005), Draft BIA Range and Agricultural Range Handbook, and RMPs would be updated to provide landscape-wide standards for consistent data collection and range monitoring. These actions would serve to better manage rangeland health and grazing and could result in beneficial effects, which are not likely to be significant.

While drought, fire, or other unpredictable events may contribute to declining rangeland health in the FBFA, applying actions to better manage grazing and rangeland health would serve to limit these adverse effects. BMPs would be established and implemented for grazing livestock to minimize climate effects.

Implementation of the IRMP is expected to improve grazing permit compliance, communication and coordination, grazing management, and eventually the overall rangeland ecological health in the FBFA. Grazing management would be planned and applied to increase the vigor of preferred plant species, improve soil and site stability, and hydrologic functioning, resulting in long-term beneficial effects to rangeland health. While these effects are too remote in time to be, implementing these practices has been shown to improve or maintain the health and vigor of selected plants and maintain a stable and desired plant community while, at the same time, maintain or improve water quality and quantity, reduce accelerated soil erosion, and maintain or improve soil condition for sustainability of the resource (USDA/NRCS 2003). The Proposed Action would have no significant adverse effects on rangeland or livestock grazing.

3.9.3 Effects from the No Action Alternative

Under the No Action alternative, existing rangeland management and livestock grazing would continue in the FBFA. Unauthorized grazing use would likely continue to occur. Future actions in the FBFA would include land withdrawals for development, scattered homesites, or agriculture. The amount and location of this acreage is unknown, but these actions would decrease the amount of land and forage available for livestock grazing and increase grazing pressure. Overgrazing from both authorized and unauthorized livestock would lead to diminished vegetative cover and production, reductions in soil and site stability, and compromised hydrological functioning. Rangeland health is likely to depart from the physical and biological conditions needed to maintain healthy, functioning rangelands. Drought, fire, or other events may also contribute to declining rangeland health. These effects would be long-term but are not likely to be significant since existing livestock management policy would continue, and existing permits may need to be modified to reduce stocking rates to offset adverse effects. Available technology would continue to be used to evaluate and monitor the condition of rangeland and range inventories, and monitoring would be completed every 10 years, as required.

However, under this alternative, an FBF DGC would not be established to pass resolutions and make decisions on grazing and dryland farming, provide recommendations to the BIA and the Navajo Nation

Department of Agriculture, or take action on establishing a Livestock Management Program to directly manage all livestock within the FBFA. Unauthorized livestock would likely not be reduced since a comprehensive, accurate, and independent livestock tally would not be conducted.

Actions to improve or repair livestock water features and structures, such as ponds, tanks, and windmills or install or repair range unit fencing would not be implemented. The Rangeland Health Monitoring Handbook (NNDA 2005), Draft BIA Range and Agricultural Range Handbook, and Range Management Plans would not be updated.

The beneficial long-term effects from improved grazing permit compliance, communication and coordination, and grazing management in the FBFA are not expected to occur, and rangeland health is unlikely to improve.

3.10 Special Status Species

Under the Proposed Action, approximately 576,314 acres in the FBFA would be designated as Conservation Land Management Areas. These areas incorporate Biological Preserves, Highly Sensitive Areas, and Moderately Sensitive Areas as identified in the NNDFW Wildlife Biological Resource Land Use Clearance Policies and Procedures; therefore, these areas are already subject to conservation practices. There would be no change in the Biological Resource Land Use Clearance Policies and Procedures and how it is implemented in the FBFA. Continued management under this policy would serve to avoid or mitigate impacts on wildlife. There would be no change to existing regulations to protect species of cultural significance. A Programmatic Biological Evaluation was prepared to analyze the potential effects to federally and tribally listed threatened, endangered, proposed, or otherwise sensitive species (Ecosphere 2021). Any future proposed development would be assessed for threatened, endangered, or other sensitive species. Navajo Natural Heritage Program, a division of the NNDFW, would issue a Biological Resources Compliance Form for final approval, disapproval, or additional mitigation measures required for any future proposed development.

3.10.1 Affected Environment

The FBFA contains potential habitat for 46 US Fish and Wildlife Service (USFWS) threatened, endangered, or candidate species or Navajo Endangered Species List (NESL)-listed species. There are four USFWS designated final critical habitats for federally listed species partially or wholly within the FBFA. Navajo endangered species include NNHP and federally protected, candidate, and other rare or otherwise sensitive species.

3.10.2 Effects from the Proposed Action Alternative

The Programmatic Biological Evaluation contains detailed descriptions of the special status species with the potential to occur in the FBFA and the potential effects on those species from adopting the IRMP (Ecosphere 2021). The types of effects to federally or tribally listed species that could occur from implementing management actions could include:

- Ground and vegetation disturbance and resulting habitat alteration or loss, habitat improvement, soil erosion from wind and water

- Disturbance from increased traffic, noise, dust, and emissions in localized areas
- The potential for spills of petroleum products or industrial fluids may affect surface or groundwater quality
- Potential injury or mortality from vehicles or equipment
- Water depletions

The purpose of the IRMP is to improve the management and protection of natural resources on the FBFA. Therefore, the management activities are intended to have beneficial consequences for natural resources with minimal adverse effects. Adherence to species-specific avoidance measures, presence/absence surveys, and site-specific analyses and biological evaluations in compliance with Navajo Nation regulations and the ESA will avoid or minimize impacts or effects to USFWS-listed and NESL species.

Table 3-5 lists the federally threatened, endangered, and candidate species evaluated in the Biological Evaluation and the preliminary effects determinations resulting from the analysis.

Table 3-5. Federally Listed Species Evaluated and Preliminary Effect Determinations

Species	Status	Effects Determination
Black-footed ferret (*Mustela nigripes*)	Experimental Population, Non-Essential; NESL Group 1	No effect
California condor (*Gymnogyps californianus*)	Experimental population, non-essential population; NESL Group 4 species	Not likely to jeopardize the continued existence of the species
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened; NESL Group 3 species	May affect not likely to adversely affect
Mexican spotted owl	Critical habitat	No effect
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered; NESL Group 2	May affect not likely to adversely affect
Humpback chub (*Gila cypha*)	Endangered; NESL Group 2	May affect not likely to adversely affect
Humpback chub	Critical habitat	May affect not likely to adversely affect
Razorback sucker (*Xyrauchen texanus*)	Endangered; NESL Group 2	May affect not likely to adversely affect
Razorback sucker	Critical habitat	May affect not likely to adversely affect
Apache trout (*Oncorhynchus apache*)	Threatened	No effect
Monarch butterfly (*Danaus plexippus*)	Candidate	May affect, but would not jeopardize the continued existence of the species
Kanab ambersnail (*Oxyloma haydeni kanabensis*)	Endangered	May affect not likely to adversely affect
Brady Pincushion Cactus (*Pediocactus bradyi*)	Endangered; NESL Group 2	May affect not likely to adversely affect
Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*)	Endangered; NESL Group 2	May affect not likely to adversely affect
Navajo sedge (*Carex specuicola*)	Threatened; NESL Group 2	May affect not likely to adversely affect
Welsh's milkweed (*Asclepias welshii*)	Threatened; NESL Group 3	May affect not likely to adversely affect

Species	Status	Effects Determination
Sentry milkvetch (*Astragalus cremnophylax* var. *cremnophylax*)	Threatened	No effect

Notes: NESL = Navajo Endangered Species List

Group 1 species are those species or subspecies that no longer occur on the Navajo Nation.

Group 2 species are considered endangered, or a species or subspecies whose prospects of survival or recruitment on the Navajo Nation are in jeopardy.

Group 3 species are those species whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future.

Group 4 species are those species for which the NNDFW does not currently have sufficient information to support it being listed as Group 2 or Group 3 but has reason to consider them.

Table 3-6 lists the Navajo Nation special status species evaluated in the Biological Evaluation and the preliminary effects determinations resulting from the analysis.

Table 3-6. Navajo Nation Special Status Species Evaluated and Preliminary Effects Determinations

Species	Status	Effects Determination
Chisel-toothed kangaroo rat (*Dipodomys microps*)	NESL Group 4	May impact individuals, no population level effects
Mountain sheep (*Ovis canadensis*)	NESL Group 4	May impact individuals, no population level effects
Pronghorn (*Antilocapra americana*)	NESL Group 3	May impact individuals, no population level effects
Townsend's big-Eared bat (*Corynorhinus townsendii*)	NESL Group 4	May impact individuals, no population level effects
Wupatki pocket mouse (*Perognathus amplus cineris*)	NESL Group 4	May impact individuals, no population level effects
Bald eagle (*Haliaeetus leucocephalus*)	NESL Group 2	May impact individuals, no population level effects
Belted kingfisher (*Ceryle alcyon*)	NESL Group 4	May impact individuals, no population level effects
Burrowing owl (*Athene cunicularia*)	NESL Group 4	May impact individuals, no population level effects
Ferruginous hawk (*Buteo regalis*)	NESL Group 3	May impact individuals, no population level effects
Golden eagle (*Aquila chrysaetos*)	NESL Group 3	May impact individuals, no population level effects
Mountain plover (*Charadrius montanus*)	NESL Group 4	May impact individuals, no population level effects
Peregrine falcon (*Falco peregrinus*)	NESL Group 4	May impact individuals, no population level effects
Sora (*Porzana carolina*)	NESL Group 3	May impact individuals, no population level effects
Yellow warbler (*Dendroica petechia*)	NESL Group 4	May impact individuals, no population level effects
Chuckwalla (*Sauromalus ater*)	NESL Group 4	May impact individuals, no population level effects

Species	Status	Effects Determination
Northern leopard frog (*Lithobates pipiens*)	NESL Group 2	May impact individuals, no population level effects
Bluehead sucker (*Catostomus discobolus*)	NESL Group 2	May impact individuals, no population level effects
Alcove bog orchid (*Platanera zothecina*)	NESL Group 3	May impact individuals, no population level effects
Alcove Death Camus (*Anticlea vaginatus*)	NESL Group 3	May impact individuals, no population level effects
Alcove death camus (*Anticlea vaginatus*)	NESL Group 3	May impact individuals, no population level effects
Beath's milkvetch (*Astragalus beathii*)	Sensitive species	No impact
Cave primrose (*Primula specuicola*)	Sensitive species	May impact individuals, no population level effects
Grand Canyon goldenweed (*Ericameria arizonica*)	Sensitive species	No impact
Marble Canyon dalea (*Psorothamnus arborescens* var. *pubescens*)	NESL Group 3	No impact
Marble Canyon milkvetch (*Astragalus cremnophylax* var. *hevronii*)	NESL Group 4	No impact
Peebles' blue star (*Amsonia peeblesii*)	NESL Group 4	No impact
Round dunebroom (*Errazurizia rotundata*)	NESL Group 3	No impact
Rydberg's thistle (*Cirsium rydbergii*)	NESL Group 4	May impact individuals, no population level effects
Parish's alkali grass (*Puccinellia parishii*)	NESL Group 4	May impact individuals, no population level effects
Welsh's American aster (*Symphyotrichum welshii*)	NESL Group 4	May impact individuals, no population level effects

Notes: NESL = Navajo Endangered Species List

Group 2 species are considered endangered, or a species or subspecies whose prospects of survival or recruitment on the Navajo Nation are in jeopardy.

Group 3 species are those species whose prospects of survival or recruitment are likely to be in jeopardy in the foreseeable future.

Group 4 species are those species for which the NNDFW does not currently have sufficient information to support it being listed as Group 2 or Group 3 but has reason to consider them.

3.10.3 Effects from the No Action Alternative

Under the No Action Alternative, there would be no effects to special status species. There would be no change in the Biological Resource Land Use Clearance Policies and Procedures and how it is implemented in the FBFA. Continued management under this policy would serve to avoid or mitigate impacts on wildlife. There would be no change to existing regulations to protect species of cultural significance. Any future proposed development would be assessed for threatened, endangered, or other sensitive species. The Navajo Natural Heritage Program, a division of the NNDFW, would issue a

Biological Resources Compliance Form for final approval, disapproval, or additional mitigation measures required for any future proposed development.

4. Consultation/Coordination

Consultation was conducted in compliance with Section 7 of the ESA and Section 106 of the National Historic Preservation Act. Consultation processes are discussed in the following sections, including the results of consultation efforts.

4.1 Section 7 Consultation

As part of this PEA, the BIA consulted with the United States Fish and Wildlife Service (USFWS) and the Navajo Natural Heritage Program regarding potential effects to threatened and endangered species, as required under Section 7 of the ESA. A Biological Evaluation was prepared to evaluate the impacts to listed species, species proposed for listing, and critical habitats from the Proposed Action. The Biological Evaluation identified environmental protection measures to minimize impacts on these species and habitats. The Biological Evaluation was submitted to the USFWS and NNHP for their concurrence in May 2021.

4.2 Section 106 Consultation

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to consider the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. For the Proposed Action, Section 106 of the National Historic Preservation Act compliance and consultation would occur on a case-by-case basis when site-specific projects are proposed.

On February 5, 2021, a letter and map describing the Proposed Action and inviting consultation with the BIA Navajo Region were sent to each of the various Pueblos and tribes listed in Table 4-1. The letter encouraged tribes to respond regarding their interest in consulting with BIA on potential effects from the action addressed in the PEA for the FBFA IRMP. The BIA received no responses to the letter.

Table 4-1. Pueblos and Tribes Sent Consultation Requests from the Bureau of Indian Affairs

Tribe/Pueblo	Name
Navajo Nation	President Johnathan Nez
San Juan Southern Paiute	President Michael King
Pueblo of Zuni	Governor Val R. Panteah, Sr.

5. List of Preparers

The BIA and Navajo Nation established an IDT made up of staff specialists who developed the PEA. The BIA worked with a third-party contractor to develop the content and analysis in the PEA. The IDT is listed in Table 5-1.

Table 5-1. Interdisciplinary Team Members

Name	Agency	Title
Renee Benally	Bureau of Indian Affairs	Contracting Officer's Representative, Project Lead
Tony Robbins	Bureau of Indian Affairs	Alternate Contracting Officer's Representative
Calvert Curley, DBA	Bureau of Indian Affairs	Natural Resources Lead
Casey Francisco	Bureau of Indian Affairs	Resource Specialist
Robert Begay	Bureau of Indian Affairs	Cultural Resources Lead
Leonard Notah	Bureau of Indian Affairs	Environmental Quality Act Compliance Review
Dr. Rudy Shebala	Navajo Nation	Executive Director Division of Natural Resources
Vangie Curley-Thomas	Navajo Nation	Deputy Director Division of Natural Resources
Cheryl Curley	Bureau of Indian Affairs	Tribal Operation's Specialist (Tribal Liaison)
Peter Lefebvre	Bureau of Indian Affairs	Soil Specialist Lead
Evan Blackstone	Office of the Solicitor	Attorney-Adviser
Richard Begay	Navajo Nation	Department Manager Navajo Heritage and Historic Preservation
Crystal Tulley-Cordova, PhD	Navajo Nation Department of Water Resources	Principal Hydrologist

A list of third-party preparers who participated in this PEA development is provided in Table 5-2.

Table 5-2. List of Third-Party Preparers and Qualifications

Name/Title	Organization	Project Roles/Responsibilities	Qualifications
Joey Herring	Ecosphere Environmental Services, Inc.	Project Manager, NEPA lead, and technical author	BS Environmental Biology/25 years of experience
Jerusha Rawlings	Ecosphere Environmental Services, Inc.	Assistant Project Manager, technical author	Ph.D. Biology/Landscape Ecology; BS Biology/Ecology and Systematics/25 years of experience
Schuyler Roskam	Ecosphere Environmental Services, Inc.	Technical author	BS Biological Sciences/2 years of experience

Name/Title	Organization	Project Roles/Responsibilities	Qualifications
Anna Riling	Ecosphere Environmental Services, Inc.	Geographic information systems analysis, mapping	MS Geographic Information Science; BS Geology/17 years of experience
Heather Parmeter	Ecosphere Environmental Services, Inc.	Technical author	BS Biology; MS Biology/20 years of experience
John Dodge	Ecosphere Environmental Services, Inc.	Threatened and endangered species analysis	BS Environmental Biology/24 years of experience
Wanda White	Ecosphere Environmental Services, Inc.	Administrative Record	Administrative Assistant/47 years of experience
Cindy Lancaster	Ecosphere Environmental Services, Inc.	Technical editor and 508 compliance	BS English/36 years of experience
Doug Loebig	Stratified Archaeological and Environmental Services	Cultural Resources Literature Review and analysis	MA Anthropology; BA Anthropology; Register of Professional Archaeologists and State Registered Principal Investigator/20 years of experience
Jeff Moffett	Triple Point Strategic Consulting, LLC	Socioeconomic analysis	Ph.D. Quantitative Resource Management; MS Forest Economics: BA Economics and Religion/36 years of experience
Joanna Austin-Manygoats		Interpreter and translator	Certified Navajo Interpreter and Translator/29 years of experience

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WHPacific, Inc. 2008d. Coalmine Canyon Chapter Chapter Comprehensive Land Use Plan. Prepared for the Navajo Nation Division of Community Development Design and Engineering Services.

WHPacific, Inc. 2008e. Coppermine Chapter Comprehensive Land Use Plan. Prepared for the Navajo Nation Division of Community Development Design and Engineering Services.

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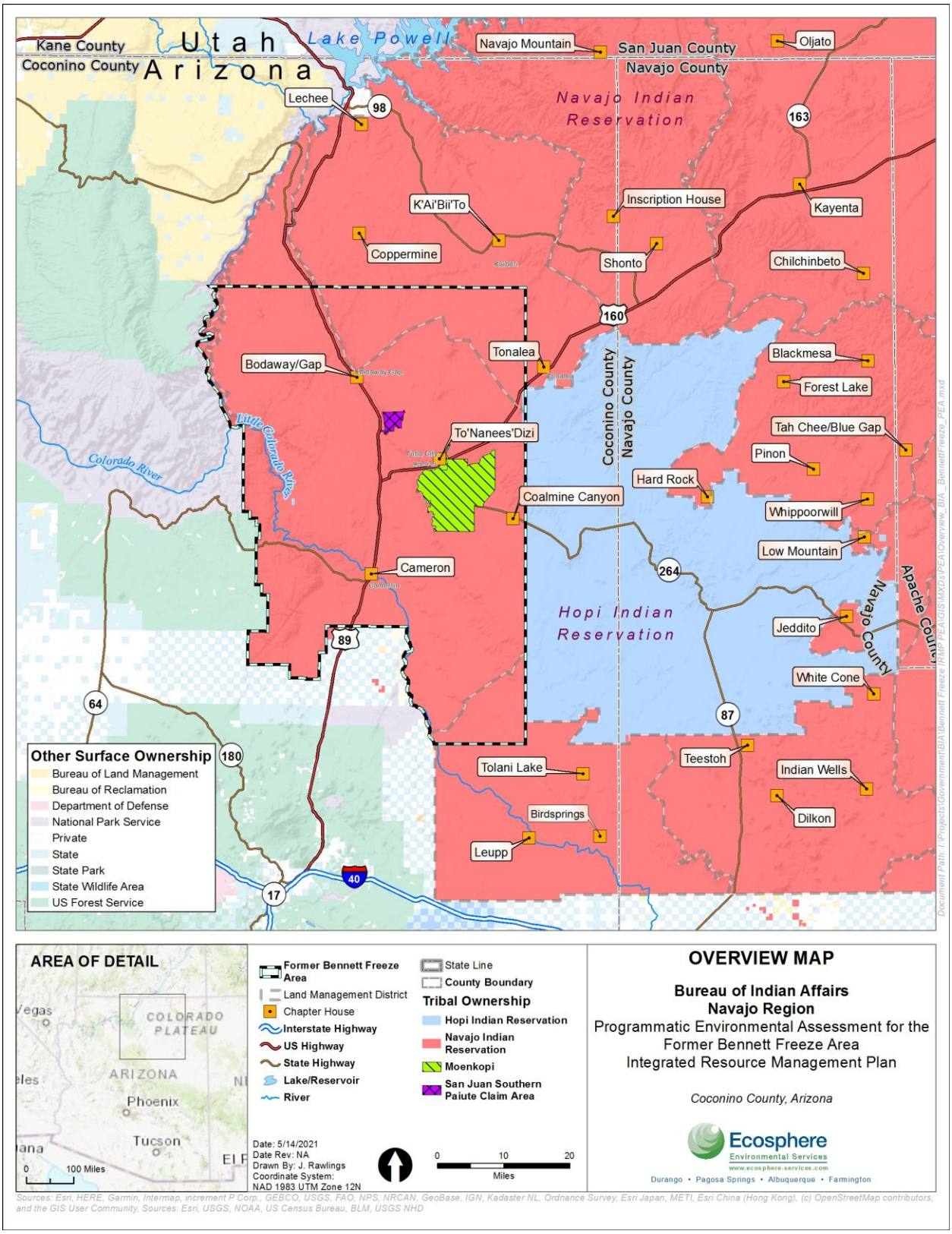
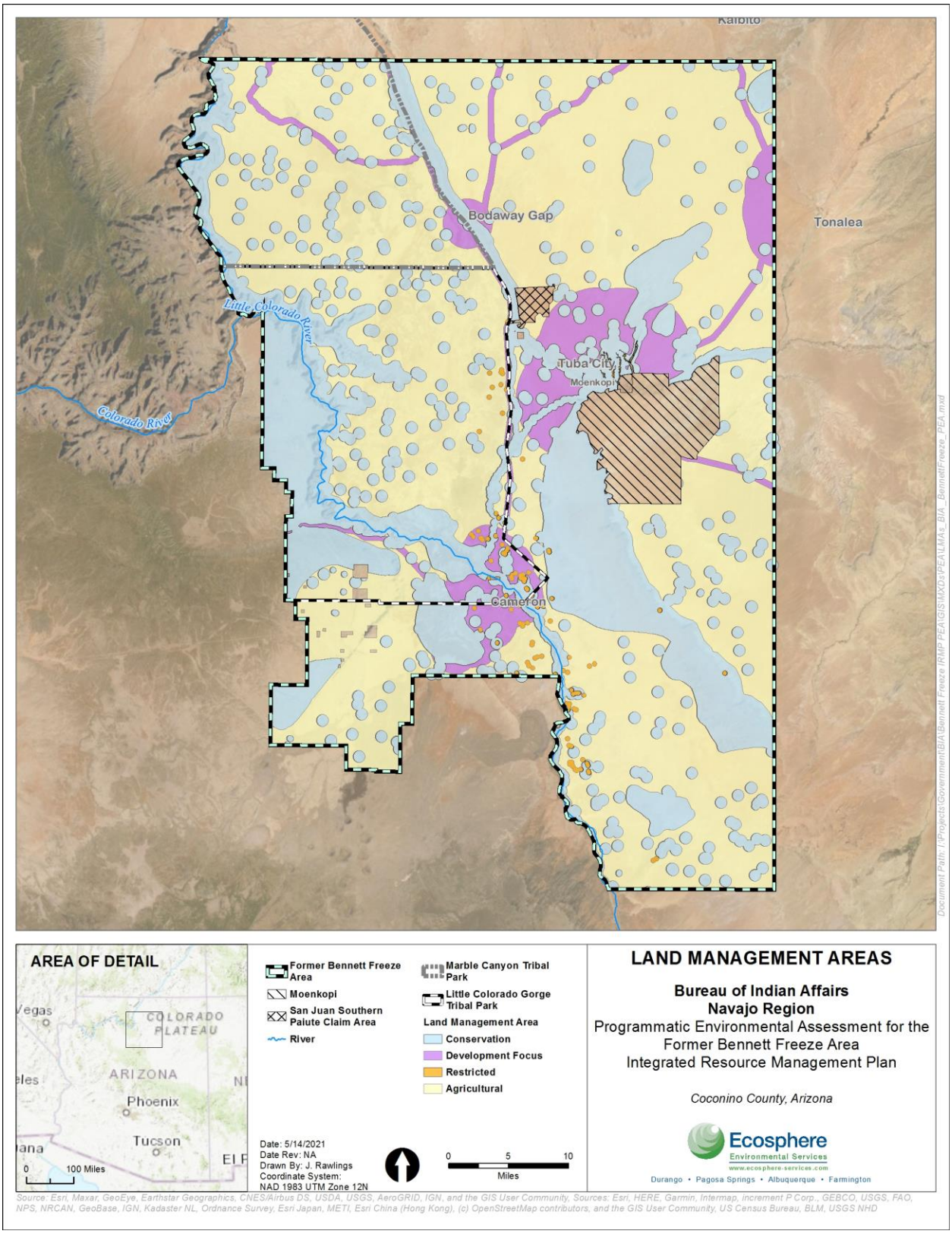
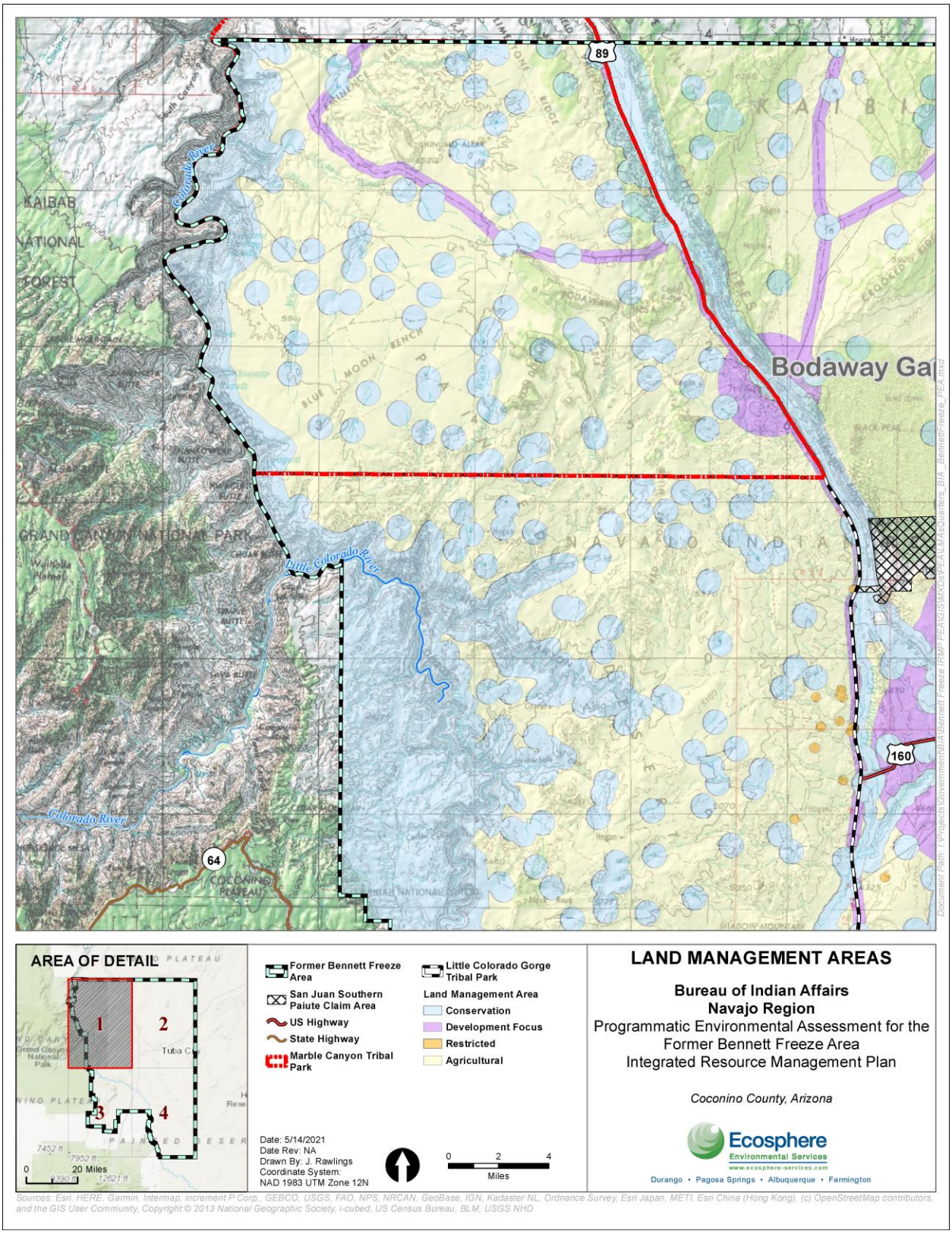
Appendix A – Maps



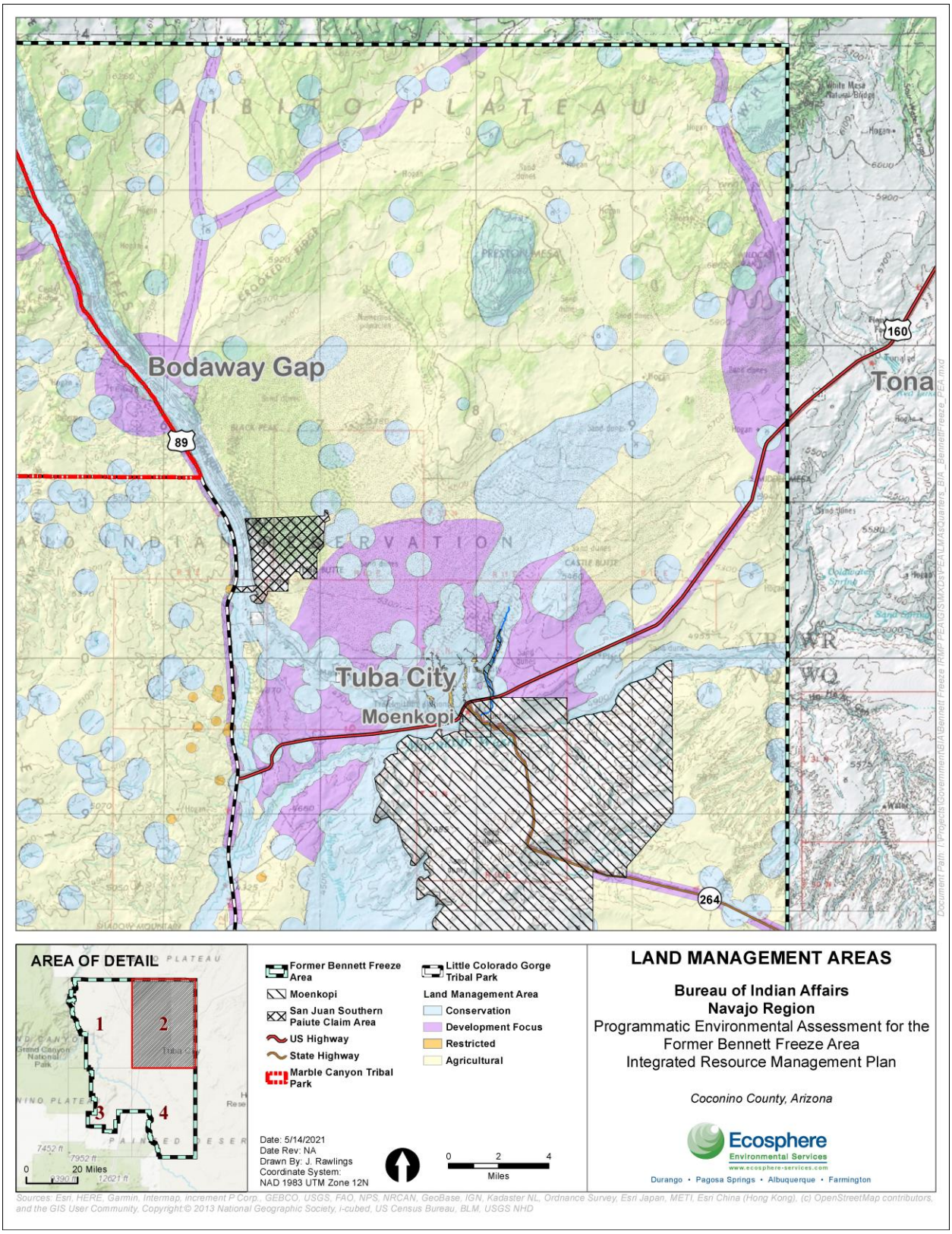
Map A-1. Overview of the Former Bennett Freeze Area



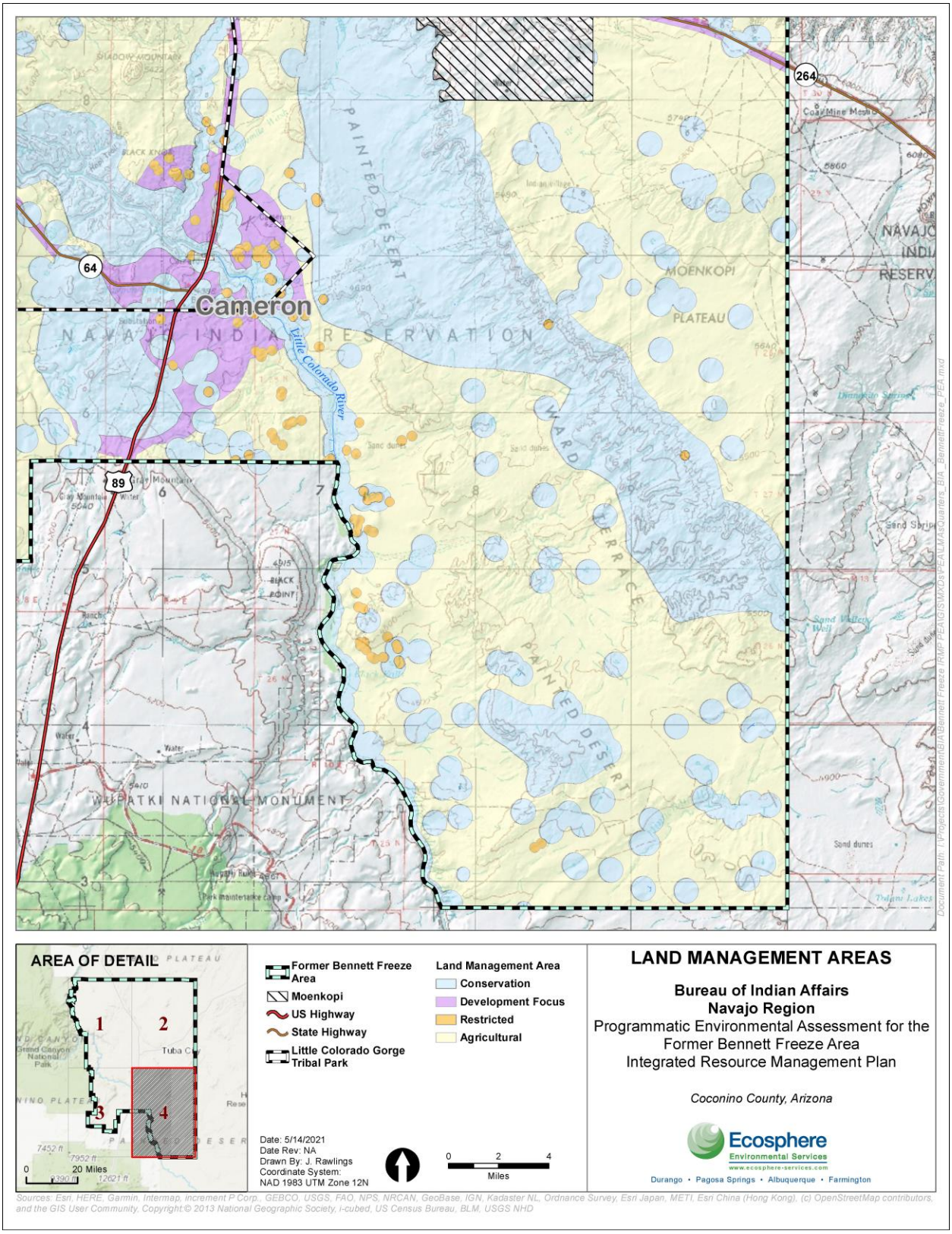
Map A-2. Proposed Land Management Areas in the Former Bennett Freeze



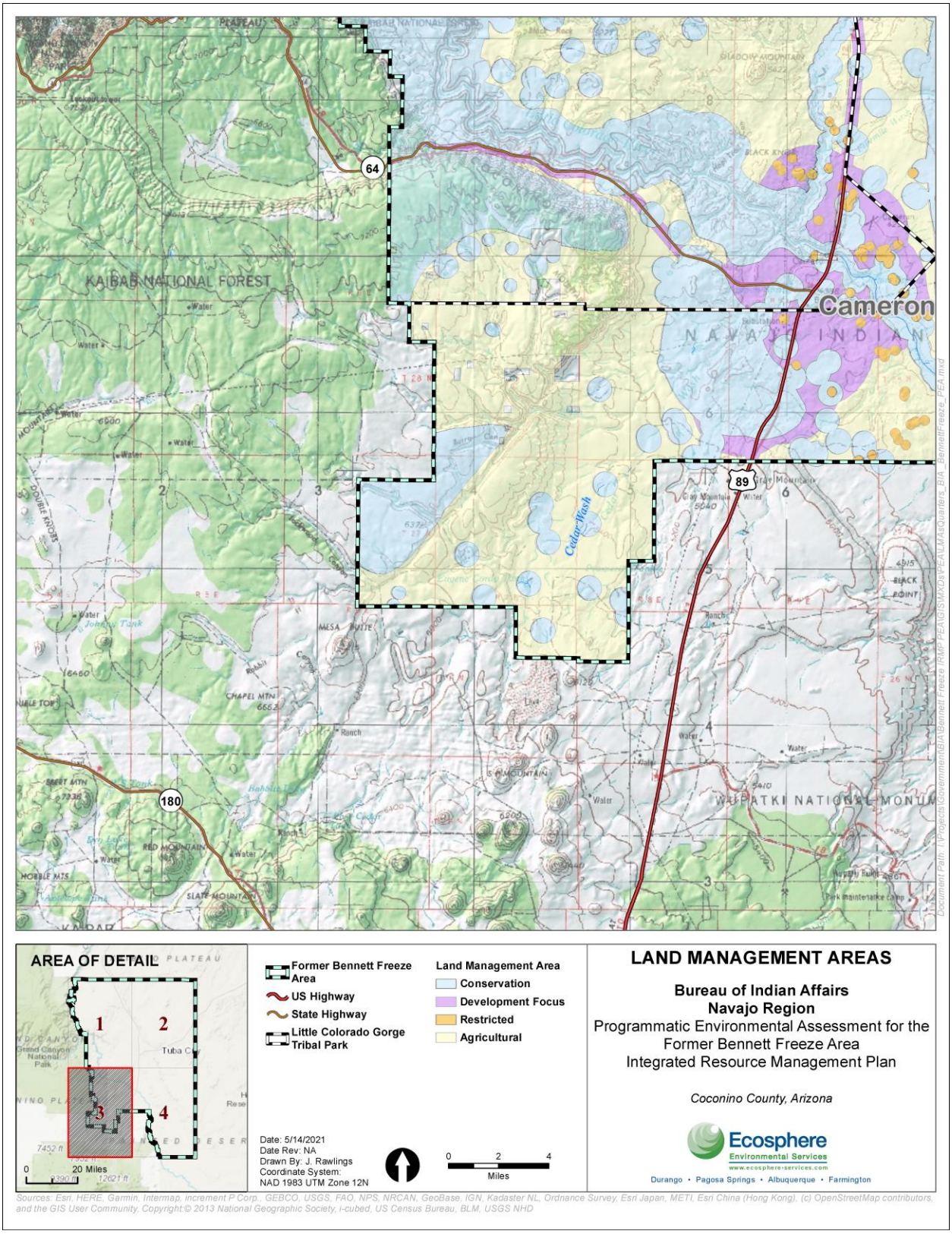
Map A-3. Proposed Land Management Areas in the Former Bennett Freeze Area NW Quarter



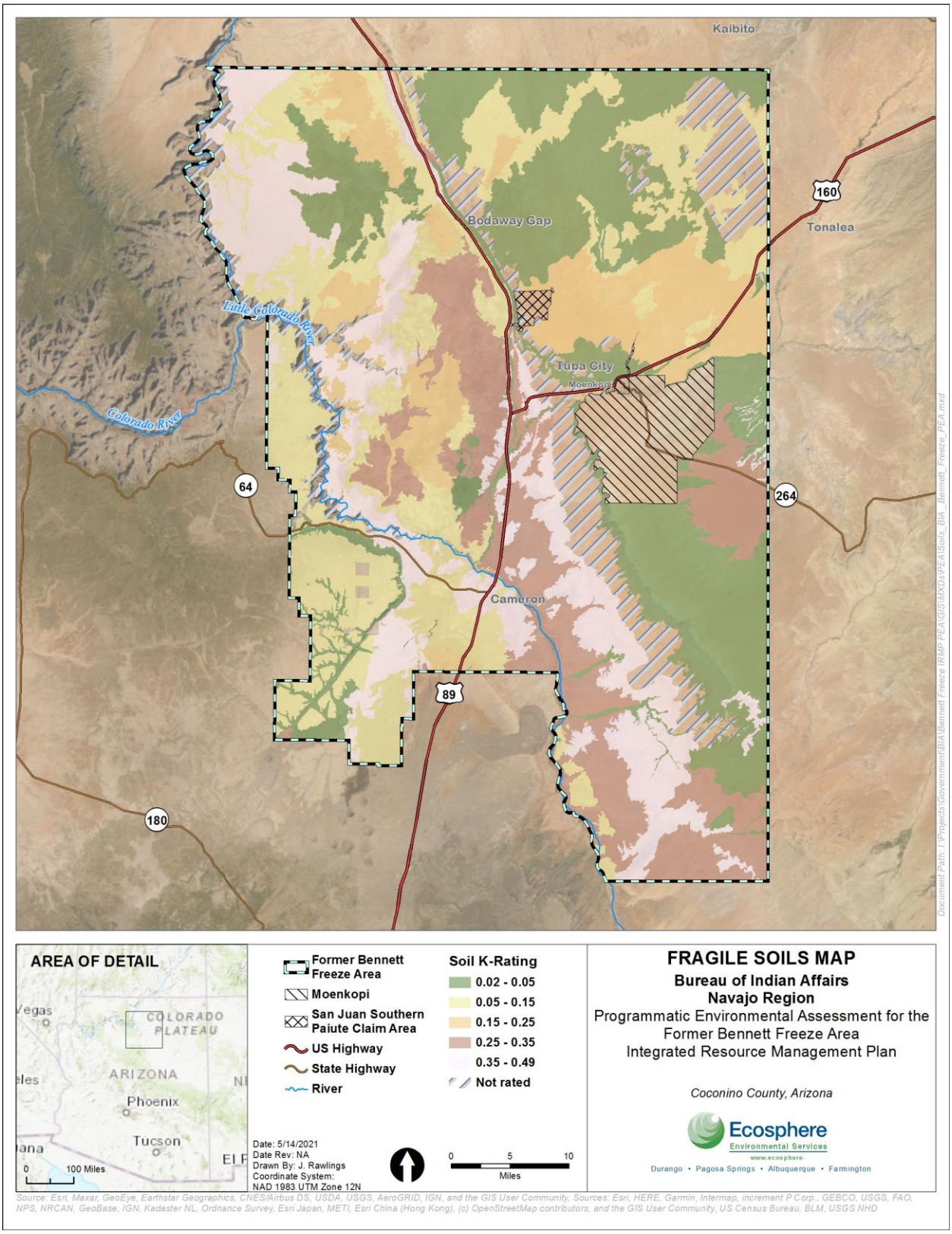
Map A-4. Proposed Land Management Areas in the Former Bennett Freeze Area NE Quarter



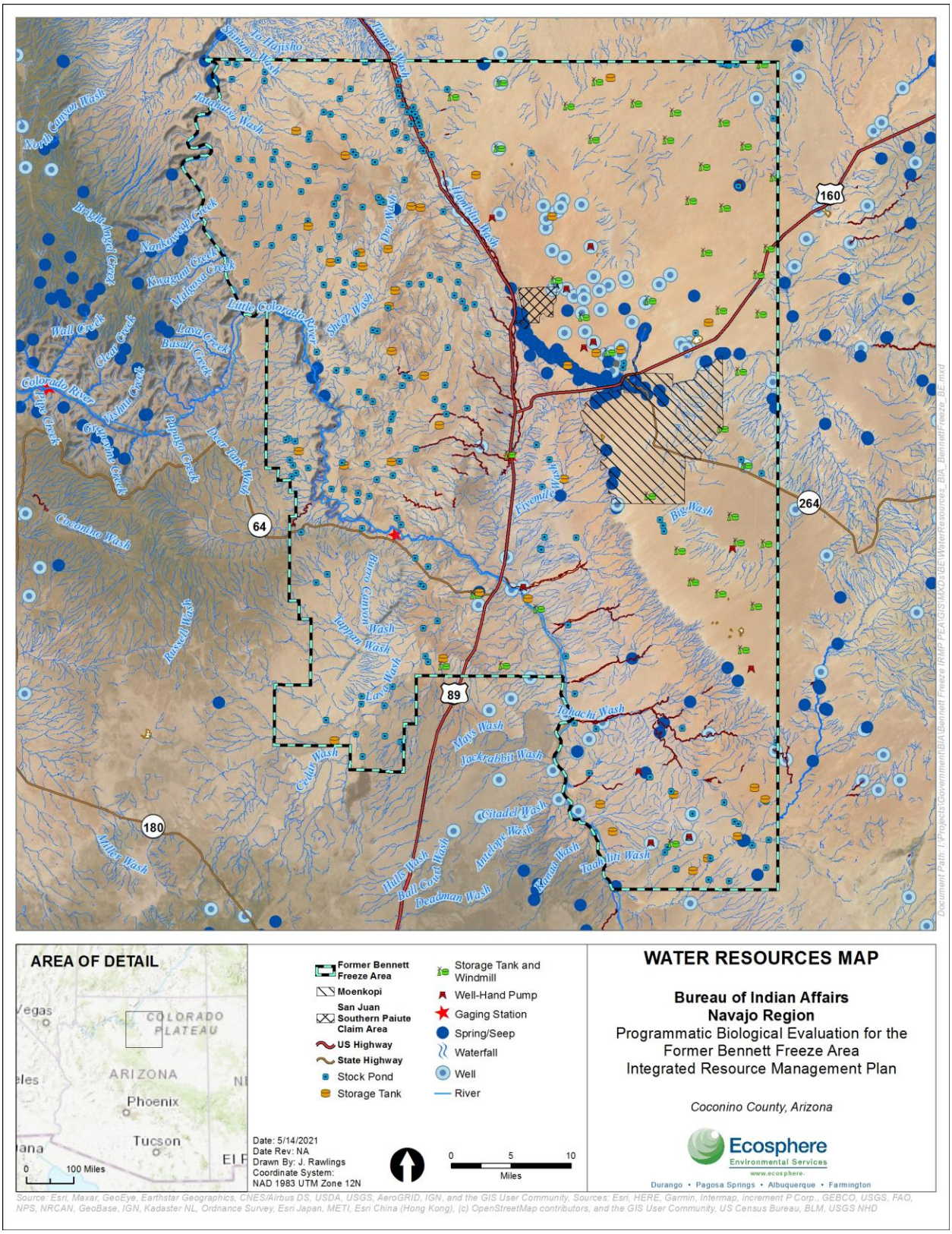
Map A-5. Proposed Land Management Areas in the Former Bennett Freeze Area SE Quarter



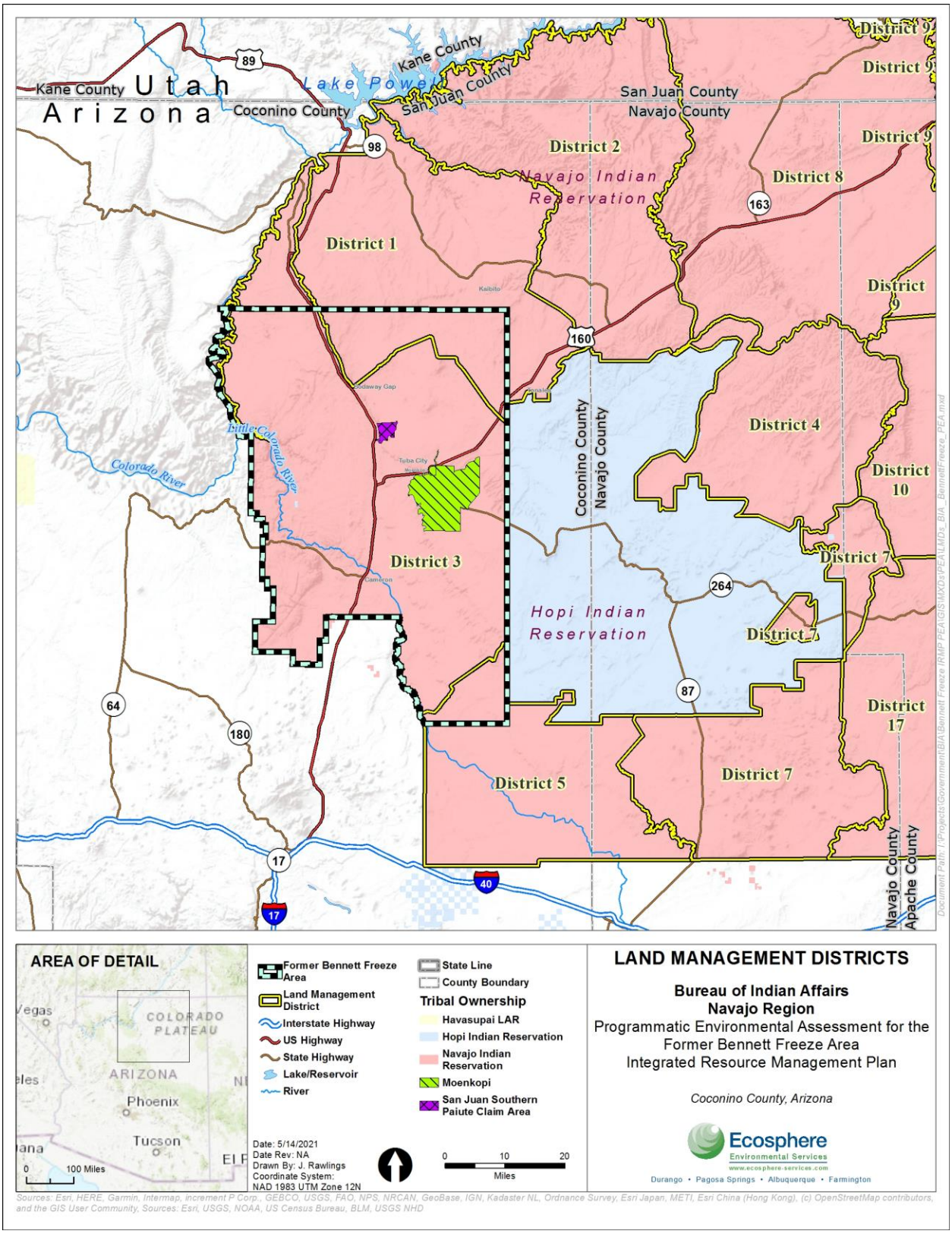
Map A-6. Proposed Land Management Areas in the Former Bennett Freeze Area SW Quarter



Map A-7. Fragile Soils in the Former Bennett Freeze Area



Map A-8. Water Resources in the Former Bennett Freeze Area



Map A-9. Grazing Land Management Districts in the Former Bennett Freeze Area

Appendix B – Economic Impact and Socioeconomic Analysis of the Former Bennett Freeze Area

Economic Impact and Socioeconomic Analysis of the Former Bennett Freeze Area

Prepared for Ecosphere Environmental Services, Inc.

by

Triple Point Strategic Consulting LLC

December 18, 2020

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX TABLES

1. Executive Summary

The purpose of this analysis is to estimate the economic impacts within the Former Bennett Freeze Area (FBFA) that would result from the implementation of the Navajo Thaw Regional Recovery Plan (Building Communities, Inc. and Native Builders, LLC 2020). The 2020 Recovery Plan is the starting point and framework for this economic impact and socioeconomic analysis and provides a summary overview of projects previously budgeted.

Three groups of projects are identified: (1) Chapter-Specific, (2) Infrastructure Capital Improvement Plan, and (3) Immediate Recovery. Each project budget was evaluated so that land acquisition expenses; furniture, fixtures, and equipment (FFE); and study-only project expenses could be excluded from capital budgets. Within each group, the projects' economic impacts were modeled for each of several breakouts, including by chapter, category, and phasing year.

The combined total direct capital budget amount is $3.6 billion, for which the total economic impact is $5.2 billion, in 2021 dollars. The majority of the budget is allocated to housing. The total capital budget for the Chapter-specific projects is $3 billion, of which $1.6 billion is for housing. Infrastructure accounts for over $630 million of the Chapter-specific budget. Table 1-1 below summarizes direct, indirect, and induced impacts for each group of projects.

The Immediate Recovery Projects are considered to be closest to shovel-ready as the name suggests. Of the $257 million capital budget, $154 million is for the Echo Cliffs Health Center. Both the Chapter-specific and Infrastructure Capital Improvement Plan projects are expected to be developed over six to seven-year time horizons.

Even with phased development, this amount of capital investment is very large relative to the size of the Coconino County economy and its construction sector. The total output of the County in 2018 was $12.1 billion. From 2010 to 2018, the total output of the County grew by $3.7 billion. The FBFA is a subset of the County's economy.

As of 2018, the Coconino County construction sector employed just under 4,000 people and produced a total output of just over $500 million. The total number of direct annual jobs to develop all recovery plan projects is over 30,000 or approximately 5,000 per year for six years – more than the County's entire construction sector. This comparison raises the question of where will the workforce come from and live throughout project development?

Many of the individual project budgets appear to be rough estimates and systematic approximations. Many were developed over 10 years ago and relied on population growth projections we now know were too high. Further planning should more precisely evaluate the necessary level of development and more carefully estimate capital budgets. The total recovery plan budget and resulting economic impacts will still be substantial, but implementation will benefit from more accurate forecasting and planning.

Table 1-1. Total Economic Impact of All Chapter-Specific Projects

Total Economic Impact of All Chapter-Specific Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	27,335	$1,348,273,121	$1,371,681,891	$269,357,285	$2,989,312,297
Indirect	3,869	$176,745,245	$269,686,884	$130,508,192	$576,940,320
Induced	5,525	$246,998,940	$319,199,083	$211,917,865	$778,115,888
Total	36,729	$1,772,017,305	$1,960,567,858	$611,783,342	$4,344,368,505
Total Economic Impact of All Nine Chapter Infrastructure Capital Improvement Plan Projects					
Impact Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	2,530	$122,888,236	$168,263,290	$46,869,597	$338,021,123
Indirect	330	$16,241,595	$27,857,820	$11,226,485	$55,325,901
Induced	504	$22,535,259	$29,122,565	$19,333,612	$70,991,436
Total	3,364	$161,665,091	$225,243,676	$77,429,694	$464,338,460
Total Economic Impact of All Immediate Recovery Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	328	$102,479,269	$124,471,231	$29,927,323	$256,877,823
Indirect	34	$11,632,166	$20,666,453	$7,750,660	$40,049,279
Induced	59	$18,479,596	$23,881,346	$15,855,283	$58,216,225
Total	421	$132,591,031	$169,019,030	$53,533,265	$355,143,326
Grand Total Economic Impact of All Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	30,193	$1,573,640,625	$1,664,416,413	$346,154,205	$3,584,211,243
Indirect	4,233	$204,619,007	$318,211,157	$149,485,336	$672,315,500
Induced	6,088	$288,013,795	$372,202,995	$247,106,760	$907,323,549
Total	40,514	$2,066,273,427	$2,354,830,564	$742,746,301	$5,163,850,292

2. Introduction

In 1966, the Commissioner of Indian Affairs, Robert Bennett, put in place an order halting economic development in order to pressure the Navajo and Hopi to resolve a land dispute. The order effectively "froze" all forms of development, from fixing roofs to constructing waterlines and repairing roads. This area became known as the Bennett Freeze Area, encompassing 1.6 million acres within the Navajo Nation. President Obama lifted this development ban in 2006. Approximately 7,000 people live in the FBFA. The FBFA lies entirely within Coconino County, Arizona, which covers almost 12 million acres and has a population of about 135,000.

Following the lifting of the Freeze, a $1 million study, known as the Former Bennett Freeze Area Recovery Plan, was prepared to identify the Freeze impacts (WHPacific 2008). This recovery plan was completed in December 2008. For each of the nine Chapters having land within the FBFA, this recovery plan detailed the economic development necessary to mitigate the Freeze impacts. Recovery plan projects ranged from housing construction to infrastructure development to community recreational facilities. Brief descriptions and capital funding requirements are provided for each of 357 projects.

According to the Bodaway Gap Chapter Community-Based Land Use Plan (CLUP), dated December 23, 2008, "The primary purpose of the FBFA Recovery Plan effort was to determine what is needed to restore the health, vitality, and viability of the communities in the nine impacted chapters. This includes not only the capital projects needed but also the resources and actions needed to breathe life into the vision of recovery."

Although the Freeze was lifted in 2006 and a recovery plan was written by 2008, little development has taken place during the past 12 years. Effectively, this has become a 54-year development freeze. New studies have taken place regarding land use planning (2017) and economic feasibility (2018). These documents offer general objectives, insightful background, and detailed resource inventories and assessments. These studies lack project-specific financial information and investment projections. However, the 2018 feasibility study does provide detailed generic financial models and promotes a residual land value approach.

The Navajo Thaw Regional Recovery Plan (Building Communities, Inc. and Native Builders, LLC 2020) seeks economic development investment by itemizing actionable development projects. The Plan comprises a Summary and nine Chapter Recovery Plans (also referred to as Chapter Land use Plans).

According to the 2020 Chapter Recovery Plan, "The Navajo Thaw Implementation Plan is not just another study that will sit on the shelf. It is a commitment by the Nez-Lizer Administration and the 24th Navajo Nation Council to listen to the people in all nine Chapters, formulate Chapter-based Recovery Plans, and to create the Navajo Thaw Regional Plan. The result of this three-year Implementation Plan will be the opportunity for the federal government to meet its Promise to the Navajo Thaw Region to improve the housing, establish the infrastructure, build the public facilities and create economic conditions necessary to benefit the lives of the impacted Navajo people."

The Bureau of Indian Affairs developed the FBFA Integrated Resource Management Plan (IRMP) in close consultation with the Navajo Nation. The early planning process involved discussions within the Navajo Nation, which identified their expectations, concerns, and recommendations for the planning effort. Through this process, it was decided that the draft IRMP would function as an update to the 2008 Recovery Plan. The IRMP is a tribal strategic, vision-based, long-term management plan based on Navajo Nation members' interests, needs, and concerns for their lands and natural and cultural resources. In October 2020, the Navajo Nation Resources

Development Committee and the Navajo-Hopi Land Commission both approved the draft IRMP through resolutions.

The Bureau of Indian Affairs is preparing a Programmatic Environmental Assessment (PEA) to evaluate potential environmental impacts of the proposed draft IRMP for the FBFA. The PEA will be prepared in accordance with the requirements of the National Environmental Policy Act (NEPA). This economic impact analysis is a supporting component of the PEA to analyze the socioeconomic impacts of implementing the IRMP and the associated 2020 Recovery Plan.

3. Purpose of this Analysis

The purpose of this analysis is to estimate the economic impacts that would result from the implementation of the Navajo Thaw Regional Recovery Plan (2020). That plan is the starting point and framework for this economic impact and socioeconomic analysis. Details and additional information first appearing in previous studies are used in this analysis only if they can be traced to the 2020 Recovery Plan. Within the broader scope of the 2020 Recovery Plan, this study focuses on the proposed development projects and the portions of development projects falling within the FBFA.

The development projects proposed in the 2020 Recovery Plan will impact the socioeconomic conditions within the FBFA and surrounding regions. In this analysis, the impacts resulting from hundreds of proposed projects' development are summarized by chapter, category, and construction year phase. The primary socioeconomic conditions include:

- Employment and Income – The construction of new infrastructure and facilities will support and create new jobs and generate labor income.
- Demographic Trends – Housing, education, and recreational facility development will improve the quality of life for FBFA residents, promote population growth and in-migration.
- Lifestyle and Cultural Values (rural, urban) – Some projects provide “urban” amenities to rural areas, such as new clinics and health facilities. Other projects such as farm developments and tribal courts support the Navajo Nation's rural character and cultural values.
- Community Infrastructure (public services, utilities) – The construction of powerlines, waterlines, wastewater treatment facilities, road improvements, public safety buildings, and other community infrastructure projects will improve the socioeconomic conditions of current residents and create a foundation for future economic growth.

This analysis will help to inform the necessary decisions required to implement the Navajo Thaw Recovery Plan. According to the 2008 Recovery Plan itself, it was “not intended as the final word on needed projects, but rather the first word.”

4. Methodology

This study aims to estimate the economic impacts that would result from the implementation of the 2020 Recovery Plan. The IMPLAN modeling approach is used to quantify economic impacts. IMPLAN is a common standard for economic impact analysis. IMPLAN modeling also allows for project impacts to be evaluated in the context of the regional economy. Several project areas referenced in the 2020 Recovery Plan lack capital expenditure budgets and are addressed qualitatively.

This analysis quantifies the economic impacts of hundreds of projects using a common framework. The common model output format allows for easy comparisons and summation. Comparing project proposals with actual demographics, for example, comparing the number of proposed housing units to the actual population, allows projects to be refined to meet the community's needs in the most efficient manner.

Except for the Little Colorado River Farms Project, the projects identified in the Recovery Plans do not include operating and maintenance budgets. Thus, except for the one exception, the projects' ongoing operating and maintenance impacts are not considered.

4.1 IMPLAN

Input-Output (I-O) modeling is based on the foundational concept that all industries, households, and government in the economy are connected through buy-sell relationships; therefore a given economic activity supports a ripple of additional economic activity throughout the economy. IMPLAN is an I-O modeling system that uses annual, regional data to map these buy-sell relationships so users can predict how specific economic changes will impact a given regional economy or estimate the effect of past or existing economic activity.

This analysis is based on the IMPLAN input-output economic model that incorporates all available economic data for each county in the country, including from the U.S. Census, Internal Revenue Services, Bureau of Labor Statistics, and others. IMPLAN was initially conceived in 1972 as part of the Rural Development Act of 1972. After initial development by the U.S. Forest Service, IMPLAN was further developed by the University of Minnesota during the 1980s. In the 1990s, IMPLAN was privatized, and the Minnesota IMPLAN Group (MIG, Inc.) began taking commercial orders. IMPLAN is now widely used for modeling economic impacts across many business sectors.

This analysis uses the latest version of IMPLAN, which now operates based on 546 industry sectors as defined by the Bureau of Economic Analysis (BEA). The latest BEA datasets are from 2018—“data year” of this IMPLAN model.

For a particular producing industry, multipliers estimate three components of total change within the local area:

- **Direct effects** represent the initial change in the industry in question. For example, building a new facility to generate electricity from solar energy will directly expand the size of that industry within the region it is located.
- **Indirect effects** are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries.
- **Induced effects** reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.

Developing an IMPLAN model for this project required specifying a region of impact, identifying representative industry sectors, and selecting which years the impacts will occur. Data inputs also include estimates of capital expenditures. IMPLAN regions can either be states, counties, or groups of states or counties. As the FBFA falls entirely within Coconino County, this analysis is conducted using Coconino County, Arizona, as the IMPLAN region.

4.1.1 Description of IMPLAN Model Output and Estimates of Economic Impacts

Each economic impact table shows the total amount of direct capital spending. This is the IMPLAN model output broken down by the following components: labor income, intermediate expenses, and taxes/profits. Using IMPLAN terminology, "taxes/profits" refers to the combination of Taxes on Production and Imports (TOPI) and Other Property Income (OPI), both of which are defined in the Glossary. The number of 1-year jobs is also shown as either total jobs assuming the capital expense occurs in a single year or as an average number of annual jobs for projects and/or groups of projects occurring over several years. In addition to the direct impacts, each impact table shows the indirect and induced impacts. Finally, the total impact line sums the direct, indirect, and induced impacts. See Glossary for additional definitions.

For each of the Chapter-specific, Infrastructure Capital Improvement Plan, and Immediate Recovery project groups, detailed tax revenue impacts and breakdowns of the top 15 industries by impact and breakdowns of the top 15 industries by impact are shown.

4.2 Documents Reviewed for Data Inputs

The reports listed below represent the sole source of data inputs for the IMPLAN model.

- Former Bennett Freeze Area Recovery Plan – 2008
- Community-Based Land-Use Plans for each Chapter – 2017
- Former Bennett Freeze Area Economic and Market Feasibility Study – 2018
- Former Bennett Freeze Area Draft Integrated Resource Management Plan – 2020
- Chapter Recovery Plan Drafts - 2020
- Navajo Thaw Regional Recovery Plan - 2020

4.3 Dollar Years

The budgets for the Chapter-specific project proposals listed in the 2008 Recovery Plan are based on 2010 dollars, the anticipated first year of construction. Section 5.1 describes the organization of these project capital budgets in terms of 2010 dollars.

Further, for these projects, the 2010 dollar values were entered into IMPLAN as inputs. The economic impact results are all presented in 2021 dollars. In these cases, IMPLAN has adjusted the dollar amounts to account for inflation. All of the dollar figures in the tables showing IMPLAN inputs and economic impacts estimated by this analysis are presented in 2021 dollars.

The Infrastructure Capital Improvement Plan project budgets have all been input into IMPLAN as 2020 dollars. Their impact results also show in 2021 dollars. The same is true for the Immediate Recovery Projects.

Both the Chapter-specific and Infrastructure Capital Improvement Plan project plans anticipate phasing construction over future years. For consistency, all of the future year budget and economic impact estimates are presented in 2021 dollars. The reader should be aware that actual future expenditure amounts will vary depending on the number of years in the future and the rate of inflation.

4.4 Disclaimer

Actual economic impacts occurring in the future will depend on final project specifications and economic conditions prevailing at the time of development. The exercise of setting up IMPLAN models requires assumptions such as which economic sector to specify. Although IMPLAN is a very sophisticated model incorporating all of the publicly available data at the county level, it also provides estimates based on a number of assumptions.

All of the projects modeled in this study are based on data identified in documents listed in Section 4.2. Many project budgets appear to be rough estimates that are several years old. This analysis estimates economic impacts based on all of the quantifiable data made available. Additional information, such as detailed capital expenditure budgets, construction plans, pro formas, and operating budgets, would improve results.

5. Regional and Chapter-Specific Projects

5.1 Organization of Capital Expenditure Budgets

The 2020 Recovery Plan lists Regional Projects totaling $447 million and Chapter-Specific Projects totaling $4.3 billion for a combined total of $4.74 billion (2010 dollars). The 2020 Recovery Plan cites the 2008 Recovery Plan as the source of these budgets.

5.1.1 The 2008 Recovery Plan

Specifically, the Chapter Land Use Plans appearing in Appendix 7.5 of the 2008 Recovery Plan provide a modest level of detail and description for each project. Further, Appendix 7.12 in the 2008 Recovery Plan organizes project lists by chapter and includes a category for "Regional." Appendix 7.13 organizes projects by category. In comparison to the 2020 Recovery Plan, the 2008 Recovery Plan categorization has a greater volume of Regional Projects at $871 million and a lesser total for Chapter-specific projects at $3.9 billion totaling $4.79 billion. After careful comparison and resolution of minor discrepancies, it is clear that both reports reference the same set of projects, and in most cases, dollar for dollar.

5.1.2 Chapter-Specific Project Categories

This analysis adopts a modified version of the 2008 Recovery Plan categorization scheme to provide the greatest level of detail and improve forecast model results (see Table 5-1**Error! Reference source not found.**). A master d atabase was created to organize this information and summarize inputs for IMPLAN modeling. Housing is broken into three categories, given the size of the total housing budget.

Table 5-1. Regional and Chapter-Specific Project Categories

Chapter-Specific Project Categories
Community Facilities and Recreation
Education
Multifamily Housing
Housing Repairs
Scattered Housing
Health
Infrastructure
Public Safety
Transportation

Note that none of the projects listed as Agricultural in the 2008 Recovery Plan are capital projects and therefore not modeled as having economic impacts as described in Section 5.1.6.

5.1.3 Proposed Studies

Many of the itemized Chapter-specific projects are proposed studies to assess market and economic feasibility, determine environmental impacts, identify water sources, and similar investigations. There are 105 of these items

for a total budget of $16,335,000 in 2010 dollars. Individuals budget amounts range from $10,000 to $1 million, with most of the studies budgeted at either a $50,000 or $200,000 level. Since these studies likely would be conducted by experts from outside of the region, these expenditures would not impact the local economy. Therefore, these research expenditures are excluded from IMPLAN model inputs.

5.1.4 Share of Project Costs within FBFA Boundary

For most projects, the proportion of the project that lies within the FBFA is given as a percentage. For the project listings not showing an FBFA percentage, this analysis assumes the project to be entirely within the FBFA. This is the case for all of the infrastructure projects. Budget amounts have been adjusted by these proportions so that only the values within the FBFA are used as IMPLAN inputs. For example, the IMPLAN input for an $8 million project that is 60 percent in the FBFA is $4.8 million.

5.1.5 Furniture, Fixtures, and Equipment Expenditures

The Chapter-Specific Project budgets include a line item for FFE. The total amount of FFE budgeted is $222 million, of which $95 million falls within the FBFA boundary (2010 dollars).

Since FFE items are often manufactured outside of the local county (in many cases overseas), their production does not impact the local economy. Therefore, FFE expenditures are excluded from IMPLAN model inputs. FFE purchases from vendors within the county and/or Navajo Nation may be subject to local sales tax.

5.1.6 Total Adjusted Chapter-Specific Capital Budget

The initial Chapter-specific project list includes 357 unique projects. After removing the study-only projects, the total proposed capital expenditure less FFE is $4.55 billion. After further removing the projects falling entirely outside of the FBFA boundary, there are 206 projects within the FBFA boundary for a total amount of $2.2 billion in 2010 dollars.

The total capital budget of these 206 projects combined is $3 billion in 2021 dollars. Sections 5.2 – 5.3 estimate the economic impact of this budget broken down by chapter and category with a year of construction.

5.2 Economic Impact of Chapter-Specific Projects per Chapter

There are ten subsections within Section 5-2, one for each of the nine FBFA chapters and one for regional projects. For each subsection there is a categorized list of projects by name, a total budget for each project category, and the share of the budget within the FBFA. Tables showing IMPLAN model inputs and economic impact outputs are also presented in each subsection. Attachment A shows the impact of each project category within each chapter.

5.2.1 Bodaway Gap

This analysis models a total of 29 Bodaway Gap Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category:

- Animal Shelter – Bitter Springs
- Park and ballfields

- Picnic ground
- Post Office
- Recreation/Wellness Center
- Veterans Center
- Animal Shelter - Gap
- Chapter House - renovation
- Football Field/track
- Multipurpose Center

Education

- Daycare – Bitter Springs
- Daycare – Cedar Ridge
- Daycare
- K-12
- Lifelong Learning Center
- New Head Start

Housing

- New Scattered Residential 284 houses at 1,200 sq. ft. each
- New Elder Living
- New Group Residential, Women's Shelter, Special Needs
- New Cluster Residential 177 houses at 1,200 sq. ft. each
- New Multifamily 16 units at 1,200 sq. ft each.
- Repair Multifamily 8 units at 1,200 sq. ft.
- Repair Residential 148 existing houses at 1,200 sq. ft. each
- Power and Water Upgrades 57 existing houses at 1,200 sq. ft. each

Health

- New Health Care Facilities

Infrastructure

- Active and inactive water and wastewater projects – 134 homes
- Unfunded water, wastewater projects – 401 Homes

Public Safety

- Fire Stations
- Police Station

Table 5-2. Bodaway Gap Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$32,490,526	$29,566,379	10
Education	$80,702,272	$73,439,068	6
Multifamily Housing	$172,476,224	$160,824,119	4
Scattered Housing	$217,489,491	$205,890,052	1
Housing Repairs	$46,759,716	$38,768,122	3
Health	$45,944,788	$41,809,757	1
Infrastructure	$9,608,856	$9,608,856	2
Public Safety	$11,941,823	$10,867,059	2
Total	**$617,413,696**	**$570,773,410**	**29**

Table 5-3. Inputs for the Bodaway Gap Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$29,566,379
Education	Construct. of new educational structures	53	$73,439,068
Multifamily Housing	Construct. of new multifamily structures	58	$160,824,119
Scattered Housing	Construct. of new single-family structures	57	$205,890,052
Housing Repairs	Repair of residential structure	61	$38,768,122
Health	Construct. of new health care structures	50	$41,809,757
Infrastructure	Construction of nonresidential structures	56	$9,608,856
Public Safety	Construct. of new commercial structures	55	$10,867,059
Total			**$570,773,410**

Table 5-4. Total Economic Impact of Bodaway Gap Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	4,758	$234,684,658	$240,144,660	$95,944,093	$570,773,410
Indirect	725	$32,669,854	$49,081,499	$24,424,437	$106,175,790
Induced	969	$43,312,175	$55,972,742	$37,160,431	$136,445,349
Total	**6,451**	**$310,666,688**	**$345,198,901**	**$157,528,961**	**$813,394,550**

5.2.2 Cameron

This analysis models a total of 24 Cameron Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Animal Shelter
- Chapter House, Community Center
- Multipurpose Center
- Park and ballfields
- Senior Center
- Sports Complex - indoor
- Veterans Center

Education

- Daycare
- K-12
- Lifelong Learning Center
- New Head Start

Housing

- New Cluster Residential 129 houses at 1,200 sq. ft. each
- New Elder Living facility
- New Group Residential, Women's Shelter, Special Needs
- New Multifamily 18 units at 1,200 sq. ft each.
- New Scattered Residential 207 houses at 1,200 sq. ft. each
- Power & Water Upgrades 41 existing houses at 1,200 sq. ft. each
- Repair Residential 108 existing houses at 1,200 sq. ft. each

Health

- New Health Care Facilities

Infrastructure

- Active and inactive water and wastewater projects – 88 homes
- Unfunded water, wastewater projects – 309 homes
- Unfunded water, wastewater projects – 58 homes

Public Safety

- Fire Stations
- Police Station

Table 5-5. Cameron Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$33,238,563	$33,238,563	7

Event	Total Budget	Total in FBFA	# in FBFA
Education	$80,752,939	$80,752,939	4
Multifamily Housing	$137,167,316	$137,167,316	4
Scattered Housing	$150,067,749	$150,067,749	1
Housing Repairs	$27,035,265	$27,035,265	2
Health	$53,316,459	$53,316,459	1
Infrastructure	$13,593,903	$13,593,903	3
Public Safety	$11,941,823	$11,941,823	2
Total	**$507,114,017**	**$507,114,017**	**24**

Table 5-6. Inputs for the Cameron Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$33,238,563
Education	Construct. of new educational structures	53	$80,752,939
Multifamily Housing	Construct. of new multifamily structures	58	$137,167,316
Scattered Housing	Construct. of new single-family structures	57	$150,067,749
Housing Repairs	Repair of residential structure	61	$27,035,265
Health	Construct. of new health care structures	50	$53,316,459
Infrastructure	Construction of nonresidential structures	56	$13,593,903
Public Safety	Construct. of new commercial structures	55	$11,941,823
Total			**$507,114,017**

Table 5-7. Total Economic Impact of Cameron Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	4,251	$210,384,026	$212,673,903	$84,056,088	$507,114,017
Indirect	603	$27,438,798	$42,114,343	$20,253,795	$89,806,937
Induced	860	$38,514,290	$49,772,363	$33,044,731	$121,331,384
Total	**5,714**	**$276,337,115**	**$304,560,609**	**$137,354,615**	**$718,252,338**

5.2.3 Coalmine Canyon

This analysis models a total of 21 Coalmine Canyon Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Veterans Center

- Multipurpose Center/Museum
- Park and ballfields
- Post Office
- Rec. Trails

Education

- K-12
- Lifelong Learning Center
- New Head Start

Housing

- New Cluster Residential 50 houses at 1,200 sq. ft. each
- New Elder Living 42 existing houses at 1,200 sq. ft. each
- New Group Residential, Independent Living, Nursing
- New Multifamily, Special Needs, Transitional Students
- New Scattered Residential 80 units at 1,200 sq. ft each.
- Power & Water Upgrades 80 houses at 1,200 sq. ft. each
- Repair Residential 16 existing houses at 1,200 sq. ft. each

Health

- Clinic

Infrastructure

- Active and inactive water and Wastewater projects - 108 homes
- Unfunded water, wastewater projects - 263 homes

Public Safety

- Tribal Court
- Fire Stations
- Police Station

Table 5-8. Coalmine Canyon Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$26,900,005	$26,900,005	5
Education	$33,058,900	$33,058,900	3
Multifamily Housing	$79,528,766	$79,528,766	4
Scattered Housing	$57,997,198	$57,997,198	1
Housing Repairs	$10,520,785	$10,520,785	2

Event	Total Budget	Total in FBFA	# in FBFA
Health	$5,893,513	$5,893,513	1
Infrastructure	$2,444,665	$2,444,665	2
Public Safety	$17,690,363	$17,690,363	3
Total	**$234,034,194**	**$234,034,194**	**21**

Table 5-9. Inputs for the Coalmine Canyon Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$26,900,005
Education	Construct. of new educational structures	53	$33,058,900
Multifamily Housing	Construct. of new multifamily structures	58	$79,528,766
Scattered Housing	Construct. of new single-family structures	57	$57,997,198
Housing Repairs	Repair of residential structure	61	$10,520,785
Health	Construct. of new health care structures	50	$5,893,513
Infrastructure	Construction of nonresidential structures	56	$2,444,665
Public Safety	Construct. of new commercial structures	55	$17,690,363
Total			**$234,034,194**

Table 5-10. Total Economic Impact of Coalmine Canyon Chapter-specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	2,029	$99,653,310	$95,464,752	$38,916,132	$234,034,194
Indirect	269	$12,199,465	$18,836,697	$8,957,803	$39,993,964
Induced	404	$18,116,072	$23,411,579	$15,542,866	$57,070,516
Total	**2,702**	**$129,968,846**	**$137,713,028**	**$63,416,800**	**$331,098,675**

5.2.4 Coppermine

This analysis models a total of 16 Coppermine chapter-specific plan projects. They are listed by category below.

Community Facility and Recreation Category

- Multipurpose Center
- Post Office
- Veterans Center

Education

- Lifelong Learning Center
- Mid/High School
- New Head Start

Housing

- Repair Residential 28 existing houses at 1,200 sq. ft. each
- Power & Water Upgrades 11 existing houses at 1,200 sq. ft. each
- New Cluster Residential 33 houses at 1,200 sq. ft. each
- New Multifamily 5 units at 1,200 sq. ft each.
- New Elder Living, Disabled, Nursing
- New Group Residential, Women's Shelter
- New Scattered Residential 53 houses at 1,200 sq. ft. each

Health

- Clinic

Public Safety

- Fire Stations
- Police and Fire Station

Table 5-11. Coppermine Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$7,962,065	$3,742,171	3
Education	$18,096,958	$8,505,570	3
Multifamily Housing	$56,461,431	$31,116,324	4
Scattered Housing	$63,796,917	$38,423,143	1
Housing Repairs	$24,431,330	$7,056,279	2
Health	$5,893,513	$2,769,951	1
Infrastructure	$0	$0	0
Public Safety	$19,404,347	$9,120,043	2
Total	**$196,046,562**	**$100,733,482**	**16**

Table 5-12. Inputs for the Coppermine Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$3,742,171
Education	Construct. of new educational structures	53	$8,505,570

Event	Industry Sector Description	Sector	Cap Ex Budget
Multifamily Housing	Construct. of new multifamily structures	58	$31,116,324
Scattered Housing	Construct. of new single-family structures	57	$38,423,143
Housing Repairs	Repair of residential structure	61	$7,056,279
Health	Construct. of new health care structures	50	$2,769,951
Infrastructure	Construction of nonresidential structures	56	$0
Public Safety	Construct. of new commercial structures	55	$9,120,043
Total			**$100,733,482**

Table 5-13. Total Economic Impact of Coppermine Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	847	$41,495,459	$42,259,726	$16,978,297	$100,733,482
Indirect	130	$5,857,263	$8,730,470	$4,395,017	$18,982,750
Induced	173	$7,673,878	$9,917,035	$6,583,697	$24,174,610
Total	**1,149**	**$55,026,599**	**$60,907,231**	**$27,957,012**	**$143,890,842**

5.2.5 Kaibeto

This analysis models a total of 22 Kaibeto Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Chapter House - renovation
- Multipurpose Center
- Recreation Center

Education

- Daycare
- K-12
- Lifelong Learning Center
- New Head Start

Housing

- New Scattered Residential 27 houses at 1,200 sq. ft. each
- New Cluster Residential 17 houses at 1,200 sq. ft. each
- New Multifamily 2 units at 1,200 sq. ft each.
- New Elder Living
- New Group Residential facility

- Repair Residential 14 existing houses at 1,200 sq. ft. each
- Power & Water Upgrades 5 existing houses at 1,200 sq. ft. each

Health

- Clinic
- Urgent Care

Infrastructure

- Active and inactive water and Wastewater projects – 58 homes
- Active and inactive water and Wastewater projects – 86 homes
- Unfunded water, wastewater projects – 185 homes
- Unfunded water, wastewater projects – 36 homes

Public Safety

- Fire Stations
- Police Station

Table 5-14. Kaibeto Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$23,433,805	$2,109,042	3
Education	$80,752,939	$7,267,765	4
Multifamily Housing	$126,671,208	$15,913,525	4
Scattered Housing	$131,218,660	$19,574,054	1
Housing Repairs	$80,170,479	$3,464,506	2
Health	$8,131,662	$731,850	2
Infrastructure	$11,517,150	$11,517,150	4
Public Safety	$11,941,823	$1,074,764	2
Total	**$473,837,727**	**$61,652,656**	**22**

Table 5-15. Inputs for the Kaibeto Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$2,109,042
Education	Construct. of new educational structures	53	$7,267,765
Multifamily Housing	Construct. of new multifamily structures	58	$15,913,525
Scattered Housing	Construct. of new single-family structures	57	$19,574,054
Housing Repairs	Repair of residential structure	61	$3,464,506
Health	Construct. of new health care structures	50	$731,850

Event	Industry Sector Description	Sector	Cap Ex Budget
Infrastructure	Construction of nonresidential structures	56	$11,517,150
Public Safety	Construct. of new commercial structures	55	$1,074,764
Total			**$61,652,656**

Table 5-16. Total Economic Impact of Kaibeto Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	560	$27,560,797	$27,319,044	$6,772,815	$61,652,656
Indirect	79	$3,604,143	$5,469,286	$2,674,746	$11,748,175
Induced	113	$5,047,335	$6,522,718	$4,330,510	$15,900,563
Total	**751**	**$36,212,275**	**$39,311,048**	**$13,778,071**	**$89,301,394**

5.2.6 Leupp

This analysis models a total of 17 Leupp Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Animal Shelter
- Chapter House - renovation
- Post Office
- Recreation Center

Education

- Daycare
- K-12
- Lifelong Learning Center

Housing

- New Cluster Residential 2 houses at 1,200 sq. ft. each
- Power and Water Upgrades 1 existing home at 1,200 sq. ft. each
- Repair Residential 1 existing houses at 1,200 sq. ft. each
- Repair Multifamily 8 units at 1,200 sq. ft.
- New Scattered Residential 3 houses at 1,200 sq. ft. each
- New Elder Living, Senior Center
- New Group Residential facility

Health

- New Health Care Facilities

Public Safety

- Fire Stations
- Police Station

Table 5-17. Leupp Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$25,489,312	$254,893	4
Education	$32,135,495	$321,355	3
Multifamily Housing	$125,726,558	$1,667,873	3
Scattered Housing	$121,069,150	$2,174,895	1
Housing Repairs	$83,911,742	$1,945,375	3
Health	$33,052,429	$330,524	1
Infrastructure	$0	$0	0
Public Safety	$11,941,823	$119,418	2
Total	**$433,326,509**	**$6,814,334**	**17**

Table 5-18. Inputs for the Leupp Chapter-specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct new commercial structures	55	$254,893
Education	Construct new educational structures	53	$321,355
Multifamily Housing	Construct new multifamily structures	58	$1,667,873
Scattered Housing	Construct new single-family structures	57	$2,174,895
Housing Repairs	Repair of residential structure	61	$1,945,375
Health	Construct new health care structures	50	$330,524
Infrastructure	Construct nonresidential structures	56	$0
Public Safety	Construct new commercial structures	55	$119,418
Total			**$6,814,334**

Table 5-19. Total Economic Impact of Leupp Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	50	$2,511,696	$3,155,473	$1,147,165	$6,814,334

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Indirect	10	$461,526	$670,772	$357,111	$1,489,409
Induced	10	$482,131	$623,063	$413,641	$1,518,835
Total	**72**	**$3,455,353**	**$4,449,308**	**$1,917,918**	**$9,822,579**

5.2.7 Tolani Lake

This analysis models a total of 21 Tolani Lake Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Chapter House – renovation
- Veterans Center
- Multipurpose Center
- Outdoor Recreation Center
- Playground
- Post Office
- Recreation Center

Education

- K-12
- Lifelong Learning Center
- New Head Start

Housing

- Repair Residential 33 existing houses at 1,200 sq. ft. each
- Power and Water Upgrades 13 existing houses at 1,200 sq. ft. each
- New Cluster Residential 40 houses at 1,200 sq. ft. each
- New Multifamily 5 units at 1,200 sq. ft each.
- New Elder Living, Nursing, Convalescence, Elder
- New Group Residential, Emergency Shelter
- New Scattered Residential 64 houses at 1,200 sq. ft. each

Health

- Clinic
- Urgent Care

Public Safety

- Fire Stations

- Police Station

Table 5-20. Tolani Lake Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$27,628,034	$13,537,737	7
Education	$28,967,546	$14,194,097	3
Multifamily Housing	$61,037,734	$35,686,177	4
Scattered Housing	$75,396,357	$46,397,758	1
Housing Repairs	$28,097,848	$8,320,874	2
Health	$6,318,917	$3,096,269	2
Infrastructure	$0	$0	0
Public Safety	$11,941,823	$5,851,493	2
Total	**$239,388,259**	**$127,084,406**	**21**

Table 5-21. Inputs for the Tolani Lake Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct new commercial structures	55	$13,537,737
Education	Construct new educational structures	53	$14,194,097
Multifamily Housing	Construct new multifamily structures	58	$35,686,177
Scattered Housing	Construct new single-family structures	57	$46,397,758
Housing Repairs	Repair residential structure	61	$8,320,874
Health	Construct new health care structures	50	$3,096,269
Infrastructure	Construct nonresidential structures	56	$0
Public Safety	Construct new commercial structures	55	$5,851,493
Total			**$127,084,406**

Table 5-22. Total Economic Impact of Tolani Lake Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1,064	$52,151,840	$53,850,349	$21,082,217	$127,084,406
Indirect	160	$7,254,325	$10,925,331	$5,419,424	$23,599,080
Induced	216	$9,625,447	$12,439,064	$8,258,156	$30,322,667
Total	**1,440**	**$69,031,612**	**$77,214,744**	**$34,759,797**	**$181,006,153**

5.2.8 Tonalea

This analysis models a total of 22 Tonalea Chapter-specific projects. They are listed by category below.

Community Facility and Recreation Category

- Animal Shelter
- Multipurpose Center – renovation
- Park and ballfields
- Recreation Center
- Veterans Center

Education

- Daycare
- K-12
- Lifelong Learning Center
- New Head Start

Housing

- Repair Residential 61 existing houses at 1,200 sq. ft. each
- Power and Water Upgrades 23 existing houses at 1,200 sq. ft. each
- New Cluster Residential 73 houses at 1,200 sq. ft. each
- New Multifamily 10 units at 1,200 sq. ft each.
- New Elder Living, Nursing, Elder
- New Group Residential, Veteran's, Women's Shelter
- New Scattered Residential 116 houses at 1,200 sq. ft. each

Health

- Clinic

Infrastructure

- Active and inactive water and wastewater projects - 18 homes
- Unfunded water, wastewater projects

Public Safety

- Tribal Court
- Fire Stations
- Police Station

Table 5-23. Tonalea Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$23,473,692	$6,572,634	5
Education	$36,919,719	$10,337,521	4
Multifamily Housing	$181,077,360	$64,270,190	4
Scattered Housing	$211,689,772	$84,095,937	1
Housing Repairs	$102,603,911	$15,249,885	2
Health	$7,706,259	$2,157,752	1
Infrastructure	$8,964,671	$8,964,671	2
Public Safety	$17,690,363	$4,953,302	3
Total	**$590,125,746**	**$196,601,892**	**22**

Table 5-24. Inputs for the Tonalea Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct. of new commercial structures	55	$6,572,634
Education	Construct. of new educational structures	53	$10,337,521
Multifamily Housing	Construct. of new multifamily structures	58	$64,270,190
Scattered Housing	Construct. of new single-family structures	57	$84,095,937
Housing Repairs	Repair of residential structure	61	$15,249,885
Health	Construct. of new health care structures	50	$2,157,752
Infrastructure	Construction of nonresidential structures	56	$8,964,671
Public Safety	Construct. of new commercial structures	55	$4,953,302
Total			**$196,601,892**

Table 5-25. Total Economic Impact of Tonalea Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1,691	$82,688,177	$83,011,425	$30,902,290	$196,601,892
Indirect	269	$12,058,108	$17,659,993	$9,123,218	$38,841,319
Induced	343	$15,357,287	$19,846,393	$13,175,426	$48,379,106
Total	**2,303**	**$110,103,572**	**$120,517,811**	**$53,200,934**	**$283,822,317**

5.2.9 Tuba City

This analysis models a total of 19 Tuba City chapter-specific plan projects. They are listed by category below.

Community Facility and Recreation Category

- Animal Shelter – expand/upgrade
- Recreation Center
- Youth Center
- Animal Shelter – new boarding and vet clinic
- Chapter House – renovation
- Park and ballfields

Education

- Daycare
- Lifelong Learning Center

Housing

- New Cluster Residential 178 houses at 1,200 sq. ft. each
- New Elder Living, Nursing
- New Group Residential Woman's Shelter, Student Housing, Detox Center
- Power & Water Upgrades 57 existing houses at 1,200 sq. ft. each
- Repair Residential 149 existing houses at 1,200 sq. ft. each
- Repair Multifamily 43 units at 1,200 sq. ft each.
- New Scattered Residential 286 houses at 1,200 sq. ft. each

Infrastructure

- Active and inactive water and Wastewater projects – 137 homes
- Unfunded water, wastewater projects – 1,372 homes

Public Safety

- Fire Stations
- Police Station

Table 5-26. Tuba City Chapter-Specific Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Community Facilities and Recreation	$52,893,955	$10,578,791	6
Education	$13,863,736	$2,772,747	2
Multifamily Housing	$561,329,241	$138,711,842	3

Event	Total Budget	Total in FBFA	# in FBFA
Scattered Housing	$706,840,847	$207,339,982	1
Housing Repairs	$388,475,123	$46,040,553	3
Health	$0	$0	0
Infrastructure	$4,195,283	$4,195,283	2
Public Safety	$23,837,770	$4,767,554	2
Total	**$1,751,435,955**	**$414,406,752**	**19**

Table 5-27. Inputs for the Tuba City Chapter-Specific Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Community Facilities and Recreation	Construct new commercial structures	55	$10,578,791
Education	Construct new educational structures	53	$2,772,747
Multifamily Housing	Construct new multifamily structures	58	$138,711,842
Scattered Housing	Construct new single-family structures	57	$207,339,982
Housing Repairs	Repair residential structure	61	$46,040,553
Health	Construct new health care structures	50	$0
Infrastructure	Construct of nonresidential structures	56	$4,195,283
Public Safety	Construct new commercial structures	55	$4,767,554
Total			**$414,406,752**

Table 5-28. Total Economic Impact of Tuba City Chapter-Specific Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	3,464	$168,728,341	$176,032,301	$69,646,111	$414,406,752
Indirect	611	$27,063,095	$38,779,573	$20,752,070	$86,594,738
Induced	711	$31,752,140	$41,033,673	$27,240,168	$100,025,981
Total	**4,786**	**$227,543,576**	**$255,845,546**	**$117,638,349**	**$601,027,472**

5.2.10 Regional

This analysis models a total of 15 Regional Chapter-specific projects. They are listed by category below.

Regarding transportation, to the extent that some or all of the projects have been completed already, future maintenance of other roads will still be required. Thus, the road projects showing below should be considered representative.

Health

- Renovate and Expand Tuba City Regional Hospital
- Tuba City Health Center – Emergency Repairs

Infrastructure

- Western Navajo Pipeline
- Pipeline – C-aquifer Leupp to Dilcon

Transportation

- Route N101
- Route N609/N614 Project No. N609(1-1)2,4
- Route N619, Project No. N619(1)2,4
- Route N6331/N6330, Project No. N6731 (1)1,2,3
- Route N101, Project No. N101(8)2&4
- Route N101, Project No. N101(9)2&4
- Route N101, Project No. N101(9)2&4
- Route N20, Project No. N20(3)2,5 – Phase 1
- Route N20, Project No. N20(3)2,6 – Phase 2
- Route N20, Project No. N20(3)2,6 – Phase 3
- Route N609 Project No. N609(2)2,4

Table 5-29. Regional Project Budgets

Event	Total Budget	Total in FBFA	# in FBFA
Housing	$27,314,017	$6,268,884	1
Hospital	$314,778,378	$69,251,243	1
Infrastructure	$582,528,447	$582,528,447	2
Transportation	$112,848,195	$112,559,122	11
Total	**$1,037,469,037**	**$770,607,696**	**15**

Table 5-30. Inputs for the Regional Projects

Event	Industry Sector Description	Sector	Cap Ex Budget
Housing	Repair of nonresidential structures	60	$6,268,884
Hospital	Construct new health care structures	50	$69,251,243
Infrastructure	Construct of nonresidential structures	56	$582,528,447
Transportation	Maintenance of highways and streets	62	$112,559,122
Total			**$770,607,696**

Table 5-31. Total Economic Impact of Regional Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	8,614	$427,947,073	$439,112,893	($96,452,269)	$770,607,696
Indirect	1,020	$48,410,089	$77,769,737	$34,392,286	$160,572,112
Induced	1,725	$77,087,741	$99,621,114	$66,142,085	$242,850,940
Total	**11,359**	**$553,444,903**	**$616,503,743**	**$4,082,102**	**$1,174,030,748**

5.3 Chapter-Specific Projects by Category and Phasing

There are nine subsections within Section 5.2.10, one for each project category. Within each subsection, there is a budget schedule allocating annual portions over a seven-year development horizon. The annual average of all projects is used to determine the allocation. Future event years remain modeled in 2021 dollars, noting that actual future capital expenditures will increase with inflation. IMPLAN model inputs and economic impact outputs are also presented in each subsection. Attachment B shows the annual impact of each project category for each of the seven years.

5.3.1 Community Facilities and Recreation

There are 50 individual Chapter-Specific Projects categorized as Community Facilities and Recreation.

Table 5-32. Inputs for the Chapter-Specific Community Facilities and Recreation

Year	Industry Sector Description	Cap Ex Budget
2021	Construct new commercial structures	$2,194,521
2022	Construct new commercial structures	$15,324,688
2023	Construct new commercial structures	$22,055,941
2024	Construct new commercial structures	$28,380,764
2025	Construct new commercial structures	$25,277,392
2026	Construct new commercial structures	$22,759,928
2027	Construct new commercial structures	$10,506,979
Total	**Construct new commercial structures**	**$126,500,213**

Table 5-33. Total Economic Impact of Chapter-Specific Community Facilities and Rec

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	153	$50,916,858	$63,890,718	$11,692,637	$126,500,213
Indirect	14	$5,071,194	$9,440,646	$3,316,841	$17,828,681
Induced	29	$9,067,650	$11,718,236	$7,779,067	$28,564,953

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Total	**196**	**$65,055,702**	**$85,049,600**	**$22,788,545**	**$172,893,847**

5.3.2 Education

There are 32 individual Chapter-Specific Projects categorized as Education.

Table 5-34. Inputs for the Chapter-Specific Education Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Construct new educational structures	$4,001,307
2022	Construct new educational structures	$27,941,760
2023	Construct new educational structures	$40,214,966
2024	Construct new educational structures	$51,747,124
2025	Construct new educational structures	$46,088,694
2026	Construct new educational structures	$41,498,561
2027	Construct new educational structures	$19,157,552
Total	**Construct new educational structures**	**$230,649,964**

Table 5-35. Total Economic Impact of Chapter-Specific Education Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	254	$93,579,661	$94,331,367	$42,738,936	$230,649,964
Indirect	24	$8,148,667	$15,317,178	$5,499,941	$28,965,785
Induced	52	$16,390,061	$21,180,765	$14,069,703	$51,640,529
Total	**330**	**$118,118,389**	**$130,829,310**	**$62,308,580**	**$311,256,278**

5.3.3 New Scattered Housing

Each chapter includes a New Scattered Housing project; however, each project contains many housing units. The Chapter-Specific Projects budget for a total of 1,120 housing units at 1,200 sq ft each.

Table 5-36. Inputs for the Chapter-Specific New Scattered Housing Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Construct new single-family structures	$14,085,866
2022	Construct new single-family structures	$98,363,827
2023	Construct new single-family structures	$141,569,392

Year	Industry Sector Description	Cap Ex Budget
2024	Construct new single-family structures	$182,166,229
2025	Construct new single-family structures	$162,246,770
2026	Construct new single-family structures	$146,088,048
2027	Construct new single-family structures	$67,440,636
Total	**Construct new single-family structures**	**$811,960,768**

Table 5-37. Total Economic Impact of Chapter-Specific New Scattered Housing Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	888	$303,069,432	$390,476,671	$118,414,664	$811,960,768
Indirect	198	$61,089,298	$85,902,365	$47,270,469	$194,262,133
Induced	189	$59,092,584	$76,366,045	$50,695,901	$186,154,530
Total	**1,275**	**$423,251,315**	**$552,745,081**	**$216,381,034**	**$1,192,377,430**

5.3.4 New Multifamily and Clustered Housing

Each chapter includes several New Multifamily and Clustered Housing projects; however, each project contains many housing units. The Chapter-Specific Projects budget for a total of 797 housing units at 1,200 sq ft each.

Table 5-38. Inputs for the Chapter-Specific New Multifamily Housing Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Construct new multifamily structures	$11,534,421
2022	Construct new multifamily structures	$80,546,680
2023	Construct new multifamily structures	$115,926,200
2024	Construct new multifamily structures	$149,169,522
2025	Construct new multifamily structures	$132,858,177
2026	Construct new multifamily structures	$119,626,369
2027	Construct new multifamily structures	$55,224,766
Total	**Construct new multifamily structures**	**$664,886,135**

Table 5-39. Total Economic Impact of Chapter-Specific New Multifamily Housing Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	994	$340,045,355	$175,397,006	$149,443,773	$664,886,135
Indirect	94	$29,308,693	$42,749,557	$21,384,713	$93,442,963

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Induced	191	$59,849,333	$77,344,103	$51,342,238	$188,535,675
Total	**1,279**	**$429,203,382**	**$295,490,666**	**$222,170,725**	**$946,864,773**

5.3.5 Housing Repairs

Each chapter includes several Housing Repair projects; however, each project contains many housing units. The Chapter-Specific Projects budget for a total of 905 housing units to be repaired.

Table 5-40. Inputs for the Chapter-Specific Housing Repair Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Repair of residential structure	$2,747,945
2022	Repair of residential structure	$19,189,341
2023	Repair of residential structure	$27,618,113
2024	Repair of residential structure	$35,537,961
2025	Repair of residential structure	$31,651,966
2026	Repair of residential structure	$28,499,636
2027	Repair of residential structure	$13,156,679
Total	**Repair of residential structure**	**$158,401,643**

Table 5-41. Total Economic Impact of Chapter-Specific Housing Repair Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	110	$36,492,057	$97,771,670	$24,137,915	$158,401,643
Indirect	49	$15,087,913	$21,265,116	$12,305,859	$48,658,887
Induced	27	$8,382,687	$10,833,012	$7,192,481	$26,408,180
Total	**186**	**$59,962,656**	**$129,869,798**	**$43,636,256**	**$233,468,710**

5.3.6 Health

There are 12 individual Chapter-Specific Projects categorized as Health. This category includes the Tuba City Hospital, of which only 22 percent of the expense is modeled in this analysis for being inside the FBFA. Here is the note from the Recovery Plan project list: “I.H.S - 2004 "Navajo Area Health Services Master Plan" for 2015 for service population of 29,000 (6,500 or 22 percent inside FBFA)”.

Table 5-42. Inputs for the Chapter-Specific Health Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Construct new health care structures	$3,211,380
2022	Construct new health care structures	$22,425,572
2023	Construct new health care structures	$32,275,834
2024	Construct new health care structures	$41,531,343
2025	Construct new health care structures	$36,989,986
2026	Construct new health care structures	$33,306,024
2027	Construct new health care structures	$15,375,519
Total	**Construct new health care structures**	**$185,115,660**

Table 5-43. Total Economic Impact of Chapter-Specific Health Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	182	$65,910,689	$83,073,449	$36,131,522	$185,115,660
Indirect	21	$7,121,413	$12,881,733	$4,615,615	$24,618,761
Induced	38	$11,816,155	$15,270,109	$10,138,509	$37,224,773
Total	**241**	**$84,848,257**	**$111,225,290**	**$50,885,646**	**$246,959,194**

5.3.7 Infrastructure

Six of the chapters have budgeted for infrastructure projects. The regional infrastructure projects include the Western Navajo pipeline and C-aquifer Leupp to Dilcon pipeline. For infrastructure projects, the FBFA percentage field is blank on the itemized product list, so all infrastructure budgets are modeled inside the FBFA.

Table 5-44. Inputs for the Chapter-Specific Infrastructure Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Construction of nonresidential structures	$10,978,710
2022	Construction of nonresidential structures	$76,666,068
2023	Construction of nonresidential structures	$110,341,059
2024	Construction of nonresidential structures	$141,982,771
2025	Construction of nonresidential structures	$126,457,281
2026	Construction of nonresidential structures	$113,862,959
2027	Construction of nonresidential structures	$52,564,125
Total	**Construction of nonresidential structures**	**$632,852,972**

Table 5-45. Total Economic Impact of Chapter-Specific Infrastructure Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1,079	$375,137,298	$365,987,240	($108,271,565)	$632,852,972
Indirect	111	$37,773,104	$62,584,919	$26,330,590	$126,688,613
Induced	213	$66,796,206	$86,321,242	$57,312,916	$210,430,363
Total	**1,403**	**$479,706,608**	**$514,893,400**	**($24,628,059)**	**$969,971,949**

Notice that the direct impact on taxes/profits is showing a loss of $108 million. As described in Section 4.1.1, taxes/profits are the sum of Taxes on Production and Imports (TOPI) and Other Property Income (OPI) for each economic sector. Since taxes are positive, we know that OPI for this sector must be negative or running a deficit. In other words, the industry as a whole for the county posted a deficit in 2018, the most recent data year available.

In this case, infrastructure projects are modeled using Sector 56 data (Construction of other new nonresidential structures). This is because the underlying IMPLAN data shows Sector 56 in Coconino County ran a deficit (negative OPI) in 2018, the most recent data year available. Sector 56 (Construction of other new nonresidential structures) employed 554 people in 2018, producing a total output of $44 million, and yet OPI was $(7,992,808.91).

Implementing the 2020 Regional Recovery Plan will increase the industry's size, with the annual average output double the current size of the industry. If absorbed, the industry most likely would not run a deficit. It is also most likely that employees will need to be brought in from outside Coconino County. Modeling the economic impacts of these likelihoods is beyond the scope of this analysis.

5.3.8 Public Safety

There are 20 individual Chapter-Specific Projects categorized as Public Safety, primarily police stations and fire stations.

Table 5-46. Inputs for the Chapter-Specific Public Safety Projects

Year	Industry Sector Description	Cap Ex Budget
2020	Construct. of new commercial structures	$1,151,659
2021	Construction of nonresidential structures	$8,042,216
2022	Construction of nonresidential structures	$11,574,698
2023	Construction of nonresidential structures	$14,893,890
2024	Construction of nonresidential structures	$13,265,277
2025	Construction of nonresidential structures	$11,944,142
2026	Construction of nonresidential structures	$5,513,939
Total	**Construction of nonresidential structures**	**$66,385,820**

Table 5-47. Total Economic Impact of Chapter-Specific Public Safety Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	80	$26,720,567	$33,529,096	$6,136,158	$66,385,820
Indirect	8	$2,661,303	$4,954,339	$1,740,639	$9,356,281
Induced	15	$4,758,596	$6,149,592	$4,082,362	$14,990,551
Total	**103**	**$34,140,465**	**$44,633,027**	**$11,959,160**	**$90,732,652**

5.3.9 Transportation

The 2008 Recovery Plan presents capital budgets for $87 million of transportation projects, which adjusts to $113 million in 2021 dollars. While some of these projects may have been completed since 2008 due to the federal funding mechanisms described in the 2020 Recovery Plan, the need for road maintenance is ongoing. Therefore, this analysis considers $113 million a reasonable budget needed for current regional road maintenance. For transportation projects, the FBFA percentage field is blank on the itemized product list, so all infrastructure budgets are modeled as inside the FBFA.

Table 5-48. Inputs for the Chapter-Specific Transportation Projects

Year	Industry Sector Description	Cap Ex Budget
2021	Maintenance of highways and streets	$1,952,671
2022	Maintenance of highways and streets	$13,635,814
2023	Maintenance of highways and streets	$19,625,242
2024	Maintenance of highways and streets	$25,253,031
2025	Maintenance of highways and streets	$22,491,671
2026	Maintenance of highways and streets	$20,251,646
2027	Maintenance of highways and streets	$9,349,047
Total	**Maintenance of highways and streets**	**$112,559,122**

Table 5-49. Total Economic Impact of Chapter-Specific Transportation Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	164	$56,401,204	$67,224,673	($11,066,755)	$112,559,122
Indirect	34	$10,483,661	$14,591,032	$8,043,524	$33,118,217
Induced	34	$10,845,666	$14,015,979	$9,304,688	$34,166,333
Total	**232**	**$77,730,531**	**$95,831,684**	**$6,281,457**	**$179,843,672**

5.3.10 Total of Chapter-Specific and Regional Projects Combined

The total capital budget for all Chapter-Specific Projects is $3 billion in 2021 dollars. This investment will support an average of 3,905 direct jobs per year for 7 years, assuming all of the projects are completed within that time frame. Additionally, this investment will generate $577 million of indirect activity and $778 million of induced activity.

Table 5-50. Total Economic Impact of All Chapter-Specific Projects

Type	Avg annual Jobs for 7 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	3,905	$1,348,273,121	$1,371,681,891	$269,357,285	$2,989,312,297
Indirect	553	$176,745,245	$269,686,884	$130,508,192	$576,940,320
Induced	789	$246,998,940	$319,199,083	$211,917,865	$778,115,888
Total	**5,247**	**$1,772,017,305**	**$1,960,567,858**	**$611,783,342**	**$4,344,368,505**

Table 5-51 breaks down, by tax category, the $293 million in tax revenues that result from the direct Chapter-Specific Project investments. An additional $97 million in tax revenue is generated from indirect economic activity, and $103 million results from induced spending. In total, the $3 billion of direct Chapter-Specific Project investment will generate $493 million in tax revenue.

Table 5-51. Tax Revenue Impacts of All Chapter-Specific Projects by Tax Category

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$5,279,858	$8,038,591	$4,060,505	$34,574,989	$240,654,956	$292,608,898
Indirect	$9,421,478	$13,935,304	$7,196,376	$29,035,478	$37,255,413	$96,844,048
Induced	$7,869,286	$11,657,754	$6,012,975	$25,960,909	$51,698,855	$103,199,779
Total	**$22,570,622**	**$33,631,650**	**$17,269,855**	**$89,571,375**	**$329,609,224**	**$492,652,726**

As described in Section 5.3.7, the infrastructure construction industry (Sector 56) ran a deficit for Other Property Income (OPI) in 2018, the most recent data year available. As a result, the combined direct impact of taxes/profits ($269 million) is less than the direct, tax-only impact of $293 million.

Table 5-52 below shows the top 15 industry sectors most impacted by all Chapter-Specific Project investment. The type of impact is shown as well. Building supply, real estate, medical, and food service are among the top sectors due to indirect and induced spending.

Table 5-52. Total Economic Impact by Industry of All Chapter-Specific Projects for the Top 15 Industries

Economic Sector\Total Output	Direct	Indirect	Induced	Total
57 - Construction of new single-family residential structures	$811,960,768	$0	$0	$811,960,768
58 - Construction of new multifamily residential structures	$664,886,133	$0	$0	$664,886,133

Economic Sector\Total Output	Direct	Indirect	Induced	Total
56 - Construction of other new nonresidential structures	$632,852,975	$0	$0	$632,852,975
53 - Construction of new educational and vocational structures	$230,649,962	$0	$0	$230,649,962
55 - Construction of new commercial structures, including farm	$192,886,032	$0	$0	$192,886,032
50 - Construction of new health care structures	$185,115,660	$0	$0	$185,115,660
405 - Retail - building material, garden equip, supplies stores	$0	$172,355,759	$4,708,371	$177,064,130
61 - Maintenance and repair Construction of residential	$158,401,644	$68,994	$5,546,341	$164,016,979
449 - Owner-occupied dwellings	$0	$0	$131,605,057	$131,605,057
62 - Maintenance and repair Construction of highways, streets	$112,559,122	$4	$3,611	$112,562,736
447 - Other real estate	$0	$51,818,976	$34,866,327	$86,685,304
490 - Hospitals	$0	$0	$85,081,292	$85,081,292
483 - Offices of physicians	$0	$0	$38,887,415	$38,887,415
396 - Other durable goods merchant wholesalers	$0	$32,828,209	$2,622,046	$35,450,255
510 - Limited-service restaurants	$0	$835,862	$32,501,047	$33,336,908

6. Infrastructure Capital Improvement Projects

Within the Navajo Nation, every Chapter must maintain Infrastructure Capital Improvement Plan listings. The 2020 Recovery Plan lists Infrastructure Capital Improvement Plan summaries for each Chapter. Additional details are provided in each 2020 Chapter Recovery Plans.

6.1 Organization of Infrastructure Capital Improvement Plan Capital Expenditure Budgets

Budget items include land, planning/predesign, architecture/engineering, construction, and others. For economic impact modeling, only planning/predesign, architecture/engineering, and construction are counted as capital expenditures for IMPLAN inputs. All of the dollar amounts shown in the Chapter Recovery Plans are assumed to be 2020 dollars and are modeled and presented as 2021 dollars in this analysis. The total budget for Infrastructure Capital Improvement Plans is $374 million, of which $338 million is modeled in IMPLAN as capital expenditure. Table 6-1 below shows ICIP budgets by expense item category.

Table 6-1. Total Infrastructure Capital Improvement Plan Budget

Infrastructure Capital Improvement Plan Expense Category	Budget
Land	$25,468,500
Planning	$8,173,682
A/E	$12,984,780
Construction	$316,862,810
Other not with construction	$2,666,499
Other with construction	$8,288,994
Total	**$374,445,266**

6.2 ICIP Land Acquisition

IMPLAN models the value of production, and land is not considered to be produced. In other words, the land acquisition does not support jobs and generate economic activity in the same manner that constructing a building does. Thus, the total Infrastructure Capital Improvement Plan land acquisition budget of $25 million does not contribute to the IMPLAN impact results.

6.3 Other ICIP Expense Items

There are two types of “other” Infrastructure Capital Improvement Plan expenses, those associated with construction projects and those not associated with construction. The former is assumed to be largely FFE and similar expenses. For example, $2.4 million is budgeted for a new multi-purpose building in Bodaway Gap Chapter, which includes $20,000 of “other” expense. We assume this $20,000 to be FFE, and it is not counted as capital expenditure for IMPLAN modeling. The total amount budgeted for this type of expense is $8 million.

Several Infrastructure Capital Improvement Plan projects have budget expenses for planning and "other" and do not appear to be associated with actual development. These projects are predominately feasibility and design studies and some equipment purchases, and are not counted as capital expenditure for IMPLAN modeling.

Table 6-2. Total Infrastructure Capital Improvement Plan projects not associated with construction

Chapter	Event	Category	Budget
Cameron	E911 addressing system	Econ development	$40,788
Coalmine	Home renovation and repairs	Housing	$203,939
Coalmine	Light industrial site	Econ development	$101,969
Coppermine	Environmental surveys, biological assessments	Roads/streets	$571,028
Coppermine	Develop Community and Economic Development plan	Econ development	$203,939
Coppermine	Purchase and equip backhoe	Econ development	$50,985
Kaibeto	Infrastructure design	Water system	$377,287
Kaibeto	Plan/Design/Cons Power and waterline connect	Water system	$254,923
Tolani Lake	Purchase motor grader	Econ development	$132,560
Tolani Lake	Withdrawal of gravel pit tract	Econ development	$729,081
Total			**$2,666,499**

6.4 ICIP Project Impacts by Chapter

There are nine Subsections within Section 6.2, one for each of the nine FBFA chapters. For each subsection, there is a categorized list of projects by name and a total budget for each project category. The share of the budget within the FBFA for each of these projects was not available. The first table in each Subsection shows the IMPLAN model inputs, and the second table presents economic impact outputs for each Chapter's Infrastructure Capital Improvement Plan projects collectively.

6.4.1 Bodaway Gap

Table 6-3. Inputs for the Bodaway Gap ICIPs

Event	Category	Sector	Cap Ex Budget
Power Line Ext E/W Chapter	Single phase	52	$713,786
Water Line Ext E/W Chapter	Water system	56	$713,786
Bathroom Addition Project	Econ development	59	$856,543
Echo Cliffs Veterans Facility	Econ development	55	$2,549,234
Chapter House/Senior Center	Senior Citizens	55	$2,472,757
Multi-purpose building	Multi-purpose building	55	$2,457,462
Construct Junction 89/160 Truck Stop	Econ development	55	$8,973,305

Event	Category	Sector	Cap Ex Budget
Total			**$18,736,872**

Table 6-4. Economic Impact of Bodaway Gap Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	157	$7,470,196	$9,555,303	$1,711,374	$18,736,872
Indirect	17	$813,903	$1,468,847	$544,143	$2,826,892
Induced	30	$1,341,752	$1,733,963	$1,151,093	$4,226,808
Total	**203**	**$9,625,851**	**$12,758,113**	**$3,406,609**	**$25,790,573**

6.4.2 Cameron

Table 6-5. Inputs for the Cameron Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Upgrade Head Start with cooling, heating, roof	Head Start	60	$42,827
Upgrade Chapter sewer line	Water system	60	$138,678
North Cameron powerline extension	Single phase	52	$892,232
E911 addressing system	Econ development	NA	$0
New Demo Farm	Econ development	55	$458,862
New Cameron Cultural Center	Econ development	55	$645,806
Upgrade solid waste transfer station	Solid waste	60	$2,549,234
New chapter house	Chapter House	55	$2,671,598
South powerline extension project	Single phase	52	$892,232
Total			**$8,291,469**

Table 6-6. Economic Impact of Cameron Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	57	$2,723,440	$4,433,124	$1,134,905	$8,291,469
Indirect	10	$456,488	$754,188	$329,005	$1,539,681
Induced	12	$515,557	$666,261	$442,294	$1,624,112
Total	**78**	**$3,695,485**	**$5,853,573**	**$1,906,203**	**$11,455,261**

6.4.3 Coalmine Canyon

Table 6-7. Inputs for the Coalmine Canyon Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Coalmine scattered powerline	Single phase	52	$92,619,800
Water/sewer phase II w/booster station	Water system	56	$774,967
Land line phone	Chapter House	52	$2,039,387
Chapter facility audit and repair	Chapter House	60	$768,169
Kerley Valley electrical hookup	Single phase	52	$141,901
Assisted living home	Senior Citizens	55	$1,019,694
Pave N Route 6720	Roads/streets	54	$30,590,811
Construct Coalmine Cemetery	Cemetery tract	55	$101,969
Install scattered solar system	Econ development	61	$305,908
Total			**$128,362,607**

Table 6-8. Economic Impact of Coalmine Canyon Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	737	$36,655,996	$60,098,062	$31,608,548	$128,362,607
Indirect	125	$6,274,821	$10,536,217	$4,395,874	$21,206,912
Induced	156	$6,954,881	$8,987,866	$5,966,904	$21,909,651
Total	**1,018**	**$49,885,699**	**$79,622,146**	**$41,971,325**	**$171,479,170**

6.4.4 Coppermine

Table 6-9. Inputs for the Coppermine Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Coppermine scattered powerline project	Single phase	52	$1,093,042
KOKO waterline Project extension	Water system	56	$19,437,911
Scattered housing development FBFA	Housing	57	$4,588,622
Multi-purpose building	Multi-purpose building	55	$2,625,711
Agriculture water development	Water system	49	$20,394
Chapter parking lot	Parking lot	55	$219,234
Coppermine Chapter Telecommunication	Econ development	52	$509,847
Total			**$28,494,762**

Table 6-10. Economic Impact of Coppermine Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	301	$14,846,503	$15,627,228	($1,979,119)	$28,494,612
Indirect	36	$1,702,322	$2,753,297	$1,207,305	$5,662,925
Induced	60	$2,678,581	$3,461,553	$2,298,212	$8,438,346
Total	**396**	**$19,227,407**	**$21,842,079**	**$1,526,398**	**$42,595,883**

6.4.5 Kaibeto

Table 6-11. Inputs for the Kaibeto Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Solid Waste Transfer Station	Solid waste	56	$837,169
Multipurpose building	Multi-purpose building	55	$9,789,060
Plan/Design/Construct one-stop tribal complex	Multi-purpose building	55	$3,181,444
Plan/Design/Construct Kaibeto safety complex	Public safety	55	$3,207,956
Plan/Design/Construct Community road and street	Roads/streets	54	$5,302,407
Plan/Design/Construct Veterans Cemetery	Cemetery tract	55	$81,575
Total			**$22,399,612**

Table 6-12. Economic Impact of Kaibeto Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	174	$8,456,642	$11,313,318	$2,629,652	$22,399,612
Indirect	19	$925,891	$1,736,428	$627,772	$3,290,090
Induced	34	$1,518,700	$1,962,631	$1,302,987	$4,784,317
Total	**226**	**$10,901,233**	**$15,012,376**	**$4,560,411**	**$30,474,020**

6.4.6 Leupp

Table 6-13. Inputs for the Leupp Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
N Grandfalls powerline extension	Single phase	52	$3,210,800
N Leupp powerline extension	Single phase	52	$412,976
E Canyon Diablo powerline extension	Single phase	52	$963,611

Event	Category	Sector	Cap Ex Budget
S Leupp powerline extension	Single phase	52	$1,269,519
S Grandfalls powerline extension	Single phase	52	$688,293
Round Cedar - GF waterline extension	Water system	56	$892,232
W Canyon Diablo powerline extension	Single phase	52	$2,039,387
Total			**$9,476,818**

Table 6-14. Economic Impact of Leupp Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	62	$3,002,226	$4,438,448	$2,036,145	$9,476,818
Indirect	10	$488,027	$785,801	$336,138	$1,609,966
Induced	13	$565,728	$731,098	$485,329	$1,782,155
Total	**84**	**$4,055,981**	**$5,955,347**	**$2,857,611**	**$12,868,939**

6.4.7 Tolani Lake

Table 6-15. Inputs for the Tolani Lake Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Parking lot for Senior Center and Preschool	Parking lot	55	$113,186
Water Line 10 miles N of TL chapter	Water system	56	$522,083
NW Powerline extension	Single phase	52	$535,339
Construct community recreation park	Recreation	55	$464,980
Parking lot for TL Chapter House	Parking lot	55	$198,840
Total			**$1,834,429**

Table 6-16. Economic Impact of Tolani Lake Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	16	$776,463	$938,972	$118,994	$1,834,429
Indirect	2	$89,423	$153,119	$60,742	$303,284
Induced	3	$140,208	$181,192	$120,289	$441,689
Total	**21**	**$1,006,094**	**$1,273,283**	**$300,025**	**$2,579,402**

6.4.8 Tonalea

Table 6-17. Inputs for the Tonalea Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
New Chapter House	Chapter House	55	$2,651,554
Wildcat Powerline extension Phase II	Single phase	52	$1,598,119
Sour Wash Powerline extension	Single phase	52	$718,884
White Mesa Powerline extension Phase II	Single phase	52	$688,293
Total			**$5,656,851**

Table 6-18. Economic Impact of Tonalea Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	40	$1,933,128	$2,712,381	$1,011,341	$5,656,851
Indirect	5	$258,502	$442,088	$174,203	$874,793
Induced	8	$355,148	$458,963	$304,673	$1,118,783
Total	**54**	**$2,546,778**	**$3,613,432**	**$1,490,217**	**$7,650,428**

6.4.9 Tuba City

Table 6-19. Inputs for the Tuba City Infrastructure Capital Improvement Plan Projects

Event	Category	Sector	Cap Ex Budget
Head Start Renovation	Head Start	60	$1,551,974
Community and Veterans Cemeteries	Cemetery tract	55	$1,543,816
New Youth Center	Multi-purpose building	55	$6,913,523
Community and Convention Center	Multi-purpose building	55	$11,471,554
New Equestrian Center	Recreation	55	$25,186,435
New Chapter House	Chapter House	55	$1,070,678
New Fire Department	Public safety	55	$11,726,478
New Sports Complex	Recreation	55	$40,073,963
New Senior Building	Senior Citizens	55	$4,456,062
Kerley Valley Road Improvement	Roads/streets	62	$2,855,142
Moenave Road Improvement	Roads/streets	62	$5,516,543
Old Airport Loop Road	Roads/streets	62	$954,535

Event	Category	Sector	Cap Ex Budget
Chee Willie Road Improvements	Roads/streets	62	$1,447,149
Total			**$114,767,853**

Table 6-20. Economic Impact of Tuba City Infrastructure Capital Improvement Plan Projects

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	987	$47,023,642	$59,146,453	$8,597,758	$114,767,853
Indirect	108	$5,232,218	$9,227,836	$3,551,304	$18,011,358
Induced	189	$8,464,703	$10,939,039	$7,261,832	$26,665,574
Total	**1,284**	**$60,720,563**	**$79,313,329**	**$19,410,894**	**$159,444,785**

6.5 Infrastructure Capital Improvement Plan Project Impacts by Category

There are 14 Subsections within Section 6.5 , one for each ICIP project category. For each category, there is a list of projects and a total capital budget. The share of the budget within the FBFA for each project is not available. The first table in each Subsection shows the IMPLAN model inputs, and the second table presents economic impact outputs for each collection of projects within the category.

6.5.1 Cemetery Projects

Table 6-21. Inputs for the Infrastructure Capital Improvement Plan Cemetery Projects

Chapter	Project Description	Sector	Cap Ex Budget
Coalmine	Construct Coalmine Cemetery	55	$101,969
Kaibeto	Plan/Design/Construct Veterans Cemetery	55	$81,575
Tuba City	Community and Veterans Cemeteries	55	$1,543,816
Total			**$1,727,361**

Table 6-22. Total Economic Impact of the Infrastructure Capital Improvement Plan Cemetery Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	15	$695,270	$872,428	$159,663	$1,727,361
Indirect	1	$69,247	$128,912	$45,291	$243,451
Induced	3	$123,819	$160,013	$106,223	$390,055
Total	**19**	**$888,336**	**$1,161,353**	**$311,178**	**$2,360,866**

6.5.2 Chapter House

Table 6-23. Inputs for the Infrastructure Capital Improvement Plan Chapter House Projects

Chapter	Project Description	Sector	Cap Ex Budget
Cameron	New Chapter House	55	$2,671,598
Coalmine	Land line phone	52	$2,039,387
Coalmine	Chapter facility audit and repair	60	$768,169
Tonalea	New Chapter House	55	$2,651,554
Tuba City	New Chapter House	55	$1,070,678
Total			**$9,201,387**

Table 6-24. Total Economic Impact of the Infrastructure Capital Improvement Plan Chapter House Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	70	$3,355,035	$4,642,303	$1,204,048	$9,201,387
Indirect	9	$420,052	$734,850	$285,914	$1,440,817
Induced	14	$611,650	$790,442	$524,726	$1,926,818
Total	**93**	**$4,386,737**	**$6,167,596**	**$2,014,689**	**$12,569,022**

6.5.3 Economic Development

Table 6-25. Inputs for the Infrastructure Capital Improvement Plan Economic Development Projects

Chapter	Project Description	Sector	Cap Ex Budget
Coalmine	Install scattered solar system	61	$305,908
Cameron	New Demo Farm	55	$458,862
Coppermine	Coppermine Chapter Telecommunication	52	$509,847
Bodaway Gap	Bathroom Addition Project	59	$856,543
Bodaway Gap	Construct Junction 89/160 Truck Stop	55	$8,973,305
Total			**$11,104,465**

Table 6-26. Total Economic Impact of the Infrastructure Capital Improvement Plan Economic Development Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	89	$4,232,983	$5,692,298	$1,179,184	$11,104,465

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Indirect	10	$508,805	$898,914	$347,103	$1,754,822
Induced	17	$768,158	$992,700	$659,003	$2,419,861
Total	**116**	**$5,509,946**	**$7,583,911**	**$2,185,290**	**$15,279,148**

6.5.4 Head Start

Table 6-27. Inputs for the Infrastructure Capital Improvement Plan Head Start Projects

Chapter	Project Description	Sector	Cap Ex Budget
Cameron	Upgrade Head Start with cooling, heating, roof	60	$42,827
Tuba City	Head Start Renovation	60	$1,551,974
Total			**$1,594,801**

Table 6-28. Total Economic Impact of the Infrastructure Capital Improvement Plan Head Start Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	8	$402,593	$998,970	$193,238	$1,594,801
Indirect	3	$125,551	$191,240	$98,077	$414,867
Induced	2	$85,763	$110,832	$73,578	$270,173
Total	**13**	**$613,906**	**$1,301,042**	**$364,893**	**$2,279,841**

6.5.5 Housing

Table 6-29. Inputs for the Infrastructure Capital Improvement Plan Housing Projects

Chapter	Project Description	Sector	Cap Ex Budget
Coppermine	Scattered housing development FBFA	57	$4,588,622

Table 6-30. Total Economic Impact of the Infrastructure Capital Improvement Plan Housing Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	35	$1,712,732	$2,206,695	$669,195	$4,588,622
Indirect	8	$345,789	$486,016	$267,430	$1,099,234
Induced	7	$333,949	$431,566	$286,497	$1,052,012
Total	**50**	**$2,392,469**	**$3,124,277**	**$1,223,122**	**$6,739,868**

6.5.6 Multi-purpose Buildings

Table 6-31. Inputs for the Infrastructure Capital Improvement Plan Multi-Purpose Building Projects

Chapter	Project Description	Sector	Cap Ex Budget
Cameron	New Cameron Cultural Center	55	$645,806
Bodaway Gap	Echo Cliffs Veterans Facility	55	$2,549,234
Bodaway Gap	Multi-purpose building	55	$2,457,462
Coppermine	Multi-purpose building	55	$2,625,711
Kaibeto	Multipurpose building	55	$9,789,060
Kaibeto	Plan/Design/Cons one-stop tribal complex	55	$3,181,444
Tuba City	New Youth Center	55	$6,913,523
Tuba City	Community and Convention Center	55	$11,471,554
Total			**$39,633,795**

Table 6-32. Total Economic Impact of the Infrastructure Capital Improvement Plan Multi-Purpose Building Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	336	$15,952,766	$20,017,608	$3,663,421	$39,633,795
Indirect	32	$1,588,856	$2,957,850	$1,039,200	$5,585,906
Induced	64	$2,840,987	$3,671,442	$2,437,260	$8,949,688
Total	**432**	**$20,382,609**	**$26,646,899**	**$7,139,881**	**$54,169,389**

6.5.7 Parking Lots

Table 6-33. Inputs for the Infrastructure Capital Improvement Plan Parking Lot Projects

Chapter	Project Description	Sector	Cap Ex Budget
Coppermine	Chapter parking lot	55	$219,234
Tolani Lake	Parking lot for Senior Center and Preschool	55	$113,186
Tolani Lake	Parking lot for TL Chapter House	55	$198,840
Total			**$531,260**

Table 6-34. Total Economic Impact of the Infrastructure Capital Improvement Plan Parking Lot Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	5	$213,835	$268,321	$49,105	$531,260
Indirect	0	$21,297	$39,648	$13,930	$74,875
Induced	1	$38,081	$49,213	$32,670	$119,964
Total	**6**	**$273,213**	**$357,181**	**$95,705**	**$726,099**

6.5.8 Public Safety

Table 6-35. Inputs for the Infrastructure Capital Improvement Plan Public Safety Projects

Chapter	Project Description	Sector	Cap Ex Budget
Kaibeto	Plan/Design/Cons Kaibeto safety complex	55	$3,207,956
Tuba City	New Fire Department	55	$11,726,478
Total			**$14,934,434**

Table 6-36. Total Economic Impact of the Infrastructure Capital Improvement Plan Public Safety Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	127	$6,011,171	$7,542,847	$1,380,416	$14,934,434
Indirect	12	$598,698	$1,114,549	$391,582	$2,104,829
Induced	24	$1,070,514	$1,383,438	$918,385	$3,372,337
Total	**163**	**$7,680,383**	**$10,040,834**	**$2,690,383**	**$20,411,600**

6.5.9 Recreation

Table 6-37. Inputs for the Infrastructure Capital Improvement Plan Recreation Projects

Chapter	Project Description	Sector	Cap Ex Budget
Tolani Lake	Construct community recreation park	55	$464,980
Tuba City	New Equestrian Center	55	$25,186,435
Tuba City	New Sports Complex	55	$40,073,963
Total			**$65,725,378**

Table 6-38. Total Economic Impact of the Infrastructure Capital Improvement Plan Recreation Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	557	$26,454,736	$33,195,530	$6,075,112	$65,725,378
Indirect	53	$2,634,827	$4,905,051	$1,723,322	$9,263,200
Induced	105	$4,711,255	$6,088,412	$4,041,749	$14,841,416
Total	**715**	**$33,800,818**	**$44,188,993**	**$11,840,183**	**$89,829,994**

6.5.10 Roads/Streets

Table 6-39. Inputs for the Infrastructure Capital Improvement Plan Roads/streets Projects

Chapter	Project Description	Sector	Cap Ex Budget
Coalmine	Pave N Route 6720	54	$30,590,811
Kaibeto	Plan/Design/Cons Community road and street	54	$5,302,407
Tuba City	Kerley Valley Road Improvement	62	$2,855,142
Tuba City	Moenave Road Improvement	62	$5,516,543
Tuba City	Old Airport Loop Road	62	$954,535
Tuba City	Chee Willie Road Improvements	62	$1,447,149
Total			**$46,666,589**

Table 6-40. Total Economic Impact of the Infrastructure Capital Improvement Plan Roads/streets Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	284	$14,981,263	$24,148,076	$7,537,250	$46,666,589
Indirect	53	$2,520,300	$4,368,235	$1,897,282	$8,785,817
Induced	63	$2,830,594	$3,657,978	$2,429,017	$8,917,589
Total	**400**	**$20,332,156**	**$32,174,289**	**$11,863,550**	**$64,369,994**

6.5.11 Senior Citizens

Table 6-41. Inputs for the Infrastructure Capital Improvement Plan Senior Citizens Projects

Chapter	Project Description	Sector	Cap Ex Budget
Bodaway Gap	Chapter House/Senior Center	55	$2,472,757
Coalmine	Assisted living home	55	$1,019,694
Tuba City	New Senior Building	55	$4,456,062

Chapter	Project Description	Sector	Cap Ex Budget
Total			**$7,948,512**

Table 6-42. Total Economic Impact of the Infrastructure Capital Improvement Plan Senior Citizens Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	67	$3,199,309	$4,014,508	$734,695	$7,948,512
Indirect	6	$318,643	$593,193	$208,410	$1,120,247
Induced	13	$569,757	$736,303	$488,790	$1,794,850
Total	**86**	**$4,087,709**	**$5,344,005**	**$1,431,895**	**$10,863,609**

6.5.12 Single Phase

Table 6-43. Inputs for the Infrastructure Capital Improvement Plan Single Phase Projects

Chapter	Project Description	Sector	Cap Ex Budget
Bodaway Gap	Powerline extension E/W Chapter	52	$713,786
Cameron	North Cameron powerline extension	52	$892,232
Cameron	South powerline extension project	52	$892,232
Coalmine	Coalmine scattered powerline	52	$92,619,800
Coalmine	Kerley Valley electrical hookup	52	$141,901
Coppermine	Coppermine scattered powerline project	52	$1,093,042
Leupp	N Grandfalls powerline extension	52	$3,210,800
Leupp	N Leupp powerline extension	52	$412,976
Leupp	E Canyon Diablo powerline extension	52	$963,611
Leupp	S Leupp powerline extension	52	$1,269,519
Leupp	S Grandfalls powerline extension	52	$688,293
Leupp	W Canyon Diablo powerline extension	52	$2,039,387
Tolani Lake	NW Powerline extension	52	$535,339
Tonalea	Wildcat Powerline extension Phase II	52	$1,598,119
Tonalea	Sour Wash Powerline extension	52	$718,884
Tonalea	White Mesa Powerline extension Phase II	52	$688,293
Total			**$108,478,214**

Table 6-44. Total Economic Impact of the Infrastructure Capital Improvement Plan ICIP Single Phase Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	646	$31,254,044	$49,565,729	$27,658,441	$108,478,214
Indirect	110	$5,492,550	$8,806,786	$3,778,055	$18,077,391
Induced	133	$5,958,759	$7,700,588	$5,111,747	$18,771,095
Total	**889**	**$42,705,353**	**$66,073,103**	**$36,548,243**	**$145,326,699**

6.5.13 Solid Waste

Table 6-45. Inputs for the Infrastructure Capital Improvement Plan Solid Waste Projects

Chapter	Project Description	Sector	Cap Ex Budget
Cameron	Upgrade solid waste transfer station	60	$2,549,234
Kaibeto	Solid waste transfer station	56	$837,169
Total			**$3,386,403**

Table 6-46. Total Economic Impact of the Infrastructure Capital Improvement Plan Solid Waste Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	23	$1,139,780	$2,080,965	$165,658	$3,386,403
Indirect	5	$250,676	$388,474	$191,615	$830,765
Induced	5	$225,450	$291,351	$193,428	$710,230
Total	**33**	**$1,615,906**	**$2,760,790**	**$550,702**	**$4,927,398**

6.5.14 Water System

Table 6-47. Inputs for the Infrastructure Capital Improvement Plan Water System Projects

Chapter	Project Description	Sector	Cap Ex Budget
Bodaway Gap	Water line extension E/W Chapter	56	$713,786
Cameron	Upgrade Chapter sewer line	60	$138,678
Coalmine	Water/sewer phase II with booster station	56	$774,967
Coppermine	KOKO waterline Project extension	56	$19,437,911
Coppermine	Agriculture water development	49	$20,394
Leupp	Round Cedar - GF waterline extension	56	$892,232

Chapter	Project Description	Sector	Cap Ex Budget
Tolani Lake	Water Line 10 miles N of chapter	56	$522,083
Total			**$22,500,052**

Table 6-48. Total Economic Impact of the Infrastructure Capital Improvement Plan System Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	268	$13,282,754	$13,017,087	($3,799,789)	$22,500,052
Indirect	28	$1,346,576	$2,228,799	$939,378	$4,514,753
Induced	53	$2,366,527	$3,058,276	$2,030,545	$7,455,348
Total	**349**	**$16,995,857**	**$18,304,162**	**($829,866)**	**$34,470,153**

6.6 Phasing

The 2020 Recovery Plan lists a year for which each project is planned, beginning with 2020 and continuing through 2025. In this section, the Infrastructure Capital Improvement Plan's economic impacts are estimated by grouping the projects in each year based on the economic sector. This analysis is stepped ahead one year. Rather than beginning in 2020 and continuing through 2025, this analysis assumes that projects begin in 2021 and continue through 2026. All of the model inputs and economic impacts are presented in 2021 dollars, regardless of the year the projects occur. Inflation will determine the actual expense and impacts of future year projects.

The first table in each Subsection shows the IMPLAN model inputs, and the second table presents economic impact outputs for each year 2021 through 2026.

6.6.1 First Year – 2021

Table 6-49. Inputs for the Infrastructure Capital Improvement Plan 2021 Projects

Category	Sector	Cap Ex Budget
Single phase	52	$101,751,364
Various economic development	55	$3,869,408
Water system	56	$2,848,005
Economic development	59	$856,543
Various repairs	60	$949,674
Total		**$110,274,994**

Table 6-50. Total Economic Impact of the ICIP 2021 Projects

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	682	$33,020,482	$51,194,983	$26,059,529	$110,274,994
Indirect	113	$5,628,638	$9,064,763	$3,880,677	$18,574,078
Induced	140	$6,266,140	$8,097,816	$5,375,511	$19,739,467
Total	**935**	**$44,915,261**	**$68,357,562**	**$35,315,717**	**$148,588,540**

6.6.2 Second Year – 2022

Table 6-51. Inputs for the Infrastructure Capital Improvement Plan 2022 Projects

Category	Sector	Cap Ex Budget
Agricultre water development	49	$20,394
Single phase	52	$2,224,902
Various economic development	55	$108,281,276
Waterline extension	56	$19,437,911
Scattered housing	57	$4,588,622
Head Start	60	$1,551,974
Total		**$136,105,079**

Table 6-52. Total Economic Impact of the Infrastructure Capital Improvement Plan 2022 Projects

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1,206	$57,856,053	$70,135,688	$8,113,188	$136,104,930
Indirect	124	$6,082,638	$10,858,552	$4,088,903	$21,030,093
Induced	232	$10,353,980	$13,380,566	$8,882,878	$32,617,425
Total	**1,562**	**$74,292,671**	**$94,374,807**	**$21,084,970**	**$189,752,447**

6.6.3 Third Year – 2023

Table 6-53. Inputs for the Infrastructure Capital Improvement Plan 2023 Projects

Category	Sector	Cap Ex Budget
Single phase and economic development	52	$2,161,751
Roads/streets	54	$30,590,811
Various economic development	55	$18,629,804

Category	Sector	Cap Ex Budget
Solid waste	60	$2,549,234
Roads/streets	62	$10,773,370
Total		**$64,704,971**

Table 6-54. Total Economic Impact of the Infrastructure Capital Improvement Plan 2023 Projects

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	442	$22,330,535	$33,525,074	$8,849,362	$64,704,971
Indirect	70	$3,352,990	$5,807,529	$2,451,485	$11,612,004
Induced	93	$4,157,024	$5,372,153	$3,566,851	$13,096,029
Total	**605**	**$29,840,549**	**$44,704,756**	**$14,867,699**	**$89,413,003**

6.6.4 Fourth Year – 2024

Table 6-55. Inputs for the Infrastructure Capital Improvement Plan 2024 Projects

Category	Sector	Cap Ex Budget
Single phase	52	$2,850,044
Various economic development	55	$12,256,718
Economic development scattered solar	61	$305,908
Total		**$15,412,671**

Table 6-56. Total Economic Impact of the Infrastructure Capital Improvement Plan 2024 Projects

	Annual	Labor	Intermediate	Taxes/	Total
Type	Jobs	Income	Expenses	Profits	Output
Direct	122	$5,824,990	$7,681,486	$1,906,195	$15,412,671
Indirect	13	$664,833	$1,187,369	$444,409	$2,296,610
Induced	24	$1,051,316	$1,358,628	$901,912	$3,311,856
Total	**159**	**$7,541,139**	**$10,227,483**	**$3,252,515**	**$21,021,137**

6.6.5 Fifth Year – 2025

Table 6-57. Inputs for the Infrastructure Capital Improvement Plan 2025 Projects

Category	Sector	Cap Ex Budget
Public safety	55	$3,207,956

Category	Sector	Cap Ex Budget
Water system	56	$892,232
Total		**$4,100,188**

Table 6-58. Total Economic Impact of the Infrastructure Capital Improvement Plan 2025 Projects

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	38	$1,820,106	$2,136,213	$143,870	$4,100,188
Indirect	4	$181,857	$327,644	$121,235	$630,736
Induced	7	$324,122	$418,867	$278,075	$1,021,064
Total	**49**	**$2,326,084**	**$2,882,724**	**$543,179**	**$5,751,988**

6.6.6 Sixth Year – 2026

Table 6-59. Inputs for the Infrastructure Capital Improvement Plan 2026 Projects

Category	Sector	Cap Ex Budget
Single phase	52	$2,039,387
Roads/streets	54	$5,302,407
Various economic development	55	$81,575
Total		**$7,423,370**

Table 6-60. Total Economic Impact of the Infrastructure Capital Improvement Plan 2026 Projects

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	39	$2,036,070	$3,589,847	$1,797,453	$7,423,370
Indirect	7	$330,640	$611,963	$239,776	$1,182,379
Induced	9	$382,676	$494,534	$328,385	$1,205,595
Total	**55**	**$2,749,387**	**$4,696,344**	**$2,365,614**	**$9,811,345**

6.7 Total of Infrastructure Capital Improvement Projects

The total capital budget for all Infrastructure Capital Improvement Plan projects is $338 million in 2021 dollars. This investment will support an average of 561 direct jobs per year for six years assuming all of the projects are completed within that time frame. Additionally, this investment will generate $55 million of indirect activity and $71 million of induced activity. Note that 561 is the average annual number of jobs over six years, whereas the project year proposals show most of the capital expenditure and associated employment impacts occurring in the

initial years. Likewise, the distribution of the total output impact of $464 million will be determined by actual annual spending occurring in each year.

Table 6-61. Total Economic Impact of All Nine Chapter Infrastructure Capital Improvement Plan Projects

Type	Avg annual Jobs for 6 yrs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	422	$122,888,236	$168,263,290	$46,869,597	$338,021,123
Indirect	55	$16,241,595	$27,857,820	$11,226,485	$55,325,901
Induced	84	$22,535,259	$29,122,565	$19,333,612	$70,991,436
Total	**561**	**$161,665,091**	**$225,243,676**	**$77,429,694**	**$464,338,460**

Table 6-62 breaks down, by tax category, the $29.3 million in tax revenues that result from the direct Infrastructure Capital Improvement Plan investments. An additional $7.8 million in tax revenue is generated from indirect economic activity, and $9.4 million results from induced spending. In total, the $338 million of Infrastructure Capital Improvement Plan investment will generate $46.5 million in tax revenue.

Table 6-62. Tax Revenue Impacts of All Nine Chapter Infrastructure Capital Improvement Plan Projects

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$817,294	$1,228,577	$626,647	$4,159,370	$22,467,223	$29,299,111
Indirect	$703,258	$1,040,753	$537,235	$2,216,689	$3,324,193	$7,822,126
Induced	$717,906	$1,063,524	$548,557	$2,368,411	$4,716,777	$9,415,174
Total	**$2,238,458**	**$3,332,853**	**$1,712,438**	**$8,744,469**	**$30,508,193**	**$46,536,411**

Table 6-63 shows the top 15 industry sectors most impacted by all Infrastructure Capital Improvement Plan investments. The type of impact is shown as well. Building supply, real estate, medical, and architectural are among the top sectors as a result of indirect and induced spending.

Table 6-63. Total Economic Impact by Industry of All Infrastructure Capital Improvement Plan Projects for the Top 15 Industries

Economic Sector\Total Output	Direct	Indirect	Induced	Total
55 - Construction of new commercial structures, including farm	$146,326,738	$0	$0	$146,326,738
52 - Construction of new power and communication structures	$111,027,448	$0	$0	$111,027,448
54 - Construction of new highways and streets	$35,893,219	$0	$0	$35,893,219
56 - Construction of other new nonresidential structures	$23,178,148	$0	$0	$23,178,148
449 - Owner-occupied dwellings	$0	$0	$12,009,449	$12,009,449
62 - Maintenance of highways, streets, bridges, tunnels	$10,773,370	$0	$329	$10,773,700

Economic Sector\Total Output	Direct	Indirect	Induced	Total
447 - Other real estate	$0	$5,631,453	$3,181,064	$8,812,517
490 - Hospitals	$0	$0	$7,764,539	$7,764,539
405 - Retail - building material, garden equipment, supplies stores	$0	$6,516,906	$429,529	$6,946,435
60 - Maintenance of nonresidential structures	$5,050,883	$304,692	$213,394	$5,568,969
396 - Wholesale - Other durable goods merchant wholesalers	$0	$4,442,448	$239,159	$4,681,608
57 - Construction of new single-family residential structures	$4,588,622	$0	$0	$4,588,622
457 - Architectural, engineering, and related services	$0	$3,918,693	$90,767	$4,009,460
483 - Offices of physicians	$0	$0	$3,547,691	$3,547,691
453 - Commercial machinery and equipment rental	$0	$3,115,316	$72,617	$3,187,933

7. Immediate Recovery Projects

Section 7 identifies Immediate Recovery Projects and estimates the economic impact of each project.

7.1 Organization of Immediate Recovery Capital Expenditure Budgets

The 2020 Recovery Plan references Immediate Recovery Projects at several points throughout the document. The total capital budget for these projects is found to be $257 million in 2021 dollars. Indeed, the document describes a number of projects in addition to the Chapter-Specific Projects and Infrastructure Capital Improvement Plans described above. However, these additional projects appear to be in various stages of planning. After careful review, projects were selected for impact modeling based on the availability of a capital expenditure budget. All of the Immediate Recovery Projects described below are shown in 2021 dollars.

7.1.1 Echo Cliffs Health Center

The Echo Cliffs Health Center has been in the planning phase for the past 12 years. This facility will be developed on 75 acres that have already been withdrawn by the Coppermine Chapter. The 122,000 square foot health center will feature a helipad, 92-person staff housing with recreational facilities, and 308 parking spaces. Once constructed, the 2020 Recovery Plan estimates operations will support 250 full-time employment jobs. The capital cost of constructing the facility is estimated to be $154 million.

Table 7-1. Inputs for the Echo Cliffs Health Center

Event Year	Project Description	Sector	Cap Ex Budget
2021	Construction of Echo Cliffs Health Center	50	$154,177,690

Table 7-2. Total Economic Impact of the Echo Cliffs Health Center

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1,060	$54,895,182	$69,189,567	$30,092,941	$154,177,690
Indirect	121	$5,931,227	$10,728,837	$3,844,218	$20,504,282
Induced	220	$9,841,347	$12,718,049	$8,444,082	$31,003,479
Total	**1,401**	**$70,667,756**	**$92,636,454**	**$42,381,241**	**$205,685,451**

7.1.2 Little Colorado River Valley Farms Project

The Little Colorado River (LCR) Valley Farms Plan ranges from 100 to 4,000 acres of fertile, irrigable soils adjacent to the alluvial aquifer of the LCR. This analysis is based on the 4,000-acre size. This economic impact analysis considers both construction costs as well as the annual operating expenses. Contingency expenses are not modeled as they are undefined. The value of and revenues derived from crop production over time are not within the scope of this analysis.

7.1.3 Construction of the Little Colorado River Valley Farms Project

Initial project development includes land development followed by water development and delivery.

Table 7-3. Inputs for the Little Colorado River Valley Farms Construction

Event Year	Project Description	Sector	Cap Ex Budget
2021	Land and water development, water delivery	56	$28,551,424
2021	Construction of farm facilities, equipment	55	$24,472,649
Total			**$53,024,073**

Table 7-4. Total Economic Impact of the Little Colorado River Valley Farms Construction

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	548	$26,774,817	$28,871,923	($2,622,667)	$53,024,073
Indirect	55	$2,685,219	$4,649,926	$1,829,589	$9,164,734
Induced	107	$4,767,760	$6,161,421	$4,090,629	$15,019,810
Total	**710**	**$34,227,796**	**$39,683,269**	**$3,297,552**	**$77,208,618**

7.1.4 Operation of the Little Colorado River Valley Farms Project

The 2020 Recovery Plan provides budget estimates for ongoing operations of this project. Thus, the annual operating impact has been modeled and is presented.

The budget for organizational development and youth capacity building scales linearly from the 100-acre budget. This may not be the case upon implementation. While management and education expenses would increase with the project's size, economies of scale would have an effect. Rather than $10 million per year, we assume each of these expenditures to be $2 million per year.

Table 7-5. Inputs for the Little Colorado River Valley Farms Annual Operations

Event Year	Project Description	Sector	Cap Ex Budget
2021	Annual Crop Production	2	$7,280,613
2021	Water Quality Monitoring	49	$2,651,204
2021	Organizational Development	469	$2,039,387
2021	Youth Capacity Building	482	$2,039,387
Total			**$14,010,592**

Table 7-6. Total Economic Impact of the Little Colorado River Valley Farms Annual Operations

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	350	$4,241,235	$6,427,502	$3,278,827	$13,947,564
Indirect	25	$1,023,851	$1,944,741	$670,221	$3,638,813

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Induced	19	$865,624	$1,118,662	$742,479	$2,726,765
Total	**394**	**$6,130,710**	**$9,490,905**	**$4,691,527**	**$20,313,143**

7.1.5 Livestock and Water Projects

The 2020 Recovery Plan explains that region-wide investment in livestock infrastructure is decades behind and necessary. This IMPLAN model does not include non-construction or "other" expenses. Also, we assume the impoundment repair is carried out by the Navajo Department of Water Resources at the cost of $6 million as described in the 2020 Recovery Plan.

Table 7-7. Inputs for the Livestock and Water Projects

Event Year	Project Description	Sector	Cap Ex Budget
2021	Livestock water components	56	$3,067,145
2021	Livestock power components	52	$173,858
2021	Impoundment repair and maintenance	60	$6,118,162
Total			**$9,359,165**

Table 7-8. Total Economic Impact of the Livestock and Water Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	69	$3,412,680	$5,685,576	$260,910	$9,359,165
Indirect	14	$672,967	$1,050,903	$509,699	$2,233,569
Induced	15	$662,294	$855,888	$568,230	$2,086,412
Total	**98**	**$4,747,940**	**$7,592,367**	**$1,338,839**	**$13,679,146**

7.1.6 Tuba City Airport

The 2020 Recovery Plan references the Tuba City Airport Layout Plan, which calls for $13.3 million in airport improvements. As a side note, the Tuba City Airport received $20,000 in 2020 from the initial round of Coronavirus Aid, Relief, and Economic Security (CARES) Act funding.

Table 7-9. Inputs for the Tuba City Airport Improvements

Event Year	Project Description	Sector	Cap Ex Budget
2021	Tuba City Airport Improvements	56	$13,357,988

Table 7-10. Total Economic Impact of the Tuba City Airport Improvements

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	159	$7,918,236	$7,725,101	($2,285,350)	$13,357,988
Indirect	16	$797,298	$1,321,015	$555,775	$2,674,089
Induced	32	$1,409,906	$1,822,032	$1,209,736	$4,441,673
Total	**207**	**$10,125,440**	**$10,868,148**	**($519,838)**	**$20,473,750**

7.1.7 Other Immediate Recovery Projects

Various other projects described in the 2020 Regional Plan appear to be ready for immediate development. Most of these projects are commercial and industrial site infrastructure developments. The Bodaway Gap Chapter 100-acre site is included based on approvals described in the 2020 Recovery Plan even though a capital budget is not provided. This project's $5 million figure is an estimate based on professional judgment and consistent with similar projects on a per-acre basis.

Table 7-11. Inputs for the Other Economic Development Projects

Event Year	Project Description	Sector	Cap Ex Budget
2021	Bodaway Gap Echo Cliffs Veterans Facility	55	$2,284,114
2021	Tuba City RBDO Business Information Center	55	$2,549,234
2021	Tonalea Commercial Site	55	$1,733,479
2021	Kerley Valley Commercial - Light industrial site	55	$1,346,047
2021	Bodaway Gap Econ Development Site 100 acre	55	$5,098,469
Total			**$13,011,343**

Table 7-12. Total Economic Impact of the Other Economic Development Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	110	$5,237,119	$6,571,562	$1,202,661	$13,011,343
Indirect	10	$521,604	$971,030	$341,158	$1,833,792
Induced	21	$932,665	$1,205,294	$800,126	$2,938,085
Total	**141**	**$6,691,388**	**$8,747,886**	**$2,343,945**	**$17,783,220**

7.2 Total Economic Impact of Immediate Recovery Projects

The combined Immediate Recovery Projects' capital budgets are $257 million, which includes $14 million for the first year of operating Little Colorado River Farms. The total economic impact, including indirect and induced spending, is $355 million. If all this activity were to take place in 1 year, a total of 421 jobs would be supported.

Otherwise, the number of annual jobs will vary with the number of years and amount of investment taking place in each year.

Table 7-13. Total Economic Impact of All Immediate Recovery Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	328	$102,479,269	$124,471,231	$29,927,323	$256,877,823
Indirect	34	$11,632,166	$20,666,453	$7,750,660	$40,049,279
Induced	59	$18,479,596	$23,881,346	$15,855,283	$58,216,225
Total	**421**	**$132,591,031**	**$169,019,030**	**$53,533,265**	**$355,143,326**

Table 7-14 breaks down, by tax category, the $22.5 million in tax revenues that result from the direct Immediate Recovery Project investments. An additional $5.1 million in tax revenue is generated from indirect economic activity, and $7.7 million results from induced spending. In total, the $257 million of this investment will generate $35.4 million in tax revenue.

Table 7-14. Tax Revenue Impacts of All Immediate Recovery Projects

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$396,064	$603,255	$304,625	$2,642,913	$18,558,290	$22,505,147
Indirect	$429,240	$635,556	$327,945	$1,380,878	$2,354,972	$5,128,590
Induced	$588,772	$872,221	$449,885	$1,942,360	$3,867,938	$7,721,177
Total	**$1,414,075**	**$2,111,032**	**$1,082,455**	**$5,966,151**	**$24,781,200**	**$35,354,914**

Table 7-15 shows the top 15 industry sectors most impacted by all Immediate Recovery Project investments. The type of impact is shown as well. Real estate, agriculture, medical, and restaurants are among the top sectors impacted after construction.

Table 7-15 Total Economic Impact by Industry of All Immediate Recovery Projects for the Top 15 Industries

Economic Sector\Total Output	Direct	Indirect	Induced	Total
50 - Construction of new health care structures	$154,177,690	$0	$0	$154,177,690
56 - Construction of other new nonresidential structures	$44,976,557	$0	$0	$44,976,557
55 - Construction of new commercial structures, including farm	$37,483,992	$0	$0	$37,483,992
449 - Owner-occupied dwellings	$0	$0	$9,845,457	$9,845,457
447 - Other real estate	$0	$5,360,503	$2,608,580	$7,969,083
2 - Grain farming	$7,265,192	$41	$2	$7,265,236

Economic Sector\Total Output	Direct	Indirect	Induced	Total
60 - Maintenance and repair construction of nonresidential structures	$6,118,162	$275,364	$175,034	$6,568,560
490 - Hospitals	$0	$0	$6,364,797	$6,364,797
405 - Retail - building material, garden equip, supplies stores	$0	$3,479,063	$352,279	$3,831,342
396 - Wholesale - Other durable goods merchant wholesalers	$0	$3,507,148	$196,195	$3,703,343
483 - Offices of physicians	$0	$0	$2,909,505	$2,909,505
417 - Truck transportation	$0	$2,450,289	$329,787	$2,780,076
49 - Water, sewage and other systems	$2,631,795	$33,278	$49,820	$2,714,893
510 - Limited-service restaurants	$0	$78,043	$2,432,027	$2,510,070
509 - Full-service restaurants	$0	$234,999	$2,153,477	$2,388,476

8. Socioeconomic Analysis of the FBFA

The direct economic impact of the recovery projects modeled in this analysis is $3.6 billion and the total impact is over $5.2 billion. In comparison, the total economic output of Coconino County in 2018 was $12.1 billion. Thus, if all of the projects were implemented in 1 year, the county's economy's size would increase by 42 percent.

8.1 Total Combined Economic Impact of All Recovery Projects

Table 8-1 summarizes all of the capital spending and resulting economic impacts for each group of projects and presents a total of the economic impacts. A total of 40,514 annual jobs will be supported throughout construction, generating over $2 billion in labor income.

Table 8-1. Total Economic Impact of Implementing the 2020 Recovery Plan for the FBFA

Total Economic Impact of All Chapter-Specific Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	27,335	$1,348,273,121	$1,371,681,891	$269,357,285	$2,989,312,297
Indirect	3,869	$176,745,245	$269,686,884	$130,508,192	$576,940,320
Induced	5,525	$246,998,940	$319,199,083	$211,917,865	$778,115,888
Total	**36,729**	**$1,772,017,305**	**$1,960,567,858**	**$611,783,342**	**$4,344,368,505**
Total Economic Impact of All Nine Chapter Infrastructure Capital Improvement Plan Projects					
Impact Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	2,530	$122,888,236	$168,263,290	$46,869,597	$338,021,123
Indirect	330	$16,241,595	$27,857,820	$11,226,485	$55,325,901
Induced	504	$22,535,259	$29,122,565	$19,333,612	$70,991,436
Total	**3,364**	**$161,665,091**	**$225,243,676**	**$77,429,694**	**$464,338,460**
Total Economic Impact of All Immediate Recovery Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	328	$102,479,269	$124,471,231	$29,927,323	$256,877,823
Indirect	34	$11,632,166	$20,666,453	$7,750,660	$40,049,279
Induced	59	$18,479,596	$23,881,346	$15,855,283	$58,216,225
Total	**421**	**$132,591,031**	**$169,019,030**	**$53,533,265**	**$355,143,326**
Grand Total Economic Impact of All Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	30,193	$1,573,640,625	$1,664,416,413	$346,154,205	$3,584,211,243

Total Economic Impact of All Chapter-Specific Projects					
Indirect	4,233	$204,619,007	$318,211,157	$149,485,336	$672,315,500
Induced	6,088	$288,013,795	$372,202,995	$247,106,760	$907,323,549
Total	**40,514**	**$2,066,273,427**	**$2,354,830,564**	**$742,746,301**	**$5,163,850,292**

One of the County's key construction sectors (56) is running a deficit captured in IMPLAN model outputs. This may lead to modest underestimates of the impacts arising from that sector.

8.2 Coconino County Economy

8.2.1 Size of Coconino County Economy

The Recovery Plan implementation's overall scope is very large relative to the size of the County's economy. Even with phasing, implementing the Plan will have a substantial impact on the local and regional economy.

From 2010 through 2018, the total output of Coconino County grew by $3.7 billion, just over the amount budgeted for all of the Recovery Plan projects combined.

Table 8-2. Comparison of Total County Output with Grand Total Recovery Plan Output

	Jobs	Labor Income	Total Output
Coconino County 2010	73,361	$3,068,874,087	$8,392,458,745
Coconino County 2018	85,890	$4,285,298,032	$12,131,467,889
2020 Recovery Plan	40,514	$2,066,273,427	$5,163,850,292

Health care comprises more than 15 percent of the County's economic activity.

Table 8-3. Top 10 Largest Economic Sectors in Coconino County in 2018

Sector	Industry Description	Jobs	Labor Income	Total Output	Cty share
377	Surgical appliance/supplies manufacturing	2,469	$297,383,210	$1,150,809,768	9.5%
490	Hospitals	3,970	$350,841,602	$747,096,279	6.2%
449	Owner-occupied dwellings	0	$0	$602,062,580	5.0%
447	Other real estate	3,260	$86,303,227	$581,249,872	4.8%
534	Other local government enterprises	1,067	$115,164,270	$420,007,623	3.5%
507	Hotels, motels, including casino hotels	3,439	$110,374,423	$347,176,872	2.9%
63	Dog and cat food manufacturing	234	$23,080,182	$337,269,097	2.8%
546	Federal govt, non-military	2,500	$259,122,706	$336,509,069	2.8%
542	Local govt, education	4,022	$270,636,717	$314,159,798	2.6%
509	Full-service restaurants	4,334	$129,640,843	$306,112,985	2.5%

8.2.2 Coconino County Construction Sector

The implementation of the Recovery Plan would directly impact fourteen economic sectors involving construction and maintenance. They have been identified throughout this report. In 2010, the total combined output of these sectors was almost $400 million. By 2018, the output had grown over 20 percent to $531 million or $132 million over eight years. Phasing over 7 years would support 4,313 annual jobs or more than double the county's total construction sector size. This raises the question of where workers will come from and live during construction.

Table 8-4. Comparison of County's Construction Output with Recovery Plan's Direct Output

	Jobs	Labor Income	Total Output
Coconino Construction Sectors 2010	3,453	$151,815,868	$399,368,808
Coconino Construction Sectors 2018	3,891	$182,702,584	$531,744,723
Recovery Plan 2020 Total Direct Output	30,193	$1,573,640,625	$3,584,211,243

8.3 Demographic Trends and Impacts

8.3.1 Population trends

According to the 2008 Recovery Plan, the collective population of the nine Chapters in 2000 was 19,718. The population was projected to reach 22,928 by 2010 and grow to 26,370 by 2020. The 2008 Recovery Plan indicates that the 2020 population projection is the basis for their housing demand forecast. We now know that the 2020 actual population is much less than previously projected. To the extent that the 2020 Recovery Plan is based on 2008 Recovery Plan budgets, the amount of housing proposed may be more than is needed.

Table 8-5. Estimates of population and housing needs over time

Population and Housing Estimates	2008-2010	2020 P	2020 A
Total Nine Chapters' population	22,928	26,370	20,425
FBFA population	7,874	9,056	6,872
FBFA habitable housing units	585	585	585
FBFA total housing units needed	2,088	2,402	1,823
FBFA new housing units needed	1,503	1,817	1,238

Source: 2008 and 2020 Recovery Plans.

8.3.2 Planned housing development within the FBFA

The 2008 Recovery Plan estimates were based on the assumption that an average of 3.77 people live in each housing unit. Survey data supported this assumption. The budgets presented in the 2020 Recovery Plan correspond to a total of 1,917 new housing units within the FBFA (scattered, multifamily, and clustered), not including new group housing such as senior living facilities. These plans also proposed the repair of 905 units within the FBFA. Thus, a total of at least 2,822 new or repaired housing units are being proposed for within the FBFA for an estimated population of 6,872 in 2020.

Table 8-6. Chapter-Specific Housing Plans compared to FBFA population

Chapter	Scattered	Multi	Repair	Total Units	FBFA pop.	People/Unit
Bodaway Gap	284	193	213	690	1,715	2.49
Cameron	207	147	149	503	1,192	2.37
Coalmine Canyon	80	92	96	268	584	2.18
Coppermine	53	38	39	130	361	2.78
Kaibeto	27	19	19	65	179	2.76
Leupp	3	2	10	15	57	3.81
Tolani Lake	64	45	46	155	344	2.22
Tonalea	116	83	84	283	557	1.97
Tuba City	286	178	249	713	1,881	2.64
Total	**1,120**	**797**	**905**	**2,822**	**6,872**	**2.44**

All of the new housing units are planned to be 1,200 sq ft. in size. The construction cost is budgeted at $437.40 in 2010 dollars, which corresponds to $592.47 in 2020 dollars. We believe this overestimates current construction costs. Further investigation may reduce the capital expenditure needed to develop the necessary amount of housing.

8.3.3 Jobs

Employment within Coconino county comprises almost 60 percent of the population. Over the past decade, the number of jobs within the County increased by 12,529. The average annual number of jobs supported by the Chapter-Specific Projects and Infrastructure Capital Improvement Plan programs is almost half that 10-year increase.

The nine FBFA Chapters population is roughly 14 percent of the county population, and the FBFA population is a third of the Nine Chapters.

Implementing the Recovery Plan will undoubtedly bring the County to full employment and most likely require additional workers outside of the County.

Table 8-7. Estimates of population and jobs compared to the Recovery Plan Job Impacts

Population and Jobs Estimates	2008-2010	2018-2020
Coconino County Population	134,618	146,348
Coconino County Employment	73,361	85,890
Total Nine Chapters' population	22,928	20,425
FBFA population	7,874	6,872
Total Immediate Recovery Jobs		421
Avg Annual CSP and ICIP Jobs (7 yrs)		5,728

8.3.4 School Construction

The 2008 and 2020 Recovery Plans propose constructing over 336,000 square feet of educational facilities from daycare through adult education across 32 different facilities. At 100 sq ft/student, this amount of educational space would accommodate 3,361 students. An amount of 100 sq ft/student is at the higher end of national averages. For a total population of 6,872, the Recovery Plans may be overestimating the number of educational facilities necessary.

Budgeted construction costs range from $400/sq ft to almost $600/sq ft in 2010 dollars, which corresponds to a range of approximately $500 to $740/sq ft in 2020 dollars.

8.4 Lifestyle Trade-Offs

Developing the FBFA by implementing the 2020 Recovery Plan will improve the area's residents' health, well-being, and quality of life. Investment in agriculture, building and renovating Chapter Houses, and other projects consistent with Navajo culture and the region's rural character will help preserve cultural values but may not attract further investment in the future. These are important trade-offs to consider. The solution is to develop sustainable funding mechanisms to support the heritage projects that sustain and preserve cultural values.

Similar trade-offs exist in the housing sector. Housing is needed. A variety is proposed from elder living facilities to multifamily and scattered. In general, higher density housing will be more affordable and will impact fewer acres of the landscape. However, higher-density housing is not consistent with a rural lifestyle.

8.4.1 Solar Energy

The 2020 Recovery Plan points to the benefits of renewable energy in job creation and improving the environment. Further, the closure of the Navajo Generating Station creates an opportunity to replace its power generation.

Arizona offers high solar generation capacity. Large scale solar generation facilities are being developed across the country. For example, Navajo Power proposes developing a 750-megawatt photovoltaic solar-generating and battery energy storage system facility in the Cameron and Coalmine Canyon Chapters within the FBFA.

8.4.2 Environmental Restoration

Decades of uranium mining in the region have left a legacy of pollution that still needs to be cleaned up. Clean water and a safe environment are necessary building blocks of desirable and sustainable economies. However, mitigation is expensive. The 2020 Recovery Plan does not provide clean-up cost estimates. However, to the extent that efficiencies and savings can be found in other aspects of the Recovery Plan, those funds should be considered for environmental restoration.

8.4.3 Telecommunications

The 2020 Recovery Plan acknowledges the development of cyber and broadband infrastructure. The plan references a 2018 comprehensive survey. Indeed, modernizing the FBFA and Navajo Nation's communication infrastructure will enhance communication and the flow of information, but may also dilute local cultural values. The solution is to develop resources that enable the use of cyber technology for promoting cultural values.

8.4.4 Business and Commercial Sites

The 2020 Recovery Plan lists a number of business and commercial sites for potential development. While developing the infrastructure for these sites should lead to subsequent investment, business development, and job creation, there is a danger that commercial and light industrial jobs will not be consistent with the rural and cultural values of the region. Planning, zoning, and incentives should be considered from the beginning as mechanisms for ensuring the development of these sites will serve to create economic benefits that fit with the local values and Navajo heritage.

8.5 Cumulative Impacts

Tourism will be a primary cumulative impact. Improved transportation systems, broadband development, environmental restoration, and other developments described in this analysis will create a more desirable region to visit. The 2020 Recovery Plan describes the tourism industry as "one very bright spot for Navajo" and describes how the Navajo Nation is at the center of the Grand Circle.

Many outside groups are scoping and proposing recreation and tourism projects in the area. The Grand Canyon National Park is nearby. Hozho Hotels and Resorts presents a $30 million 4-star hotel business model, and the Recovery Plan points to possible locations within and outside of the FBFA. Developing the tourism industry will create jobs and economic impact; however, many jobs would pay lower wages. Tourism developments near scenically desirable yet environmentally sensitive locations will be controversial.

9. Summary

The objective of this economic impact and socioeconomic analysis is to quantify the impacts resulting from the implementation of the 2020 Recovery Plan. The IMPLAN economic impact model was used to estimate the job creation and multiplier effects of the various projects identified in the Recovery Plan.

Capital budget estimates were obtained for each project by reviewing previous plans, reports, and documents. These budget estimates were used as model inputs. A total of 326 projects and project components were modeled in IMPLAN.

The scale of the proposed development is substantial. The total economic impact of implementing the Recovery Plan is equivalent to 42 percent of Coconino County's economy. Whether or not the region has the resources necessary to implement the Recovery Plan, even if funded by outside investment, is an important question to consider.

Some of the proposed projects appear to be based on population growth estimates that did not materialize. Updating budget proposals based on current costs and community needs, prioritization, and phasing will be necessary for successful implementation.

10. Glossary

Dollar year: Is the year represented by the values in an Impact Event being modeled. This is usually (but not always) the same as the year in which your event occurred or is expected to occur.

Intermediate Expenditures: These are repeating everyday materials required to make a final product.

Jobs: The job impact counts are supported in the case of construction and created in the case of operations within the region that would result from this project. IMPLAN calculates direct, indirect and induced job impact estimates resulting from a project. Note that IMPLAN jobs are not equivalent to full-time employment. In IMPLAN, 1 job lasting 12 months = 2 jobs lasting 6 months each = 3 jobs lasting 4 months each. A job can be either full-time or part-time. Similarly, a job that lasts one quarter of the year would be 0.25 job.

Labor Income: Represents the total value of all forms of employment income paid throughout a defined economy during a specified period of time. It reflects the combined cost of total payroll paid to employees (e.g., wages and salaries, benefits, payroll taxes) and payments received by self-employed individuals and/or unincorporated business owners (e.g., capital consumption allowance) across the defined economy.

Other Property Income (OPI): All money collected by an industry that isn't paid into the operations of the company. This would include profits, capital consumption allowance, payments for rent, royalties, and interest income. This is also known as Gross Operational Surplus.

Output: This is the value of production by industry in a calendar year. Total output is the sum of labor income, OPI, TOPI, and intermediate expenditures.

Taxes on Production and Imports (TOPI): This impact category includes (sales tax, property tax, motor vehicle taxes, severance, excise, assessments, custom duties, and other taxes and fees) less government subsidies.

Appendix A – Chapter-Specific Plan Impact Category Details

IMPACTS OF TUBA CITY CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-1. Economic Impact of Tuba City Chapter-Specific Projects by Category

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	90	$4,258,007	$5,342,968	$977,816	$10,578,791
Indirect	9	$424,087	$789,490	$277,376	$1,490,953
Induced	17	$758,297	$979,957	$650,537	$2,388,792
Total	**115**	**$5,440,391**	**$7,112,414**	**$1,905,730**	**$14,458,536**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	21	$1,124,963	$1,134,000	$513,784	$2,772,747
Indirect	2	$97,959	$184,135	$66,117	$348,211
Induced	4	$197,032	$254,624	$169,138	$620,794
Total	**28**	**$1,419,954**	**$1,572,758**	**$749,040**	**$3,741,752**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,452	$70,941,948	$36,592,193	$31,177,701	$138,711,842
Indirect	138	$6,114,525	$8,918,625	$4,461,385	$19,494,534
Induced	279	$12,486,065	$16,135,910	$10,711,272	$39,333,247
Total	**1,869**	**$89,542,538**	**$61,646,728**	**$46,350,358**	**$197,539,624**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,587	$77,390,944	$99,711,007	$30,238,030	$207,339,982
Indirect	354	$15,599,589	$21,935,783	$12,070,852	$49,606,223
Induced	338	$15,089,714	$19,500,615	$12,945,560	$47,535,889
Total	**2,279**	**$108,080,247**	**$141,147,405**	**$55,254,443**	**$304,482,094**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	224	$10,606,673	$28,418,025	$7,015,855	$46,040,553
Indirect	99	$4,385,408	$6,180,856	$3,576,785	$14,143,048
Induced	55	$2,436,487	$3,148,691	$2,090,545	$7,675,724
Total	**378**	**$17,428,568**	**$37,747,572**	**$12,683,185**	**$67,859,325**

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	0	$0	$0	$0	$0
Indirect	0	$0	$0	$0	$0
Induced	0	$0	$0	$0	$0
Total	**0**	**$0**	**$0**	**$0**	**$0**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	50	$2,486,845	$2,426,188	($717,749)	$4,195,283
Indirect	5	$250,404	$414,885	$174,550	$839,839
Induced	10	$442,803	$572,237	$379,936	$1,394,976
Total	**65**	**$3,180,051**	**$3,413,310**	**($163,263)**	**$6,430,098**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	40	$1,918,960	$2,407,920	$440,673	$4,767,554
Indirect	4	$191,124	$355,800	$125,005	$671,929
Induced	8	$341,743	$441,638	$293,178	$1,076,559
Total	**52**	**$2,451,826**	**$3,205,359**	**$858,857**	**$6,516,042**

IMPACTS OF BODAWAY GAP CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-2. Economic Impact of Bodaway Gap Chapter-Specific Projects by Category

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	251	$11,900,589	$14,932,917	$2,732,872	$29,566,379
Indirect	24	$1,185,269	$2,206,524	$775,232	$4,167,025
Induced	47	$2,119,345	$2,738,856	$1,818,169	$6,676,370
Total	**322**	**$15,205,204**	**$19,878,296**	**$5,326,274**	**$40,409,774**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	565	$29,795,812	$30,035,156	$13,608,099	$73,439,068

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Indirect	52	$2,594,540	$4,876,997	$1,751,184	$9,222,721
Induced	117	$5,218,604	$6,743,967	$4,479,801	$16,442,371
Total	**734**	**$37,608,956**	**$41,656,120**	**$19,839,084**	**$99,104,160**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,683	$82,250,917	$42,425,413	$36,147,788	$160,824,119
Indirect	160	$7,089,251	$10,340,357	$5,172,581	$22,602,189
Induced	324	$14,476,488	$18,708,162	$12,418,773	$45,603,423
Total	**2,167**	**$103,816,657**	**$71,473,931**	**$53,739,143**	**$229,029,731**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,576	$76,849,749	$99,013,727	$30,026,576	$205,890,052
Indirect	351	$15,490,501	$21,782,385	$11,986,440	$49,259,326
Induced	335	$14,984,191	$19,364,247	$12,855,032	$47,203,470
Total	**2,263**	**$107,324,441**	**$140,160,360**	**$54,868,048**	**$302,352,848**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	189	$8,931,274	$23,929,196	$5,907,651	$38,768,122
Indirect	84	$3,692,702	$5,204,546	$3,011,806	$11,909,054
Induced	46	$2,051,627	$2,651,333	$1,760,329	$6,463,289
Total	**318**	**$14,675,603**	**$31,785,075**	**$10,679,786**	**$57,140,464**
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	287	$14,886,422	$18,762,760	$8,160,575	$41,809,757
Indirect	33	$1,608,424	$2,909,436	$1,042,471	$5,560,331
Induced	60	$2,668,767	$3,448,868	$2,289,858	$8,407,494
Total	**380**	**$19,163,614**	**$25,121,064**	**$11,492,904**	**$55,777,582**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	115	$5,695,857	$5,556,928	($1,643,930)	$9,608,856
Indirect	12	$573,524	$950,251	$399,788	$1,923,563

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Induced	23	$1,014,193	$1,310,649	$870,205	$3,195,047
Total	**149**	**$7,283,574**	**$7,817,829**	**($373,938)**	**$14,727,466**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	92	$4,374,036	$5,488,562	$1,004,461	$10,867,059
Indirect	9	$435,643	$811,003	$284,935	$1,531,581
Induced	17	$778,961	$1,006,660	$668,264	$2,453,885
Total	**118**	**$5,588,640**	**$7,306,225**	**$1,957,660**	**$14,852,525**

IMPACTS OF CAMERON CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-3. Economic Impact of Cameron Chapter-Specific Projects by Category

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	282	$13,378,659	$16,787,605	$3,072,299	$33,238,563
Indirect	27	$1,332,481	$2,480,577	$871,517	$4,684,575
Induced	53	$2,382,570	$3,079,025	$2,043,989	$7,505,584
Total	**362**	**$17,093,710**	**$22,347,207**	**$5,987,804**	**$45,428,722**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	622	$32,763,208	$33,026,388	$14,963,344	$80,752,939
Indirect	57	$2,852,933	$5,362,702	$1,925,586	$10,141,221
Induced	128	$5,738,330	$7,415,605	$4,925,949	$18,079,884
Total	**807**	**$41,354,470**	**$45,804,695**	**$21,814,879**	**$108,974,044**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,436	$70,152,025	$36,184,747	$30,830,544	$137,167,316
Indirect	136	$6,046,441	$8,819,318	$4,411,708	$19,277,467
Induced	276	$12,347,035	$15,956,240	$10,592,005	$38,895,280
Total	**1,848**	**$88,545,501**	**$60,960,305**	**$45,834,257**	**$195,340,063**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,149	$56,013,725	$72,168,456	$21,885,567	$150,067,749
Indirect	256	$11,290,611	$15,876,598	$8,736,596	$35,903,805
Induced	244	$10,921,576	$14,114,082	$9,369,689	$34,405,346
Total	**1,649**	**$78,225,913**	**$102,159,136**	**$39,991,852**	**$220,376,900**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	132	$6,228,297	$16,687,220	$4,119,749	$27,035,265
Indirect	58	$2,575,136	$3,629,432	$2,100,308	$8,304,875
Induced	32	$1,430,718	$1,848,929	$1,227,580	$4,507,227
Total	**222**	**$10,234,151**	**$22,165,581**	**$7,447,636**	**$39,847,367**
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	367	$18,983,400	$23,926,567	$10,406,493	$53,316,459
Indirect	42	$2,051,088	$3,710,158	$1,329,376	$7,090,622
Induced	76	$3,403,254	$4,398,051	$2,920,063	$10,721,368
Total	**485**	**$24,437,742**	**$32,034,776**	**$14,655,932**	**$71,128,449**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	162	$8,058,080	$7,861,534	($2,325,711)	$13,593,903
Indirect	17	$811,379	$1,344,346	$565,590	$2,721,316
Induced	32	$1,434,806	$1,854,210	$1,231,101	$4,520,118
Total	**211**	**$10,304,265**	**$11,060,090**	**($529,019)**	**$20,835,336**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	101	$4,806,633	$6,031,386	$1,103,804	$11,941,823
Indirect	10	$478,729	$891,212	$313,115	$1,683,056
Induced	19	$856,001	$1,106,220	$734,356	$2,696,577
Total	130	$6,141,363	$8,028,819	$2,151,275	$16,321,457

IMPACTS OF COALMINE CANYON CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-4. Economic Impact of Coalmine Canyon Chapter-Specific Projects by Category

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	228	$10,827,363	$13,586,227	$2,486,415	$26,900,005
Indirect	22	$1,078,379	$2,007,533	$705,319	$3,791,231
Induced	43	$1,928,217	$2,491,858	$1,654,202	$6,074,277
Total	**293**	**$13,833,958**	**$18,085,619**	**$4,845,936**	**$36,765,513**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	254	$13,412,708	$13,520,450	$6,125,742	$33,058,900
Indirect	24	$1,167,943	$2,195,400	$788,303	$4,151,646
Induced	53	$2,349,176	$3,035,824	$2,016,601	$7,401,601
Total	**330**	**$16,929,827**	**$18,751,674**	**$8,930,646**	**$44,612,147**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	832	$40,673,713	$20,979,694	$17,875,360	$79,528,766
Indirect	79	$3,505,689	$5,113,386	$2,557,881	$11,176,957
Induced	160	$7,158,735	$9,251,330	$6,141,179	$22,551,244
Total	**1,071**	**$51,338,137**	**$35,344,410**	**$26,574,420**	**$113,256,967**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	444	$21,647,817	$27,891,191	$8,458,190	$57,997,198
Indirect	99	$4,363,521	$6,135,883	$3,376,462	$13,875,867
Induced	94	$4,220,899	$5,454,718	$3,621,136	$13,296,752
Total	**637**	**$30,232,237**	**$39,481,792**	**$15,455,788**	**$85,169,816**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	51	$2,423,744	$6,493,838	$1,603,202	$10,520,785
Indirect	23	$1,002,115	$1,412,395	$817,336	$3,231,846
Induced	12	$556,765	$719,511	$477,713	$1,753,989
Total	**86**	**$3,982,624**	**$8,625,745**	**$2,898,251**	**$15,506,620**

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	41	$2,098,394	$2,644,803	$1,150,317	$5,893,513
Indirect	5	$226,724	$410,115	$146,947	$783,786
Induced	8	$376,190	$486,153	$322,779	$1,185,122
Total	**54**	**$2,701,308**	**$3,541,071**	**$1,620,042**	**$7,862,421**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	29	$1,449,128	$1,413,782	($418,245)	$2,444,665
Indirect	3	$145,915	$241,761	$101,713	$489,389
Induced	6	$258,029	$333,453	$221,396	$812,877
Total	**38**	**$1,853,072**	**$1,988,996**	**($95,136)**	**$3,746,932**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	150	$7,120,444	$8,934,767	$1,635,151	$17,690,363
Indirect	14	$709,179	$1,320,223	$463,842	$2,493,243
Induced	28	$1,268,061	$1,638,731	$1,087,860	$3,994,652
Total	**193**	**$9,097,684**	**$11,893,721**	**$3,186,853**	**$24,178,258**

IMPACTS OF COPPERMINE CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-5. Economic Impact of Coppermine Chapter-Specific Projects by Category

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	32	$1,506,239	$1,890,036	$345,895	$3,742,171
Indirect	3	$150,018	$279,276	$98,120	$527,414
Induced	6	$268,242	$346,653	$230,123	$845,018
Total	**41**	**$1,924,499**	**$2,515,965**	**$674,138**	**$5,114,602**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	65	$3,450,893	$3,478,613	$1,576,064	$8,505,570
Indirect	6	$300,495	$564,844	$202,819	$1,068,158
Induced	14	$604,409	$781,073	$518,842	$1,904,323
Total	**85**	**$4,355,796**	**$4,824,531**	**$2,297,724**	**$11,478,051**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	326	$15,913,945	$8,208,488	$6,993,891	$31,116,324
Indirect	31	$1,371,632	$2,000,657	$1,000,793	$4,373,082
Induced	63	$2,800,918	$3,619,664	$2,402,790	$8,823,371
Total	**419**	**$20,086,494**	**$13,828,809**	**$10,397,474**	**$44,312,778**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	294	$14,341,678	$18,477,914	$5,603,551	$38,423,143
Indirect	66	$2,890,833	$4,065,023	$2,236,906	$9,192,762
Induced	63	$2,796,346	$3,613,750	$2,399,002	$8,809,098
Total	**422**	**$20,028,857**	**$26,156,687**	**$10,239,460**	**$56,425,003**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	34	$1,625,603	$4,355,410	$1,075,266	$7,056,279
Indirect	15	$672,118	$947,292	$548,186	$2,167,595
Induced	8	$373,421	$482,576	$320,402	$1,176,399
Total	**58**	**$2,671,142**	**$5,785,278**	**$1,943,854**	**$10,400,273**

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	19	$986,245	$1,243,057	$540,649	$2,769,951
Indirect	2	$106,560	$192,754	$69,065	$368,379
Induced	4	$176,809	$228,492	$151,706	$557,007
Total	**25**	**$1,269,615**	**$1,664,303**	**$761,420**	**$3,695,338**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	0	$0	$0	$0	$0
Indirect	0	$0	$0	$0	$0
Induced	0	$0	$0	$0	$0
Total	**0**	**$0**	**$0**	**$0**	**$0**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	77	$3,670,855	$4,606,207	$842,982	$9,120,043
Indirect	7	$365,608	$680,624	$239,128	$1,285,360
Induced	15	$653,733	$844,827	$560,832	$2,059,393
Total	**99**	**$4,690,196**	**$6,131,658**	**$1,642,942**	**$12,464,796**

IMPACTS OF KAIBETO CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-6. Economic Impact of Kaibeto Chapter-Specific Projects by Category

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	18	$848,898	$1,065,202	$194,943	$2,109,042
Indirect	2	$84,548	$157,397	$55,299	$297,244
Induced	3	$151,178	$195,369	$129,694	$476,242
Total	**23**	**$1,084,625**	**$1,417,968**	**$379,936**	**$2,882,528**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	56	$2,948,689	$2,972,375	$1,346,701	$7,267,765

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Indirect	5	$256,764	$482,643	$173,303	$912,710
Induced	12	$516,450	$667,404	$443,335	$1,627,190
Total	**73**	**$3,721,902**	**$4,122,423**	**$1,963,339**	**$9,807,664**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	167	$8,138,717	$4,197,989	$3,576,819	$15,913,525
Indirect	16	$701,480	$1,023,177	$511,826	$2,236,484
Induced	32	$1,432,447	$1,851,170	$1,228,836	$4,512,453
Total	**214**	**$10,272,644**	**$7,072,336**	**$5,317,481**	**$22,662,462**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	150	$7,306,138	$9,413,277	$2,854,639	$19,574,054
Indirect	33	$1,472,688	$2,070,861	$1,139,556	$4,683,105
Induced	32	$1,424,553	$1,840,967	$1,222,133	$4,487,654
Total	**215**	**$10,203,380**	**$13,325,105**	**$5,216,328**	**$28,744,813**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	17	$798,142	$2,138,428	$527,936	$3,464,506
Indirect	7	$329,998	$465,103	$269,149	$1,064,250
Induced	4	$183,343	$236,936	$157,311	$577,591
Total	**28**	**$1,311,482**	**$2,840,467**	**$954,397**	**$5,106,346**
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	5	$260,576	$328,429	$142,845	$731,850
Indirect	1	$28,154	$50,928	$18,248	$97,330
Induced	1	$46,715	$60,370	$40,082	$147,167
Total	**7**	**$335,445**	**$439,726**	**$201,175**	**$976,346**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	138	$6,827,040	$6,660,520	($1,970,410)	$11,517,150
Indirect	14	$687,424	$1,138,969	$479,185	$2,305,578

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Induced	27	$1,215,609	$1,570,941	$1,043,025	$3,829,575
Total	**179**	**$8,730,074**	**$9,370,430**	**($448,201)**	**$17,652,303**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	9	$432,597	$542,825	$99,342	$1,074,764
Indirect	1	$43,086	$80,209	$28,180	$151,475
Induced	2	$77,040	$99,560	$66,092	$242,692
Total	12	$552,723	$722,594	$193,615	$1,468,931

IMPACTS OF LEUPP CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-7. Economic Impact of Leupp Chapter-Specific Projects by Category

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	2	$102,596	$128,737	$23,560	$254,893
Indirect	0	$10,218	$19,023	$6,683	$35,924
Induced	0	$18,271	$23,612	$15,675	$57,557
Total	**3**	**$131,085**	**$171,372**	**$45,918**	**$348,375**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	2	$130,381	$131,428	$59,546	$321,355
Indirect	0	$11,353	$21,341	$7,663	$40,357
Induced	1	$22,836	$29,510	$19,603	$71,949
Total	**3**	**$164,569**	**$182,279**	**$86,812**	**$433,660**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	17	$853,007	$439,985	$374,881	$1,667,873
Indirect	2	$73,521	$107,238	$53,644	$234,403
Induced	3	$150,133	$194,018	$128,793	$472,944
Total	**22**	**$1,076,661**	**$741,241**	**$557,317**	**$2,375,219**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Direct	17	$811,793	$1,045,920	$317,182	$2,174,895
Indirect	4	$163,632	$230,096	$126,617	$520,345
Induced	4	$158,284	$204,552	$135,793	$498,628
Total	**24**	**$1,133,709**	**$1,480,567**	**$579,592**	**$3,193,868**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	9	$448,169	$1,200,762	$296,445	$1,945,375
Indirect	4	$185,299	$261,163	$151,132	$597,594
Induced	2	$102,950	$133,043	$88,333	$324,326
Total	**16**	**$736,418**	**$1,594,968**	**$535,909**	**$2,867,295**
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	2	$117,684	$148,328	$64,513	$330,524
Indirect	0	$12,715	$23,000	$8,241	$43,957
Induced	0	$21,098	$27,265	$18,102	$66,465
Total	**3**	**$151,497**	**$198,593**	**$90,856**	**$440,946**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	0	$0	$0	$0	$0
Indirect	0	$0	$0	$0	$0
Induced	0	$0	$0	$0	$0
Total	**0**	**$0**	**$0**	**$0**	**$0**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1	$48,066	$60,314	$11,038	$119,418
Indirect	0	$4,787	$8,912	$3,131	$16,831
Induced	0	$8,560	$11,062	$7,344	$26,966
Total	**1**	**$61,414**	**$80,288**	**$21,513**	**$163,215**

IMPACTS OF TOLANI LAKE CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-8. Economic Impact of Tolani Lake Chapter-Specific Projects by Category

Community Facilities and Recreation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	115	$5,448,995	$6,837,425	$1,251,317	$13,537,737
Indirect	11	$542,706	$1,010,314	$354,960	$1,907,981
Induced	22	$970,397	$1,254,056	$832,496	$3,056,950
Total	**147**	**$6,962,099**	**$9,101,796**	**$2,438,773**	**$18,502,667**
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	109	$5,758,851	$5,805,111	$2,630,135	$14,194,097
Indirect	10	$501,465	$942,612	$338,464	$1,782,542
Induced	23	$1,008,637	$1,303,455	$865,843	$3,177,935
Total	**142**	**$7,268,954**	**$8,051,178**	**$3,834,443**	**$19,154,575**
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	373	$18,251,123	$9,414,016	$8,021,038	$35,686,177
Indirect	35	$1,573,074	$2,294,480	$1,147,773	$5,015,328
Induced	72	$3,212,270	$4,151,260	$2,755,672	$10,119,203
Total	**481**	**$23,036,468**	**$15,859,757**	**$11,924,484**	**$50,820,708**
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	355	$17,318,253	$22,312,953	$6,766,552	$46,397,758
Indirect	79	$3,490,817	$4,908,707	$2,701,170	$11,100,693
Induced	76	$3,376,719	$4,363,774	$2,896,909	$10,637,402
Total	**510**	**$24,185,789**	**$31,585,433**	**$12,364,631**	**$68,135,853**
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	41	$1,916,936	$5,135,968	$1,267,970	$8,320,874
Indirect	18	$792,571	$1,117,061	$646,430	$2,556,062
Induced	10	$440,344	$569,061	$377,823	$1,387,228
Total	**68**	**$3,149,852**	**$6,822,090**	**$2,292,222**	**$12,264,164**

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	21	$1,102,431	$1,389,498	$604,341	$3,096,269
Indirect	2	$119,114	$215,462	$77,201	$411,777
Induced	4	$197,639	$255,410	$169,578	$622,627
Total	**28**	**$1,419,183**	**$1,860,369**	**$851,120**	**$4,130,673**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	0	$0	$0	$0	$0
Indirect	0	$0	$0	$0	$0
Induced	0	$0	$0	$0	$0
Total	**0**	**$0**	**$0**	**$0**	**$0**
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	50	$2,355,250	$2,955,379	$540,864	$5,851,493
Indirect	5	$234,577	$436,694	$153,426	$824,697
Induced	9	$419,440	$542,048	$359,835	$1,321,323
Total	**64**	**$3,009,268**	**$3,934,121**	**$1,054,125**	**$7,997,514**

IMPACTS OF TONALEA CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-9. Economic Impact of Tonalea Chapter-Specific Projects by Category

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	56	$2,645,512	$3,319,601	$607,520	$6,572,634
Indirect	5	$263,486	$490,512	$172,335	$926,334
Induced	11	$471,132	$608,850	$404,181	$1,484,163
Total	72	$3,380,131	$4,418,964	$1,184,036	$8,983,130
Education		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	80	$4,194,155	$4,227,846	$1,915,520	$10,337,521
Indirect	7	$365,216	$686,502	$246,502	$1,298,220

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Induced	16	$734,588	$949,303	$630,591	$2,314,482
Total	103	$5,293,959	$5,863,651	$2,792,614	$13,950,223
Multifamily Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	673	$32,869,958	$16,954,480	$14,445,751	$64,270,190
Indirect	64	$2,833,080	$4,132,320	$2,067,120	$9,032,519
Induced	129	$5,785,243	$7,476,348	$4,962,918	$18,224,509
Total	866	$41,488,281	$28,563,148	$21,475,789	$91,527,218
Scattered Housing		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	644	$31,389,334	$40,442,227	$12,264,376	$84,095,937
Indirect	143	$6,327,106	$8,897,031	$4,895,870	$20,120,007
Induced	137	$6,120,303	$7,909,340	$5,250,647	$19,280,291
Total	924	$43,836,743	$57,248,598	$22,410,893	$123,496,234
Housing Repairs		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	74	$3,513,219	$9,412,824	$2,323,842	$15,249,885
Indirect	33	$1,452,567	$2,047,268	$1,184,729	$4,684,563
Induced	18	$807,031	$1,042,932	$692,446	$2,542,409
Total	125	$5,772,817	$12,503,024	$4,201,016	$22,476,857
Health		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	15	$768,271	$968,324	$421,158	$2,157,752
Indirect	2	$83,009	$150,153	$53,801	$286,962
Induced	3	$137,732	$177,992	$118,177	$433,901
Total	20	$989,012	$1,296,469	$593,135	$2,878,615
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	107	$5,314,003	$5,184,388	($1,533,720)	$8,964,671
Indirect	11	$535,074	$886,546	$372,986	$1,794,606
Induced	21	$946,201	$1,222,783	$811,865	$2,980,849

Community Facilities and Recreation		Labor	Intermediate	Taxes/	Total
Total	139	$6,795,278	$7,293,716	($348,868)	$13,740,126
Public Safety		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	42	$1,993,724	$2,501,735	$457,842	$4,953,302
Indirect	4	$198,570	$369,662	$129,876	$698,108
Induced	8	$355,057	$458,845	$304,601	$1,118,503
Total	**54**	**$2,547,351**	**$3,330,242**	**$892,319**	**$6,769,912**

IMPACTS OF REGIONAL CHAPTER-SPECIFIC PROJECTS BY CATEGORY

Appendix Table A-10. Economic Impact of Regional Chapter-Specific Projects by Category

Housing repairs		Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	32	$1,582,521	$3,926,777	$759,586	$6,268,884
Indirect	11	$492,945	$751,525	$385,294	$1,629,764
Induced	8	$337,119	$435,662	$289,222	$1,062,003
Total	**51**	**$2,412,584**	**$5,113,964**	**$1,434,103**	**$8,960,650**
Hospital		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	476	$24,657,002	$31,077,542	$13,516,700	$69,251,243
Indirect	54	$2,664,100	$4,819,020	$1,726,689	$9,209,809
Induced	99	$4,420,390	$5,712,504	$3,792,787	$13,925,682
Total	**629**	**$31,741,492**	**$41,609,066**	**$19,036,176**	**$92,386,734**
Infrastructure		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	6,955	$345,306,346	$336,883,901	($99,661,801)	$582,528,447
Indirect	714	$34,769,383	$57,608,160	$24,236,780	$116,614,323
Induced	1,375	$61,484,566	$79,456,969	$52,755,387	$193,696,922
Total	**9,044**	**$441,560,295**	**$473,949,030**	**($22,669,634)**	**$892,839,692**
Transportation		**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**

Housing repairs		Labor	Intermediate	Taxes/	Total
Direct	1,151	$56,401,204	$67,224,673	($11,066,755)	$112,559,122
Indirect	241	$10,483,661	$14,591,032	$8,043,524	$33,118,217
Induced	243	$10,845,666	$14,015,979	$9,304,688	$34,166,333
Total	**1,635**	**$77,730,531**	**$95,831,684**	**$6,281,457**	**$179,843,672**

Appendix B – Chapter-Specific Plan Impact Phasing Details

IMPACT OF CHAPTER-SPECIFIC COMMUNITY AND REC FACILITIES PROJECTS BY YEAR

Appendix Table B-1. The Economic Impacts of Chapter-Specific Community and Rec Facilities Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	19	$883,304	$1,108,374	$202,843	$2,194,521
Indirect	2	$87,975	$163,776	$57,540	$309,291
Induced	4	$157,305	$203,288	$134,951	$495,544
Total	**25**	**$1,128,584**	**$1,475,437**	**$395,335**	**$2,999,356**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	130	$6,168,250	$7,739,950	$1,416,488	$15,324,688
Indirect	12	$614,343	$1,143,674	$401,814	$2,159,830
Induced	25	$1,098,488	$1,419,589	$942,384	$3,460,460
Total	167	$7,881,080	$10,303,212	$2,760,686	$20,944,978
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	187	$8,877,607	$11,139,664	$2,038,669	$22,055,941
Indirect	18	$884,188	$1,646,023	$578,308	$3,108,519
Induced	35	$1,580,990	$2,043,133	$1,356,319	$4,980,441
Total	240	$11,342,785	$14,828,820	$3,973,296	$30,144,901
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	241	$11,423,375	$14,334,105	$2,623,284	$28,380,764
Indirect	23	$1,137,740	$2,118,042	$744,145	$3,999,927
Induced	46	$2,034,359	$2,629,027	$1,745,261	$6,408,647
Total	310	$14,595,473	$19,081,174	$5,112,690	$38,789,337
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	214	$10,174,255	$12,766,704	$2,336,434	$25,277,392
Indirect	20	$1,013,331	$1,886,439	$662,774	$3,562,544
Induced	41	$1,811,906	$2,341,549	$1,554,420	$5,707,876

Total	275	$12,999,492	$16,994,692	$4,553,629	$34,547,812
2026	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	193	$9,160,965	$11,495,223	$2,103,740	$22,759,928
Indirect	18	$912,410	$1,698,562	$596,766	$3,207,738
Induced	36	$1,631,452	$2,108,346	$1,399,610	$5,139,409
Total	247	$11,704,827	$15,302,131	$4,100,117	$31,107,075
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	89	$4,229,103	$5,306,698	$971,179	$10,506,979
Indirect	8	$421,208	$784,130	$275,493	$1,480,832
Induced	17	$753,150	$973,305	$646,121	$2,372,576
Total	114	$5,403,461	$7,064,134	$1,892,793	$14,360,388

IMPACT OF CHAPTER-SPECIFIC EDUCATION PROJECTS BY YEAR

Appendix Table B-2. The Economic Impacts of Chapter-Specific Education Projects by Year

2021	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	31	$1,623,417	$1,636,457	$741,434	$4,001,307
Indirect	3	$141,363	$265,722	$95,413	$502,497
Induced	6	$284,334	$367,443	$244,081	$895,858
Total	**40**	**$2,049,114**	**$2,269,622**	**$1,080,927**	**$5,399,663**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	215	$11,336,574	$11,427,638	$5,177,547	$27,941,760
Indirect	20	$987,159	$1,855,578	$666,282	$3,509,019
Induced	44	$1,985,551	$2,565,913	$1,704,454	$6,255,918
Total	**279**	**$14,309,283**	**$15,849,129**	**$7,548,284**	**$37,706,696**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	310	$16,316,078	$16,447,142	$7,451,746	$40,214,966

Indirect	29	$1,420,760	$2,670,626	$958,942	$5,050,328
Induced	64	$2,857,689	$3,692,972	$2,453,123	$9,003,783
Total	**403**	**$20,594,528**	**$22,810,740**	**$10,863,810**	**$54,269,077**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	398	$20,994,923	$21,163,571	$9,588,629	$51,747,124
Indirect	37	$1,828,182	$3,436,462	$1,233,931	$6,498,575
Induced	82	$3,677,167	$4,751,979	$3,156,587	$11,585,733
Total	**517**	**$26,500,272**	**$29,352,012**	**$13,979,147**	**$69,831,431**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	355	$18,699,176	$18,849,383	$8,540,135	$46,088,694
Indirect	33	$1,628,274	$3,060,693	$1,099,003	$5,787,971
Induced	73	$3,275,078	$4,232,361	$2,811,421	$10,318,859
Total	**461**	**$23,602,528**	**$26,142,436**	**$12,450,559**	**$62,195,524**
2026	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	319	$16,836,860	$16,972,108	$7,689,593	$41,498,561
Indirect	30	$1,466,109	$2,755,868	$989,550	$5,211,526
Induced	66	$2,948,901	$3,810,845	$2,531,422	$9,291,168
Total	**415**	**$21,251,870**	**$23,538,820**	**$11,210,565**	**$56,001,256**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	147	$7,772,632	$7,835,068	$3,549,853	$19,157,552
Indirect	14	$676,820	$1,272,229	$456,819	$2,405,869
Induced	30	$1,361,342	$1,759,253	$1,168,615	$4,289,210
Total	**191**	**$9,810,793**	**$10,866,550**	**$5,175,287**	**$25,852,631**

IMPACT OF CHAPTER-SPECIFIC NEW SCATTERED HOUSING PROJECTS BY YEAR

Appendix Table B-3. The Economic Impacts of Chapter-Specific New Scattered Housing Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	108	$5,257,637	$6,773,975	$2,054,253	$14,085,866
Indirect	24	$1,059,775	$1,490,231	$820,046	$3,370,052
Induced	23	$1,025,136	$1,324,795	$879,471	$3,229,402
Total	**155**	**$7,342,548**	**$9,589,002**	**$3,753,770**	**$20,685,320**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	753	$36,714,913	$47,303,738	$14,345,175	$98,363,827
Indirect	168	$7,400,576	$10,406,519	$5,726,513	$23,533,608
Induced	160	$7,158,687	$9,251,255	$6,141,482	$22,551,425
Total	**1,081**	**$51,274,176**	**$66,961,513**	**$26,213,171**	**$144,448,860**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,084	$52,841,661	$68,081,547	$20,646,185	$141,569,392
Indirect	242	$10,651,223	$14,977,504	$8,241,841	$33,870,568
Induced	230	$10,303,086	$13,314,799	$8,839,082	$32,456,967
Total	**1,556**	**$73,795,969**	**$96,373,850**	**$37,727,108**	**$207,896,927**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,395	$67,994,684	$87,604,803	$26,566,743	$182,166,229
Indirect	311	$13,705,597	$19,272,495	$10,605,295	$43,583,387
Induced	297	$13,257,627	$17,132,989	$11,373,802	$41,764,418
Total	**2,003**	**$94,957,908**	**$124,010,286**	**$48,545,839**	**$267,514,034**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,242	$60,559,621	$78,025,418	$23,661,730	$162,246,770
Indirect	277	$12,206,921	$17,165,092	$9,445,630	$38,817,643
Induced	264	$11,807,936	$15,259,536	$10,130,103	$37,197,575
Total	**1,783**	**$84,574,479**	**$110,450,046**	**$43,237,463**	**$238,261,988**

2026	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,118	$54,528,277	$70,254,595	$21,305,176	$146,088,048
Indirect	249	$10,991,192	$15,455,561	$8,504,907	$34,951,659
Induced	238	$10,631,943	$13,739,785	$9,121,211	$33,492,938
Total	**1,605**	**$76,151,411**	**$99,449,940**	**$38,931,293**	**$214,532,645**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	516	$25,172,639	$32,432,595	$9,835,402	$67,440,636
Indirect	115	$5,074,015	$7,134,963	$3,926,237	$16,135,215
Induced	110	$4,908,170	$6,342,886	$4,210,750	$15,461,806
Total	**741**	**$35,154,824**	**$45,910,444**	**$17,972,389**	**$99,037,657**

IMPACT OF CHAPTER-SPECIFIC NEW MULTIFAMILY HOUSING PROJECTS BY YEAR

Appendix Table B-4. The Economic Impacts of Chapter-Specific New Multifamily Housing Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	121	$5,899,095	$3,042,781	$2,592,545	$11,534,421
Indirect	11	$508,446	$741,618	$370,981	$1,621,045
Induced	23	$1,038,264	$1,341,763	$890,683	$3,270,710
Total	**155**	**$7,445,805**	**$5,126,162**	**$3,854,210**	**$16,426,176**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	843	$41,194,308	$21,248,220	$18,104,152	$80,546,680
Indirect	80	$3,550,560	$5,178,834	$2,590,620	$11,320,014
Induced	162	$7,250,362	$9,369,741	$6,219,782	$22,839,885
Total	**1,085**	**$51,995,230**	**$35,796,794**	**$26,914,555**	**$114,706,579**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,213	$59,288,596	$30,581,339	$26,056,264	$115,926,200

Indirect	115	$5,110,116	$7,453,598	$3,728,531	$16,292,245
Induced	233	$10,435,028	$13,485,329	$8,951,774	$32,872,131
Total	**1,561**	**$74,833,741**	**$51,520,265**	**$38,736,569**	**$165,090,576**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,561	$76,290,361	$39,350,930	$33,528,232	$149,169,522
Indirect	148	$6,575,508	$9,591,012	$4,797,735	$20,964,255
Induced	300	$13,427,407	$17,352,419	$11,518,810	$42,298,636
Total	**2,009**	**$96,293,275**	**$66,294,361**	**$49,844,777**	**$212,432,413**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,390	$67,948,185	$35,047,996	$29,861,996	$132,858,177
Indirect	132	$5,856,491	$8,542,257	$4,273,114	$18,671,861
Induced	268	$11,959,150	$15,454,972	$10,259,255	$37,673,377
Total	**1,790**	**$85,763,826**	**$59,045,225**	**$44,394,365**	**$189,203,416**
2026	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,252	$61,180,989	$31,557,444	$26,887,936	$119,626,369
Indirect	119	$5,273,223	$7,691,504	$3,847,539	$16,812,266
Induced	241	$10,768,097	$13,915,757	$9,237,500	$33,921,354
Total	**1,612**	**$77,222,308**	**$53,164,705**	**$39,972,975**	**$170,359,989**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	578	$28,243,821	$14,568,297	$12,412,648	$55,224,766
Indirect	55	$2,434,350	$3,550,735	$1,776,192	$7,761,277
Induced	111	$4,971,025	$6,424,123	$4,264,434	$15,659,581
Total	**744**	**$35,649,196**	**$24,543,154**	**$18,453,274**	**$78,645,625**

IMPACT OF CHAPTER-SPECIFIC HOUSING REPAIR PROJECTS BY YEAR

Appendix Table B-5. The Economic Impacts of Chapter-Specific Housing Repair Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	13	$633,063	$1,696,139	$418,744	$2,747,945
Indirect	6	$261,745	$368,906	$213,482	$844,132
Induced	3	$145,423	$187,931	$124,775	$458,128
Total	**22**	**$1,040,230**	**$2,252,976**	**$757,000**	**$4,050,206**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	93	$4,420,778	$11,844,410	$2,924,153	$19,189,341
Indirect	41	$1,827,804	$2,576,132	$1,490,776	$5,894,712
Induced	23	$1,015,509	$1,312,350	$871,323	$3,199,181
Total	**157**	**$7,264,091**	**$15,732,892**	**$5,286,252**	**$28,283,234**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	134	$6,362,571	$17,046,976	$4,208,565	$27,618,113
Indirect	60	$2,630,653	$3,707,679	$2,145,588	$8,483,919
Induced	33	$1,461,563	$1,888,789	$1,254,045	$4,604,397
Total	**227**	**$10,454,787**	**$22,643,444**	**$7,608,198**	**$40,706,429**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	173	$8,187,120	$21,935,415	$5,415,426	$35,537,961
Indirect	77	$3,385,026	$4,770,903	$2,760,862	$10,916,791
Induced	42	$1,880,685	$2,430,424	$1,613,658	$5,924,767
Total	**292**	**$13,452,831**	**$29,136,742**	**$9,789,946**	**$52,379,519**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	154	$7,291,877	$19,536,828	$4,823,261	$31,651,966
Indirect	68	$3,014,881	$4,249,216	$2,458,968	$9,723,065
Induced	37	$1,675,036	$2,164,663	$1,437,208	$5,276,908
Total	**259**	**$11,981,795**	**$25,950,706**	**$8,719,438**	**$46,651,938**

2026	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	139	$6,565,654	$17,591,087	$4,342,896	$28,499,636
Indirect	61	$2,714,618	$3,826,021	$2,214,071	$8,754,711
Induced	34	$1,508,214	$1,949,076	$1,294,072	$4,751,362
Total	**234**	**$10,788,486**	**$23,366,184**	**$7,851,039**	**$42,005,709**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	64	$3,030,993	$8,120,816	$2,004,871	$13,156,679
Indirect	28	$1,253,187	$1,766,259	$1,022,112	$4,041,558
Induced	16	$696,257	$899,779	$597,400	$2,193,437
Total	**108**	**$4,980,437**	**$10,786,853**	**$3,624,383**	**$19,391,674**

IMPACT OF CHAPTER-SPECIFIC HEALTH PROJECTS BY YEAR

Appendix Table B-6. The Economic Impacts of Chapter-Specific Health Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	22	$1,143,416	$1,441,155	$626,808	$3,211,380
Indirect	3	$123,542	$223,472	$80,072	$427,085
Induced	5	$204,986	$264,905	$175,883	$645,774
Total	**30**	**$1,471,945**	**$1,929,533**	**$882,763**	**$4,284,240**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	154	$7,984,656	$10,063,814	$4,377,102	$22,425,572
Indirect	18	$862,713	$1,560,539	$559,152	$2,982,405
Induced	32	$1,431,451	$1,849,876	$1,228,215	$4,509,542
Total	**204**	**$10,278,821**	**$13,474,229**	**$6,164,469**	**$29,917,519**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	222	$11,491,856	$14,484,268	$6,299,710	$32,275,834

Indirect	25	$1,241,654	$2,245,994	$804,755	$4,292,403
Induced	46	$2,060,205	$2,662,419	$1,767,699	$6,490,324
Total	**293**	**$14,793,715**	**$19,392,681**	**$8,872,165**	**$43,058,561**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	286	$14,787,293	$18,637,818	$8,106,233	$41,531,343
Indirect	33	$1,597,714	$2,890,062	$1,035,529	$5,523,305
Induced	59	$2,650,996	$3,425,902	$2,274,610	$8,351,508
Total	**378**	**$19,036,002**	**$24,953,782**	**$11,416,372**	**$55,406,156**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	254	$13,170,336	$16,599,815	$7,219,835	$36,989,986
Indirect	29	$1,423,007	$2,574,040	$922,297	$4,919,344
Induced	53	$2,361,115	$3,051,288	$2,025,886	$7,438,289
Total	**336**	**$16,954,459**	**$22,225,143**	**$10,168,018**	**$49,347,620**
2026	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	229	$11,858,656	$14,946,582	$6,500,786	$33,306,024
Indirect	26	$1,281,285	$2,317,682	$830,442	$4,429,409
Induced	48	$2,125,964	$2,747,399	$1,824,121	$6,697,484
Total	**303**	**$15,265,905**	**$20,011,663**	**$9,155,349**	**$44,432,918**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	106	$5,474,475	$6,899,996	$3,001,048	$15,375,519
Indirect	12	$591,497	$1,069,944	$383,368	$2,044,809
Induced	22	$981,438	$1,268,320	$842,094	$3,091,852
Total	**140**	**$7,047,410**	**$9,238,260**	**$4,226,510**	**$20,512,180**

IMPACT OF CHAPTER-SPECIFIC INFRASTRUCTURE PROJECTS BY YEAR

Appendix Table B-7. The Economic Impacts of Chapter-Specific Infrastructure Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	131	$6,507,868	$6,349,133	($1,878,291)	$10,978,710
Indirect	13	$655,286	$1,085,721	$456,782	$2,197,789
Induced	26	$1,158,778	$1,497,498	$994,262	$3,650,538
Total	**170**	**$8,321,933**	**$8,932,352**	**($427,247)**	**$16,827,038**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	915	$45,445,471	$44,337,001	($13,116,404)	$76,666,068
Indirect	94	$4,575,969	$7,581,760	$3,189,782	$15,347,511
Induced	181	$8,091,931	$10,457,263	$6,943,091	$25,492,285
Total	**1,190**	**$58,113,371**	**$62,376,025**	**($2,983,531)**	**$117,505,865**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,317	$65,407,051	$63,811,693	($18,877,685)	$110,341,059
Indirect	135	$6,585,928	$10,911,991	$4,590,869	$22,088,789
Induced	260	$11,646,250	$15,050,537	$9,992,791	$36,689,579
Total	**1,712**	**$83,639,229**	**$89,774,221**	**($4,294,024)**	**$169,119,426**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,695	$84,163,361	$82,110,513	($24,291,103)	$141,982,771
Indirect	174	$8,474,528	$14,041,145	$5,907,360	$28,423,032
Induced	335	$14,985,962	$19,366,472	$12,858,352	$47,210,786
Total	**2,204**	**$107,623,850**	**$115,518,129**	**($5,525,391)**	**$217,616,589**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,510	$74,960,290	$73,131,917	($21,634,927)	$126,457,281
Indirect	155	$7,547,857	$12,505,778	$5,261,404	$25,315,039
Induced	299	$13,347,281	$17,248,792	$11,452,321	$42,048,395
Total	**1,964**	**$95,855,429**	**$102,886,487**	**($4,921,202)**	**$193,820,714**

2026	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	1,359	$67,494,734	$65,848,454	($19,480,229)	$113,862,959
Indirect	140	$6,796,140	$11,260,284	$4,737,402	$22,793,826
Induced	269	$12,017,979	$15,530,925	$10,311,744	$37,860,648
Total	**1,768**	**$86,308,852**	**$92,639,663**	**($4,431,082)**	**$174,517,433**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	628	$31,158,523	$30,398,528	($8,992,926)	$52,564,125
Indirect	64	$3,137,396	$5,198,240	$2,186,992	$10,522,627
Induced	124	$5,548,025	$7,169,755	$4,760,353	$17,478,132
Total	**816**	**$39,843,943**	**$42,766,522**	**($2,045,582)**	**$80,564,884**

IMPACT OF CHAPTER-SPECIFIC PUBLIC SAFETY PROJECTS BY YEAR

Appendix Table B-8. The Economic Impacts of Chapter-Specific New Public Safety Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	10	$463,547	$581,662	$106,450	$1,151,659
Indirect	1	$46,168	$85,948	$30,197	$162,312
Induced	2	$82,552	$106,683	$70,821	$260,056
Total	**13**	**$592,268**	**$774,292**	**$207,467**	**$1,574,027**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	68	$3,237,025	$4,061,835	$743,356	$8,042,216
Indirect	6	$322,400	$600,186	$210,867	$1,133,453
Induced	13	$576,473	$744,984	$494,552	$1,816,009
Total	**87**	**$4,135,898**	**$5,407,005**	**$1,448,775**	**$10,991,678**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	98	$4,658,864	$5,845,964	$1,069,870	$11,574,698
Indirect	9	$464,011	$863,814	$303,489	$1,631,314

Induced	19	$829,685	$1,072,212	$711,780	$2,613,677
Total	**126**	**$5,952,560**	**$7,781,990**	**$2,085,139**	**$15,819,689**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	126	$5,994,852	$7,522,369	$1,376,668	$14,893,890
Indirect	12	$597,073	$1,111,523	$390,518	$2,099,114
Induced	24	$1,067,608	$1,379,682	$915,892	$3,363,182
Total	**162**	**$7,659,532**	**$10,013,575**	**$2,683,079**	**$20,356,186**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	112	$5,339,329	$6,699,815	$1,226,133	$13,265,277
Indirect	11	$531,784	$989,981	$347,816	$1,869,581
Induced	21	$950,867	$1,228,817	$815,741	$2,995,426
Total	**144**	**$6,821,980**	**$8,918,613**	**$2,389,691**	**$18,130,284**
2026	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	101	$4,807,567	$6,032,558	$1,104,018	$11,944,142
Indirect	10	$478,822	$891,385	$313,176	$1,683,383
Induced	19	$856,167	$1,106,435	$734,499	$2,697,101
Total	**130**	**$6,142,555**	**$8,030,378**	**$2,151,693**	**$16,324,626**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	47	$2,219,383	$2,784,893	$509,663	$5,513,939
Indirect	4	$221,045	$411,502	$144,576	$777,123
Induced	9	$395,244	$510,779	$339,077	$1,245,100
Total	**60**	**$2,835,672**	**$3,707,174**	**$993,316**	**$7,536,162**

IMPACT OF CHAPTER-SPECIFIC TRANSPORTATION PROJECTS BY YEAR

Appendix Table B-9. The Economic Impacts of Chapter-Specific Transportation Projects by Year

2021	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	20	$978,446	$1,166,211	($191,986)	$1,952,671
Indirect	4	$181,870	$253,125	$139,539	$574,534
Induced	4	$188,150	$243,149	$161,417	$592,716
Total	**28**	**$1,348,466**	**$1,662,484**	**$108,970**	**$3,119,921**
2022	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	139	$6,832,643	$8,143,837	($1,340,666)	$13,635,814
Indirect	29	$1,270,028	$1,767,610	$974,421	$4,012,059
Induced	29	$1,313,883	$1,697,946	$1,127,203	$4,139,031
Total	**197**	**$9,416,554**	**$11,609,392**	**$760,958**	**$21,786,904**
2023	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	201	$9,833,830	$11,720,955	($1,929,544)	$19,625,242
Indirect	42	$1,827,878	$2,544,019	$1,402,428	$5,774,325
Induced	42	$1,890,996	$2,443,755	$1,622,319	$5,957,070
Total	**285**	**$13,552,704**	**$16,708,730**	**$1,095,203**	**$31,356,637**
2024	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	258	$12,653,807	$15,082,090	($2,482,865)	$25,253,031
Indirect	54	$2,352,046	$3,273,549	$1,804,593	$7,430,187
Induced	54	$2,433,263	$3,144,534	$2,087,539	$7,665,336
Total	**366**	**$17,439,116**	**$21,500,172**	**$1,409,267**	**$40,348,555**
2025	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	230	$11,270,142	$13,432,898	($2,211,369)	$22,491,671
Indirect	48	$2,094,855	$2,915,594	$1,607,265	$6,617,714
Induced	48	$2,167,191	$2,800,686	$1,859,272	$6,827,149
Total	**326**	**$15,532,189**	**$19,149,178**	**$1,255,167**	**$35,936,534**

2026	Annual	Labor	Intermediate	Taxes/	Total
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	207	$10,147,709	$12,095,069	($1,991,131)	$20,251,646
Indirect	43	$1,886,221	$2,625,220	$1,447,191	$5,958,632
Induced	44	$1,951,353	$2,521,756	$1,674,100	$6,147,209
Total	**294**	**$13,985,283**	**$17,242,044**	**$1,130,160**	**$32,357,488**
2027	**Annual**	**Labor**	**Intermediate**	**Taxes/**	**Total**
Type	**Jobs**	**Income**	**Expenses**	**Profits**	**Output**
Direct	96	$4,684,627	$5,583,613	($919,193)	$9,349,047
Indirect	20	$870,762	$1,211,916	$668,087	$2,750,766
Induced	20	$900,830	$1,164,153	$772,838	$2,837,821
Total	**136**	**$6,456,219**	**$7,959,683**	**$521,731**	**$14,937,634**

Appendix C – Water Supplement Analysis

1. Navajo Thaw Regional Recovery Plan (2020) Water Projects

1.1 Executive Summary

The purpose of this supplemental analysis is to determine the amount of funding allocated for water-related projects, including agriculture, within the Former Bennett Freeze Area (FBFA) as identified in the Navajo Thaw Regional Recovery Plan (Building Communities, Inc. and Native Builders, LLC 2020). The economic impacts that could result from the implementation of these projects are estimated.

Two pipelines account for most of the total amount budgeted for water projects. The Western Navajo Pipeline and the C-aquifer Leupp to Dilkon Pipeline are the two Regional Projects for water development, and their combined capital budget is $582 million. The 2020 Recovery Plan shows a total implementation budget of $3.6 billion, including the $582 million. The 2020 Recovery Plan also describes what appear to be subsets of these projects with lesser budget amounts. This analysis estimates the economic impacts that would result from spending the entire $582 million.

The Chapter-specific projects within each Chapter are primarily residential and would improve water service to 4,017 houses within the FBFA at the cost of $79 million. Another $22.5 million is budgeted for seven Infrastructure Capital Improvement Plan water projects, primarily water and sewer lines.

Within the Immediate Recovery category, the Little Colorado River Valley Farms Project accounts for most water development within that category. The total budget for Immediate Recovery water projects is $76 million.

The total direct investment for the various water projects within the 2020 Recovery Plan is $760 million, and the resulting total economic impact is almost $1.2 billion. This economic activity would create a total of 11,600 one-year jobs.

Table 1-1. Economic Impacts by Project Category

Economic Impacts by Project Category					
Total Economic Impact of Nine Chapter-Specific Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	740	$36,398,510	$46,699,524	($4,265,611)	$78,832,423
Indirect	122	$5,719,126	$8,803,889	$4,308,524	$18,831,538
Induced	152	$6,820,291	$8,813,915	$5,851,975	$21,486,181
Total	1,014	$48,937,927	$64,317,327	$5,894,888	$119,150,143
Total Economic Impact of the Regional Chapter-Specific Water Projects					
Impact Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	6,955	$345,306,346	$336,883,901	($99,661,801)	$582,528,447
Indirect	714	$34,769,383	$57,608,160	$24,236,780	$116,614,323
Induced	1,375	$61,484,566	$79,456,969	$52,755,387	$193,696,922
Total	9,044	$441,560,295	$473,949,030	($22,669,634)	$892,839,692

Economic Impacts by Project Category					
Total Economic Impact of Infrastructure Capital Improvement Plan Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	268	$13,282,720	$13,017,013	($3,799,830)	$22,499,902
Indirect	28	$1,346,041	$2,228,993	$939,050	$4,514,083
Induced	53	$2,366,526	$3,058,280	$2,030,542	$7,455,348
Total	348	$16,995,287	$18,304,286	($830,239)	$34,469,334
Total Economic Impact of Immediate Recovery Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	968	$34,428,732	$40,985,001	$917,070	$76,330,803
Indirect	94	$4,382,037	$7,645,570	$3,009,509	$15,037,116
Induced	141	$6,295,678	$8,135,971	$5,401,338	$19,832,988
Total	1,202	$45,106,446	$56,766,542	$9,327,918	$111,200,906
Grand Total Economic Impact of All Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	8,931	$429,416,307	$437,585,439	($106,810,171)	$760,191,575
Indirect	958	$46,216,586	$76,286,612	$32,493,862	$154,997,061
Induced	1,721	$76,967,062	$99,465,134	$66,039,243	$242,471,439
Total	11,608	$552,599,955	$613,337,185	($8,277,066)	$1,157,660,074

1.2 Background and Approach

The importance of water is referenced throughout the Navajo Thaw Regional Recovery Plan (2020), from the lack of running water to wash hands to the need for large-scale infrastructure development. This report identifies the many water resource projects appearing in the 2020 Recovery Plan and traces project details to their originating documents.

Many water projects first appear in the 2008 Recovery Plan and the associated Chapter Land Use Plans (CLUPs) in the form of "Power, Water, and Access to Existing Scattered Housing." The capital budgets for these projects overestimate providing water by combining power and access costs. However, the 2008 Recovery Plan does provide a cost range for providing water and wastewater services to scattered houses of $20,000 to $30,000 "based on historical information and data from other studies." Remember that these are 2010 dollars.

The capital budgets also identify the number of houses to be served by the project. According to the 2008 Recovery Plan, these capital budgets are based on a level of population growth and 2020 housing demand estimated that was projected in 2008. At that time, the population of the FBFA was estimated to grow to 9,056 by 2020. As we now know, the actual population growth fell short of the 2008 projections. The existing 2020 FBFA population is estimated at 6,872.

Researching and updating the actual number of houses needing water improvements based on the current population, revised population projections, and current housing inventory is beyond this analysis's scope. The Navajo Thaw Regional Recovery Plan (2020) draws from the 2008 Recovery Plan budgets and acknowledges the need to update the 2008 Recovery Plan projects and their associated budgets but does not do this at the project-specific budget level.

This analysis models the economic impacts of all the water-specific project budgets referenced in the Navajo Thaw Regional Recovery Plan (2020) using the IMPLAN software system. All the results are shown in 2021 dollars.

The 2008 Recovery Plan includes several sections on livestock water; however, the focus is that many of these water sources are not safe for human or livestock consumption. Somewhat more detailed descriptions of the current water systems and utilities are provided in each Chapter's 2008 CLUPs. For the most part, the Chapter-specific and Infrastructure Capital Improvement Projects appear to be residential in nature as water lines, sewer lines, and in many cases identifying the number of houses served. Presumably, the pipeline and aquifer projects will serve both residential and agricultural needs.

For the Chapter-specific projects, there are three tables presented for each Chapter and Regional projects. The first lists the project line items shown in the 2008 Recovery Plan. The second and third show the economic and tax revenue impacts, respectively. For the Infrastructure Capital Improvement projects, one table is presented at the beginning of the section showing the seven projects' capital budget. For each Chapter, the economic and tax revenue impacts are presented. For the Immediate Recovery projects, the project budget and economic effects are presented with combined total financial and tax revenue impacts. Available descriptions have been excerpted and are presented.

The Indian Health Service maintains the Sanitation Deficiency System (SDS) database of unfunded, priority water and wastewater projects throughout the Navajo Nation. The SDS project list is shown on page 97 of the 2020 Recovery Plan. It is not clear whether these projects are included within the other budgets considered in this analysis. This analysis assumes they are included, and therefore they are not shown as additional projects.

2. Regional and Chapter-Specific Water Projects

The 2020 Recovery Plan lists Regional Projects totaling $447 million and Chapter-specific Projects totaling $4.3 billion for a combined total of $4.74 billion (2010 dollars). The 2020 Recovery Plan cites the 2008 Recovery Plan as the source of these budgets. Specifically, the CLUPs appearing in Appendix 7.5 of the 2008 Recovery Plan provide a modest level of detail and description for each project. Further, Appendix 7.12 in the 2008 Recovery Plan organizes project lists by Chapter and includes a separate section for Regional projects.

The Regional and Chapter-specific capital budgets in the 2008 Recovery Plan list 33 projects involving water and water system development and improvements. Thirty-one of these projects connect to homes within each of the nine Chapters, and two of the projects are substantial infrastructure projects. Project descriptions show a total of 4,986 homes are to have water systems connected and/or upgraded.

Twenty-six of these home projects are within the FBFA or a total of 4,017 homes for a combined budget of $78 million. Infrastructure project budgets do not identify the percent of projects within the FBFA and all of those have been assumed to be 100 percent within the FBFA.

2.1 Chapter-Specific Water Project Categories

Water service in the FBFA is poor. The 2008 Recovery Plan found:

> Based on limited field data and comparison with other reports, approximately 30 percent of FBFA residents haul water. Some FBFA residents are as many as 24 miles away from a regulated watering point with safe drinking water. Often these residents resort to drinking the same water as their livestock from nearby windmills – water untested for water quality and exposed to bacteria from livestock, vandalism, and, in some cases, uranium contamination.

There are three types of water projects within the list of Chapter-specific projects falling under either the Housing or Infrastructure categories, as shown below.

- Housing
  - Power, water, and access to existing scattered housing
- Infrastructure
  - Unfunded water, wastewater projects
  - Active and inactive water and wastewater projects

Beyond identifying the number of houses served by each project budget, the 2008 Recovery Plan offers few details on each project's nature. Concentrated development, improved tanks at windmills, and better storage for scattered houses not connected to public water systems are frequently cited water supply needs.

Economic impacts are modeled using IMPLAN software. Many water and wastewater projects are modeled using Sector 56 data (Construction of other new nonresidential structures). In 2018, the most recent IMPLAN data year available, this sector in Coconino County ran a deficit, and as a result, the direct taxes/profit result is a loss. Overall, Coconino County employed 554 people in 2018, producing a total output of $44 million, and yet Other Property Income was ($7,992,808.91).

2.2 Chapter-Specific Studies

In addition to budgeted capital projects, the 2008 Recovery Plan recommended two studies on water. The Livestock Water Provision Study description includes the topics of irrigation, windmills, earthen dams, tanks, water for livestock.

Table 2-1. Recommended Water Studies in the Recovery Plan

Study	Year	Budget
Water and Land	2010	$500,000
Livestock / Agricultural Water Provision Study & Plan	2010	$500,000
Total		**$1,000,000**

2.3 Chapter-Specific Water Project Impacts by Chapter

This section models the economic impacts arising from the implementation of water-related Chapter-specific projects. Capital budget estimates are used as IMPLAN inputs to model direct, indirect, and induced impacts. Tax impacts are also provided. In addition to economic impacts, unique information pertaining to each Chapter's water needs is included as excerpts from the 2008 and 2020 Chapter CLUPs.

Table 2-2. Chapter-Specific Water Project Budgets

Chapter	# houses	# houses in FBFA	Budget	Budget in FBFA
Bodaway Gap	604	592	$18,458,218	$16,863,106
Cameron	496	496	$18,811,872	$18,811,872
Coalmine Canyon	451	451	$4,480,946	$4,480,946
Coppermine	38	11	$4,836,167	$1,399,943
Kaibeto	487	370	$28,178,249	$12,153,488
Leupp	126	1	$16,030,999	$127,230
Tolani Lake	43	13	$5,472,505	$1,654,478
Tonalea	651	517	$29,963,412	$11,891,825
Tuba City	2,090	1,566	$80,014,578	$11,449,534
Chapter Subtotal	**4,986**	**4,017**	**$206,246,947**	**$78,832,423**
Regional	0	0	$582,528,447	$582,528,447
Chapter-specific Total	**4,986**	**4,017**	**$788,775,394**	**$661,360,870**

2.3.1 Bodaway Gap Chapter-Specific Water Projects

Table 2-3 below shows 604 homes in the Chapter are estimated to need residential water improvements in 2020, of which 592 are in the FBFA. Table 2-4 shows the economic impact of constructing these improvements with a total capital budget of $16,863,106. Table 2-5 shows the tax impacts.

Table 2-3. Bodaway Gap Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrades 12	12	0%	$1,595,112	$0
Power and water upgrades 57	57	100%	$7,576,781	$7,576,781
Active and inactive water/wastewater 134	134	100%	$5,381,640	$5,381,640
Unfunded water/wastewater 401	401	100%	$3,904,685	$3,904,685
Total	**604**		**$18,458,218**	**$16,863,106**

Table 2-4. Bodaway Gap Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	150	$7,367,068	$10,034,535	($538,496)	$16,863,106
Indirect	27	$1,264,498	$1,924,121	$963,354	$4,151,973
Induced	31	$1,398,091	$1,806,764	$1,199,595	$4,404,451
Total	**209**	**$10,029,658**	**$13,765,419**	**$1,624,453**	**$25,419,530**

Table 2-5. Bodaway Gap Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$47,644	$71,655	$36,534	$233,923	$1,280,455	$1,670,211
Indirect	$70,873	$104,816	$54,133	$217,428	$268,063	$715,313
Induced	$44,547	$65,993	$34,039	$146,959	$292,634	$584,172
Total	**$163,064**	**$242,464**	**$124,706**	**$598,310**	**$1,841,151**	**$2,969,695**

2.3.1.1 Except from 2008 Bodaway Gap CLUP

Extended waterlines are needed to better serve the communities and future development areas within the Chapter. The Cedar Ridge Community needs to have municipal water service because the existing water wells are inadequate and provide poor water quality.

2.3.1.2 Excerpts from Bodaway Gap 2020 CLUP

Overview of Western Navajo Pipeline Project

The Bodaway Gap Chapter officials and Steering Committee understand that the Western Navajo Pipeline project is intended to draw water from Lake Powell in Page to pipe the water south to many Navajo Chapters. There was some discussion at the Bodaway Gap Steering Committee that there is a desire to run the waterline to Coppermine and then to First Windmill and then over to Cedar Ridge before it comes down to the Gap. This would provide water for people and livestock at Cedar Ridge. Water to Cedar Ridge could then gravity flow to the fields below the community.

Drinking Water

People that live in portions of the Chapter away from US-89 do not have drinking water and must haul the water from the service station. Before 2 years ago, their drinking water source was the water system managed and operated by the Chapter itself. Unfortunately, that system has not been functioning due to problems with system electronics. Not only is this preventing the people from getting water from the Chapter, but the Chapter is losing water sale revenues. The water volume and quality are "good and plentiful," it is just the system/mechanics that are broken. In addition, it is thought that the valve may be leaking. A cost estimate of $28,000 was provided to fix the leak.

2.3.2 Cameron Chapter-Specific Water Projects

Table 2-6 below shows 496 homes in the Chapter are estimated to need residential water improvements in 2020, of which all 496 are in the FBFA. Table 2-7 shows the economic impact of constructing these improvements with a total capital budget of $18,811,872. Table 2-8 shows the tax impacts.

Table 2-6. Cameron Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrades 41	41	100%	$5,515,731	$5,515,731
Active and inactive water/wastewater 88	88	100%	$3,866,123	$3,866,123
Unfunded water/wastewater 309	309	100%	$5,524,351	$5,524,351
Unfunded water/wastewater 58	58	100%	$3,905,668	$3,905,668
Total	**496**		**$18,811,872**	**$18,811,872**

Table 2-7. Cameron Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	188	$9,260,179	$11,082,268	($1,530,575)	$18,811,872
Indirect	28	$1,308,396	$2,044,848	$970,962	$4,324,207
Induced	38	$1,710,943	$2,211,065	$1,468,032	$5,390,040
Total	**254**	**$12,279,518**	**$15,338,181**	**$908,419**	**$28,526,119**

Table 2-8. Cameron Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$46,005	$69,585	$35,326	$252,632	$1,588,876	$1,992,424
Indirect	$69,174	$102,317	$52,837	$213,392	$275,081	$712,801
Induced	$54,515	$80,761	$41,656	$179,845	$358,117	$714,894
Total	**$169,695**	**$252,663**	**$129,818**	**$645,868**	**$2,222,075**	**$3,420,119**

2.3.2.1 Except from 2008 Cameron CLUP

Water infrastructure development is needed for commercial and domestic use. The Chapter needs to investigate acquiring water rights to the Colorado River and Little Colorado River to provide water to the community.

2.3.3 Coalmine Canyon Chapter-Specific Water Projects

Table 2-9 below shows 496 homes in the Chapter are estimated to need residential water improvements in 2020, of which all 496 are in the FBFA. Table 2-10 shows the economic impact of constructing these improvements with a total capital budget of $18,811,872. Table 2-11 shows the tax impacts.

Table 2-9. Coalmine Canyon Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 80	80	100%	$2,122,800	$2,122,800
Active and inactive 108	108	100%	$1,671,762	$1,671,762
Unfunded 263	263	100%	$686,384	$686,384
Total	**451**		**$4,480,946**	**$4,480,946**

Table 2-10. Coalmine Canyon Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	39	$1,918,240	$2,670,654	($107,948)	$4,480,946
Indirect	7	$339,873	$515,128	$259,907	$1,114,908
Induced	8	$365,790	$472,713	$313,856	$1,152,359
Total	**55**	**$2,623,902**	**$3,658,495**	**$465,815**	**$6,748,213**

Table 2-11. Coalmine Canyon Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$12,930	$19,432	$9,913	$62,474	$334,184	$438,933
Indirect	$19,206	$28,404	$14,670	$58,878	$72,136	$193,296
Induced	$11,655	$17,266	$8,906	$38,450	$76,563	$152,840
Total	**$43,792**	**$65,102**	**$33,489**	**$159,802**	**$482,884**	**$785,069**

2.3.3.1 Excerpt from the 2008 Coalmine Canyon CLUP

Many scattered-site homes are not connected to municipal water systems due to their remoteness and cost and the inefficiency of extending these systems to isolated locations. At the same time, the Chapter's vision includes each home having adequate plumbing and access to safe water for drinking and domestic use. Those homes located close to existing water systems should be hooked up. Those too far from existing systems should be retrofitted for plumbing and provided nearby watering points where safe water for drinking and domestic use can be collected and hauled.

As part of the FBFA Recovery Plan, a system of residential zones is being proposed to distinguish among those homes close enough to hook up to existing municipal water systems, those homes already near safe watering points, and those homes in remote locations that must haul water from long distances. Two major issues are facing those in remote homes. One is the cost, stress, and labor of hauling the water from far away to their homes—a particular burden for elderly residents living alone and their families who help care for them. Another is the risk that many people in these remote areas resort to using water from nearby windmills or earthen dams instead of traveling long distances to a safer water source. Water from windmills and earthen dams, intended for livestock use, is not tested for water quality and is at risk for airborne and bacterial contamination from contact with animals.

Improving access to safe domestic and drinking water and water for livestock and irrigation would rely on policy decisions about how best to provide water in remote locations. Providing more safe watering points is one approach; providing a regional water delivery system might be another. The technology exists to solve any number of problems once the community decides what problem to solve and what a successful solution will look like. Some solutions will be more costly or more efficient than others, but strong leadership and precise decision-making, starting at the Chapter level, will still be needed to set the parameters of what solutions the community demands.

The municipal water service needs new waterlines to replace the existing copper waterlines that have exceeded their useful life. The existing water service needs to extend beyond the current service area, and additional water storage tanks are needed to handle the additional demand.

2.3.3.2 Excerpt from the 2020 Coalmine Canyon CLUP

Large-scale Agriculture. There is interest at Coalmine Canyon to develop large-scale agriculture, drawing from area groundwater supplies.

2.3.4 Coppermine Chapter-Specific Water Projects

Table 2-12 below shows 38 homes in the Chapter are estimated to need residential water improvements in 2020, of which 11 are in the FBFA. Table 2-13 shows the economic impact of constructing these improvements with a total capital budget of $1,399,943. Table 2-14 shows the tax impacts.

Table 2-12. Coppermine Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 11	11	100%	$1,399,943	$1,399,943
Power and water upgrade 27	27	0%	$3,436,224	$0
Total	**38**		**$4,836,167**	**$1,399,943**

Table 2-13. Coppermine Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	7	$322,514	$864,099	$213,329	$1,399,943
Indirect	3	$133,346	$187,940	$108,758	$430,044
Induced	2	$74,086	$95,741	$63,567	$233,394

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Total	**12**	**$529,946**	**$1,147,781**	**$385,654**	**$2,063,381**

Table 2-14. Coppermine Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$5,938	$8,821	$4,540	$21,730	$61,776	$102,805
Indirect	$8,628	$12,756	$6,590	$26,143	$28,903	$83,020
Induced	$2,361	$3,497	$1,804	$7,787	$15,507	$30,955
Total	**$16,926**	**$25,074**	**$12,933**	**$55,661**	**$106,186**	**$216,781**

2.3.5 Kaibeto Chapter-Specific Water Projects

Table 2-15 below shows 487 homes in the Chapter are estimated to need residential water improvements in 2020, of which 370 are in the FBFA. Table 2-16 shows the economic impact of constructing these improvements with a total capital budget of $12,153,488. Table 2-17 shows the tax impacts.

Table 2-15. Kaibeto Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 5	5	100%	$684,819	$684,819
Power and water upgrade 117	117	0%	$16,024,761	$0
Active and inactive 58	58	100%	$2,390,089	$2,390,089
Active and inactive 86	86	100%	$4,384,290	$4,384,290
Unfunded 185	185	100%	$2,720,219	$2,720,219
Unfunded 36	36	100%	$1,974,071	$1,974,071
Total	**487**		**$28,178,249**	**$12,153,488**

Table 2-16. Kaibeto Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	141	$6,973,637	$7,053,293	($1,873,442)	$12,153,488
Indirect	15	$748,036	$1,224,396	$528,620	$2,501,052
Induced	28	$1,249,285	$1,614,460	$1,071,919	$3,935,663
Total	**184**	**$8,970,958**	**$9,892,149**	**($272,903)**	**$18,590,203**

Table 2-17. Kaibeto Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$22,925	$35,108	$17,656	$155,294	$1,179,142	$1,410,125

Type	Sub County	Special Districts	County	State	Federal	Total
Indirect	$35,282	$52,201	$26,951	$110,118	$154,923	$379,476
Induced	$39,806	$58,969	$30,416	$131,318	$261,488	$521,997
Total	**$98,013**	**$146,279**	**$75,023**	**$396,731**	**$1,595,553**	**$2,311,599**

2.3.5.1 Excerpts from 2020 Kaibeto CLUP

In addition to the Projects and Priorities already identified in the Kaibeto Chapter Recovery Plan, Chapter President Franklin Fowler identified the following Priorities on May 22, 2020. Second, a Watering Point needs to be developed between Gap and Kaibeto.

Water for Livestock

Most of the stock ponds and windmills need repair. The windmills generate the power to pump the water into the ponds for use by livestock. Sadly, the livestock pond tanks are often used for human water consumption and hygienic needs due to the tanks being open and uncovered. Also, BIA built cistern and hand pump systems have become inoperable due to decades of neglect.

Large-Scale Water Supply/Use for Agriculture

The Kaibeto Leadership believes it has an opportunity for large-scale agriculture if the area's groundwater supply could be harnessed. The agricultural activity would relate to food crops as well as livestock use.

2.3.6 Leupp Chapter-Specific Water Projects

Table 2-18 below shows 126 homes in the Chapter are estimated to need residential water improvements in 2020, of which 1 is in the FBFA. Table 2-19 shows the economic impact of constructing these improvements with a total capital budget of $127,230. Table 2-20 shows the tax impacts.

Table 2-18. Leupp Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 1	1	100%	$127,230	$127,230
Power and water upgrade 125	125	0%	$15,903,769	$0
Total	**126**		**$16,030,999**	**$127,230**

Table 2-19. Leupp Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1	$29,311	$78,531	$19,388	$127,230
Indirect	0	$12,119	$17,080	$9,884	$39,083
Induced	0	$6,733	$8,701	$5,777	$21,211
Total	**1**	**$48,163**	**$104,313**	**$35,049**	**$187,525**

Table 2-20. Leupp Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$540	$802	$413	$1,975	$5,614	$9,343
Indirect	$784	$1,159	$599	$2,376	$2,627	$7,545
Induced	$215	$318	$164	$708	$1,409	$2,813
Total	**$1,538**	**$2,279**	**$1,175**	**$5,059**	**$9,650**	**$19,702**

2.3.6.1 Excerpt from 2020 Leupp CLUP

The Chapter has identified Dinnebeto Wash and Grand Falls as areas that it wants to develop. Dinnebeto Wash needs to be connected to irrigation water. Grand Falls needs to be connected to water and electricity.

2.3.7 Tolani Lake Chapter-Specific Water Projects

Table 2-21 below shows 43 homes in Chapter are estimated to need residential water improvements in 2020, of which 13 are in the FBFA. Table 2-22 shows the economic impact of constructing these improvements with a total capital budget of $1,654,478. Table 2-23 shows the tax impacts.

Table 2-21. Tolani Lake Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 13	13	100%	$1,654,478	$1,654,478
Power and water upgrade 30	30	0%	$3,818,027	$0
Total	**43**		**$5,472,505**	**$1,654,478**

Table 2-22. Tolani Lake Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	8	$381,153	$1,021,208	$252,116	$1,654,478
Indirect	4	$157,591	$222,111	$128,533	$508,234
Induced	2	$87,556	$113,149	$75,124	$275,829
Total	**14**	**$626,300**	**$1,356,468**	**$455,773**	**$2,438,541**

Table 2-23. Tolani Lake Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$7,017	$10,425	$5,366	$25,681	$73,009	$121,497
Indirect	$10,197	$15,076	$7,788	$30,897	$34,158	$98,115
Induced	$2,790	$4,133	$2,132	$9,203	$18,326	$36,584
Total	**$20,004**	**$29,633**	**$15,285**	**$65,781**	**$125,493**	**$256,196**

2.3.7.1 Excerpts from the 2020 Tolani Lake CLUP

People in the Bennett Freeze portion of Tolani Lake indicate that they live on "No Water Mesa" (NWM). The name is self-explanatory.

In addition to TLE, the area is benefited by the Tolani Lake Livestock Water Users Association, which primarily focuses on utilizing water from the Lower Colorado River to benefit the Tolani Lake area. The area is devoid of windmills that draw and help store water. Also, the area does not have any artesian wells.

Tolani Lake Livestock Water Users Association

The Tolani Lake Livestock Water Users Association (TLLWUA) is working to bring water 18 miles to benefit the Livestock Range. This effort has been underway since the early 1990s, coordinating with the Natural Resources Conservation Service (NRCS) and the Bureau of Indian Affairs (BIA). One of the key programs benefitting the effort is the USDA Environmental Quality Incentives Program (EQIP).

The Water Users Association is running additional lines six miles to the east to the Range Management Units (RMU). Another line will serve the Bennett Freeze portion of the Tolani Lake Chapter. That particular project is challenged because the Navajo Nation does not recognize the Navajo Partitioned Lands (NPL), and a line cannot be extended to that area until grazing permits are in place. The project is complex because it involves the Navajo Partitioned Lands, the Hopi Partitioned Lands, "Big Navajo," and the Bennett Freeze.

2.3.8 Tonalea Chapter-Specific Water Projects

Table 2-24 below shows 651 homes in the Chapter are estimated to need residential water improvements in 2020, of which 370 are in the FBFA. Table 2-25 shows the economic impact of constructing these improvements with a total capital budget of $11,891,825. Table 2-26 shows the tax impacts.

Table 2-24. Tonalea Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 23	23	100%	$3,101,840	$3,101,840
Power and water upgrade 134	134	0%	$18,071,587	$0
Active and inactive 18	18	100%	$525,919	$525,919
Unfunded 476	476	100%	$8,264,067	$8,264,067
Total	**651**		**$29,963,412**	**$11,891,825**

Table 2-25. Tonalea Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	121	$5,988,351	$6,991,141	($1,087,667)	$11,891,825
Indirect	17	$813,889	$1,279,511	$600,390	$2,693,789
Induced	25	$1,101,107	$1,422,969	$944,778	$3,468,854
Total	**163**	**$7,903,347**	**$9,693,621**	**$457,500**	**$18,054,468**

Table 2-26. Tonalea Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$28,159	$42,651	$21,629	$158,624	$1,025,127	$1,276,191
Indirect	$42,450	$62,791	$32,425	$131,127	$170,796	$439,590
Induced	$35,084	$51,975	$26,808	$115,742	$230,473	$460,082
Total	**$105,694**	**$157,417**	**$80,863**	**$405,494**	**$1,426,396**	**$2,175,863**

2.3.9 Tuba City Chapter-Specific Water Projects

Table 2-27 below shows 2,090 homes in the Chapter are estimated to need residential water improvements in 2020, of which 1,566 are in the FBFA. Table 2-28 shows the economic impact of constructing these improvements with a total capital budget of $11,449,534. Table 2-29 shows the tax impacts.

Table 2-27. Tuba City Water Projects – Capital Budgets

Event	# houses	FBFA %	Budget	IMPAN Input
Power and water upgrade 57	57	100%	$7,458,411	$7,458,411
Power and water upgrade 524	524	0%	$68,565,045	$0
Active and inactive 137	137	100%	$3,568,035	$3,568,035
Unfunded 1372	1,372	100%	$423,087	$423,087
Total	**2,090**		**$80,014,578**	**$11,449,534**

Table 2-28. Tuba City Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	85	$4,158,056	$6,903,794	$387,684	$11,449,534
Indirect	21	$941,378	$1,388,755	$738,116	$3,068,249
Induced	18	$826,701	$1,068,352	$709,327	$2,604,380
Total	**125**	**$5,926,135**	**$9,360,900**	**$1,835,127**	**$17,122,163**

Table 2-29. Tuba City Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$38,136	$57,038	$29,205	$165,570	$739,404	$1,029,354
Indirect	$56,132	$83,004	$42,873	$171,253	$201,417	$554,680
Induced	$26,341	$39,022	$20,127	$86,898	$173,037	$345,424
Total	**$120,609**	**$179,064**	**$92,205**	**$423,721**	**$1,113,858**	**$1,929,458**

2.3.9.1 Excerpt from the 2008 Tuba City CLUP

Many scattered site homes are not connected to municipal water systems due to these systems' remoteness and cost and the inefficiency of extending these systems to isolated locations. At the same time, the Chapter's vision includes each home having adequate plumbing and access to safe water for drinking and domestic use. Those homes located close to existing water systems should be hooked up. Those too far from existing systems should be retrofitted for plumbing and provided nearby watering points where safe water for drinking and domestic use can be collected and hauled.

As part of the FBFA Recovery Plan, a system of residential zones is being proposed to distinguish among those homes close enough to hook up to existing municipal water systems, those homes already near safe watering points, and those homes in remote locations that must haul water from long distances. Two major issues are facing those in remote homes. One is the cost, stress, and labor of hauling the water from far away to their homes—a particular burden for elderly residents living alone and their families who help care for them. Another risk is that many people in these remote areas resort to using water from nearby windmills or earthen dams instead of traveling long distances to a safer water source. Water from windmills and earthen dams, intended for livestock use, is not tested for water quality and is at risk for airborne and bacterial contamination from contact with animals.

2.3.9.2 Excerpt from the 2020 Tuba City CLUP

Water – Domestic and Livestock Use

Although the problem is much worse on the Bennett Freeze portion of the Tuba City Chapter, there are still locations within the Administrative Area that do not have access to water for domestic use. Furthermore, the Tuba City area depends on groundwater from the N Aquifer for domestic, agricultural, municipal, and industrial needs, and they are concerned that the excessive drilling and pumping of water out of the N aquifer over the years is resulting in the degradation of water quality in the N Aquifer. Two of the main concerns include arsenic and uranium. Due to historical events that entailed massive water usages, such as uranium mining and the Peabody Coalmine operations, Tuba City would like to closely monitor the municipal water supply to prevent potential health risks.

2.4 Total Chapter-Specific Water Project Impacts

Table 2-30 below shows the combined economic impact of constructing the Chapter-specific water projects within each of the nine Chapters. These projects will serve 4,017 homes. The combined capital budget is $79 million, and the total economic impact is $119 million. This activity will generate over $6 million in tax revenue.

Table 2-30. Chapter-Specific Water Projects – Economic Impacts

Impact Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	740	$36,398,510	$46,699,524	($4,265,611)	78,832,423
Indirect	122	$5,719,126	$8,803,889	$4,308,524	18,831,538
Induced	152	$6,820,291	$8,813,915	$5,851,975	21,486,181
Total	1,014	$48,937,927	$64,317,327	$5,894,888	$119,150,143

Table 2-31. Chapter-Specific Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	161,651	$243,861	$124,047	$843,979	5,007,134	6,380,673
Indirect	241,854	$357,710	$184,732	$744,185	940,042	2,468,523
Induced	172,766	$255,940	$132,012	$569,951	1,134,920	2,265,590
Total	**576,271**	**$857,512**	**$440,792**	**$2,158,116**	**$3,456,419**	**$6,055,327**

2.5 Regional Chapter-Specific Water Projects

The Navajo Thaw Regional Recovery Plan (2020) introduces the Water Infrastructure Section with reference to the Brown and Caldwell Report.

> In September 2013, Brown and Caldwell was authorized by the Navajo Nation to prepare the Tuba City Regional Water Plan (Plan). This plan was developed for the "Tuba City Nine Chapters (now known as the Navajo Thaw Region)," and included water planning for the Bodaway-Gap, Cameron, Coalmine Canyon, Coppermine, Inscription House, Kaibeto, LeChee, Red Lake #1/Tonalea, and Tuba City Chapters. (Note: The region is slightly different from the Navajo Thaw Region).
>
> The plan summarized existing and anticipated water needs within that region, reviewed water resources available to serve those demands, evaluated alternatives to address supply deficiencies, and recommended a preferred alternative for implementation to address short- and long-term water supply deficiencies.
>
> Brown and Caldwell is a part of the Navajo Thaw Support Team, working to develop and implement the Navajo Thaw Implementation Plan.

The section describes Western Navajo Pipeline Phase 1 with descriptions of several aspects of the projects. Some cost figures are listed for each Chapter, but not for the Phase 1 projects described. Approximately $200 million is listed, which is less than half of the cost of the Western Navajo Pipeline Project listed in the 2008 Recovery Plan. This analysis assumes that Phase 1 of the pipeline is included in the total cost showing in the 2008 Recovery Plan.

The 2008 Recovery Plan identified two major water infrastructure projects, recommending "as part of its regional projects full-funding for both the Western Navajo Pipeline and the C-aquifer Leupp to Dilkon Pipeline, which will provide a new or additional water source to approximately 75 percent of the people in the nine Chapters." Note that in the Bodaway Gap CLUP appendix, the portion of the nine Chapter population standing to benefit is stated to be 60 percent.

The capital budgets and resulting economic impacts of these two projects are shown in Tables 2-32 through 2-34.

Table 2-32. Regional Water Projects – Capital Budgets

Event	FBFA %	Budget	IMPAN Input
Western Navajo Pipeline	100%	$455,510,966	$455,510,966
Pipeline - C-aquifer Leupp to Dilkon	100%	$127,017,481	$127,017,481
Total		**$582,528,447**	**$582,528,447**

Table 2-33. Regional Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	6,955	$345,306,346	$336,883,901	($99,661,801)	$582,528,447
Indirect	714	$34,769,383	$57,608,160	$24,236,780	$116,614,323
Induced	1,375	$61,484,566	$79,456,969	$52,755,387	$193,696,922
Total	**9,044**	**$441,560,295**	**$473,949,030**	**($22,669,634)**	**$892,839,692**

Table 2-34. Regional Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$1,023,036	$1,572,956	$788,625	$7,355,090	$58,219,788	$68,959,495
Indirect	$1,586,169	$2,347,032	$1,211,670	$4,968,650	$7,171,413	$17,284,935
Induced	$1,959,077	$2,902,224	$1,496,944	$6,462,935	$12,869,326	$25,690,507
Total	**$4,568,283**	**$6,822,212**	**$3,497,240**	**$18,786,675**	**$78,260,527**	**$111,934,937**

3. Infrastructure Capital Improvement Projects

The Infrastructure Capital Improvement water projects were already separated. I was planning to pull some descriptions from the various 2020 CLUPs to explain each of these projects.

3.1 Infrastructure Capital Improvement Water Project Impacts by Chapter

Table 3-1 below shows the seven Infrastructure Capital Improvement water projects budgets by Chapter.

Table 3-1. Inputs for the Infrastructure Capital Improvement Plan Water System Projects

Chapter	Project Description	Sector	Cap Ex Budget
Bodaway Gap	Water line extension east/west Chapter	56	$713,786
Cameron	Upgrade Chapter Sewer line	60	$138,678
Coalmine	Water/sewer phase II w/booster station	56	$774,967
Coppermine	KOKO waterline project extension	56	$19,437,911
Coppermine	Agriculture water development	49	$20,394
Leupp	Round Cedar – Grand Falls waterline extension	56	$892,232
Tolani Lake	Water Line 10 miles north of Chapter	56	$522,083
Total			**$22,500,052**

3.1.1 Bodaway Gap Infrastructure Capital Improvement Water Project Impacts

Table 3-2. Bodaway Gap Infrastructure Capital Improvement Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	9	$423,112	$412,792	($122,118)	$713,786
Indirect	1	$42,604	$70,589	$29,698	$142,890
Induced	2	$75,338	$97,360	$64,642	$237,341
Total	**11**	**$541,054**	**$580,741**	**($27,778)**	**$1,094,017**

Table 3-3. Bodaway Gap Infrastructure Capital Improvement Project Water Project – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$1,254	$1,927	$966	$9,012	$71,338	$84,498
Indirect	$1,944	$2,876	$1,485	$6,088	$8,787	$21,180
Induced	$2,401	$3,556	$1,834	$7,919	$15,769	$31,479
Total	**$5,598**	**$8,359**	**$4,285**	**$23,020**	**$95,894**	**$137,156**

3.1.2 Cameron Infrastructure Capital Improvement Water Project Impacts

Table 3-4. Cameron Infrastructure Capital Improvement Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	1	$35,008	$86,867	$16,803	$138,678
Indirect	0	$10,905	$16,625	$8,523	$36,053
Induced	0	$7,458	$9,638	$6,398	$23,493
Total	**1**	**$53,370**	**$113,130**	**$31,725**	**$198,225**

Table 3-5. Cameron Infrastructure Capital Improvement Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$349	$522	$267	$1,521	$6,476	$9,135
Indirect	$640	$947	$489	$1,957	$2,319	$6,353
Induced	$238	$352	$182	$784	$1,561	$3,116
Total	**$1,227**	**$1,821**	**$938**	**$4,262**	**$10,356**	**$18,604**

3.1.2.1 Excerpt from the 2020 Cameron CLUP

The most notable project implementing the Value-added Agriculture strategy is Cameron Farm Enterprise. The mission statement for this project is "Putting wisdom and water to work rebuilding our agricultural economy in Hozho." The project will create a 133-acre enterprise farm, which will serve as a model for the Lower Colorado River. The project entails building infrastructure (fences, wells, solar power, pipes, and irrigation systems), developing policies for farming and community garden plots, hiring staff and recruiting youth growers, offering garden plots to families, planting and tending crops, offering beginning farmer training at an incubator farm, harvesting crops for market and community giveaways, celebrating the land, and learning to share with other communities. This project also supports efforts to maintain water rights. Cameron has received funding in a partnership with Tolani Lake Enterprises for this project. Work is underway, including many of the studies and surveys that will support the water wells and the overall project. The Cameron Farm Enterprise project received a commitment of $100,000 of funding from the Sihasin Fund to complete their project. Funding is still needed for architectural clearances and work to meet the Endangered Species Act.

3.1.3 Coalmine Canyon Infrastructure Capital Improvement Water Project Impacts

Table 3-6. Coalmine Canyon Infrastructure Capital Improvement Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	9	$459,379	$448,174	($132,585)	$774,967
Indirect	1	$46,255	$76,639	$32,243	$155,138
Induced	2	$81,796	$105,706	$70,183	$257,685
Total	**12**	**$587,430**	**$630,519**	**($30,159)**	**$1,187,790**

Table 3-7. Coalmine Canyon Infrastructure Capital Improvement Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$1,361	$2,093	$1,049	$9,785	$77,453	$91,740
Indirect	$2,110	$3,122	$1,612	$6,610	$9,541	$22,995
Induced	$2,606	$3,861	$1,991	$8,598	$17,121	$34,177
Total	**$6,077**	**$9,076**	**$4,653**	**$24,993**	**$104,114**	**$148,913**

3.1.3.1 Excerpt from the 2020 Coalmine Canyon CLUP

The Coalmine Canyon Chapter's objective is to improve health, sanitation, and overall enhancement of the quality of life for nine families in dire need of waterline extension. Limited areas of the community are served by the public water system. It is the project's intent to provide families access to water, increasing the probability of improving the community members' general health and well-being.

3.1.4 Coppermine Infrastructure Capital Improvement Water Project Impacts

Table 3-8. Coppermine Infrastructure Capital Improvement Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	232	$11,526,855	$11,251,263	($3,319,963)	$19,458,155
Indirect	24	$1,161,861	$1,925,274	$809,741	$3,896,876
Induced	46	$2,052,656	$2,652,663	$1,761,234	$6,466,553
Total	**302**	**14,741,372**	**15,829,200**	**(748,988)**	**29,821,584**

Table 3-9. Coppermine Infrastructure Capital Improvement Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$34,405	$52,883	$26,520	$246,252	$1,943,746	$2,303,806
Indirect	$52,957	$78,360	$40,454	$165,903	$239,626	$577,300
Induced	$65,404	$96,891	$49,975	$215,765	$429,641	$857,675
Total	**$152,766**	**$228,134**	**$116,949**	**$627,919**	**$2,613,014**	**$3,738,782**

3.1.4.1 Excerpt from the 2020 Coppermine CLUP

Top priorities for the Coppermine Chapter include three waterline extensions. These projects are known as the:

- KOKO Project
- Phase 1 Project
- Phase 2 Project

In total, these three waterline extensions will serve 60 homes, which are all in the FBFA. The project will include kitchen and bath additions. HIS will be doing the plumbing for bathrooms. The Chapter will provide matching funds both from their Housing Escrow Fund as well as Chapter discretionary funds. Another infrastructure

project, this one not in the Coppermine CIP, is the Highway 89 Waterline Extension project. Indian Health Service is coordinating this project.

In addition to the KOKO Project, there is an Infrastructure Capital Improvement Project in Coppermine for agriculture water development budgeted at $20,000, which is included in the economic and tax impacts shown above.

3.1.5 Leupp Infrastructure Capital Improvement Water Project Impacts

Table 3-10. Leupp Infrastructure Capital Improvement Water Project – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	11	$528,890	$515,990	($152,647)	$892,232
Indirect	1	$53,255	$88,236	$37,122	$178,613
Induced	2	$94,173	$121,701	$80,803	$296,677
Total	**14**	**$676,318**	**$725,926**	**($34,722)**	**$1,367,521**

Table 3-11. Leupp Infrastructure Capital Improvement Water Project – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$1,567	$2,409	$1,208	$11,265	$89,173	$105,622
Indirect	$2,429	$3,595	$1,856	$7,610	$10,984	$26,475
Induced	$3,001	$4,445	$2,293	$9,899	$19,711	$39,349
Total	**$6,997**	**$10,449**	**$5,357**	**$28,775**	**$119,868**	**$171,446**

3.1.6 Tolani Lake Infrastructure Capital Improvement Water Project Impacts

Table 3-12. Tolani Lake Infrastructure Capital Improvement Water Project – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	6	$309,476	$301,928	($89,321)	$522,083
Indirect	1	$31,162	$51,631	$21,722	$104,514
Induced	1	$55,105	$71,212	$47,281	$173,598
Total	**8**	**$395,742**	**$424,770**	**($20,317)**	**$800,195**

Table 3-13. Tolani Lake Infrastructure Capital Improvement Water Project – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$917	$1,410	$707	$6,592	$52,179	$61,804
Indirect	$1,422	$2,104	$1,086	$4,453	$6,427	$15,491
Induced	$1,756	$2,601	$1,342	$5,792	$11,534	$23,025

Type	Sub County	Special Districts	County	State	Federal	Total
Total	$4,094	$6,114	$3,134	$16,837	$70,140	$100,320

3.1.6.1 Excerpts from the 2020 Tolani Lake CLUP

Yadeeskid Waterline Project

The second priority project to the Senior Center is the Yadeeskid Waterline Project. This project is approximately 3 miles north of the Chapter House.

Tolani Lake Livestock and Water Users Association

An ongoing project—the Tolani Lake Livestock and Water Users Association—is working to draw water through a waterline to benefit ranching and agricultural practices. The initial project is a 6-mile waterline that could be extended in the future to benefit the Bennett Freeze portion of the Chapter.

3.2 Combined Infrastructure Capital Improvement Water Project Impacts

Table 3-14. Combined Infrastructure Capital Improvement Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	268	$13,282,720	$13,017,013	($3,799,830)	$22,499,902
Indirect	28	$1,346,041	$2,228,993	$939,050	$4,514,083
Induced	53	$2,366,526	$3,058,280	$2,030,542	$7,455,348
Total	**348**	**$16,995,287**	**$18,304,286**	**($830,239)**	**$34,469,334**

Table 3-15. Combined Infrastructure Capital Improvement Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$39,853	$61,244	$30,717	$284,427	$2,240,365	$2,656,605
Indirect	$61,502	$91,004	$46,981	$192,622	$277,685	$669,794
Induced	$75,404	$111,706	$57,617	$248,757	$495,337	$988,821
Total	**$176,759**	**$263,954**	**$135,316**	**$725,806**	**$3,013,386**	**$4,315,221**

4. Immediate Recovery Projects

4.1 Little Colorado River Valley Farms Project

The Little Colorado River (LCR) Valley Farms Plan ranges from 100 to 4,000 acres of fertile, irrigable soils adjacent to the alluvial aquifer of the LCR. This analysis is based on the 4,000-acre size. This economic impact analysis considers both construction costs as well as the annual operating expenses. Contingency expenses are not modeled as they are undefined. The value of and revenues derived from crop production over time are not within the scope of this analysis.

4.1.1 Construction of the Little Colorado River Valley Farms Project

Initial project development includes land development followed by water development and delivery.

Table 4-1. Inputs for the Little Colorado River Valley Farms Construction

Event Year	Project Description	Sector	Cap Ex Budget
2021	Land and water development, water delivery	56	$28,551,424
2021	Construction of farm facilities, equipment	55	$24,472,649
Total			**$53,024,073**

Table 4-2. Total Economic Impact of the Little Colorado River Valley Farms Construction

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	548	$26,774,817	$28,871,923	($2,622,667)	$53,024,073
Indirect	55	$2,685,219	$4,649,926	$1,829,589	$9,164,734
Induced	107	$4,767,760	$6,161,421	$4,090,629	$15,019,810
Total	**710**	**$34,227,796**	**$39,683,269**	**$3,297,552**	**$77,208,618**

4.1.2 Operation of the Little Colorado River Valley Farms Project

The 2020 Recovery Plan provides budget estimates for the ongoing operations of this project. Thus, the annual operating impact has been modeled and is presented.

The budget for organizational development and youth capacity building scales linearly from the 100-acre budget. This may not be the case upon implementation. While management and education expenses would increase with the project's size, economies of scale would have an effect. Rather than $10 million per year, we assume each of these expenditures to be $2 million per year.

Table 4-3. Inputs for the Little Colorado River Valley Farms Annual Operations

Event Year	Project Description	Sector	Cap Ex Budget
2021	Annual Crop Production	2	$7,280,613
2021	Water Quality Monitoring	49	$2,651,204

Event Year	Project Description	Sector	Cap Ex Budget
2021	Organizational Development	469	$2,039,387
2021	Youth Capacity Building	482	$2,039,387
Total			**$14,010,592**

Table 4-4. Total Economic Impact of the Little Colorado River Valley Farms Annual Operations

Type	Annual Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	350	$4,241,235	$6,427,502	$3,278,827	$13,947,564
Indirect	25	$1,023,851	$1,944,741	$670,221	$3,638,813
Induced	19	$865,624	$1,118,662	$742,479	$2,726,765
Total	**394**	**$6,130,710**	**$9,490,905**	**$4,691,527**	**$20,313,143**

4.2 Livestock and Water Projects

The 2020 Recovery Plan explains that region-wide investment in livestock infrastructure is decades behind and necessary. This IMPLAN model does not include non-construction or "other" expenses. Also, we assume the impoundment repair is carried out by the Navajo Department of Water Resources at the cost of $6 million as described in the 2020 Recovery Plan.

Improvements to Earthen Dams (from 2020 Bodaway Gap CLUP)

There are approximately 100 earthen dams at the Bodaway Gap Chapter. These dam structures were built in the 1950s and 1960s, and area ranchers still rely on this infrastructure for livestock. Unfortunately, soil and silt from wind erosion have blown into the earthen dams, rendering many of them unfunctional. A wholesale earthen dam recovery project needs to benefit the Bodaway Gap Chapter and the other Navajo Thaw Region's other Chapters. There is a strong desire by the Navajo Nation Division of Natural Resources to conduct this work.

Table 4-5. Inputs for the Livestock and Water Projects

Event Year	Project Description	Sector	Cap Ex Budget
2021	Livestock water components	56	$3,067,145
2021	Livestock power components	52	$173,858
2021	Impoundment repair and maintenance	60	$6,118,162
Total			**$9,359,165**

Table 4-6. Total Economic Impact of the Livestock and Water Projects

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	69	$3,412,680	$5,685,576	$260,910	$9,359,165
Indirect	14	$672,967	$1,050,903	$509,699	$2,233,569
Induced	15	$662,294	$855,888	$568,230	$2,086,412
Total	**98**	**$4,747,940**	**$7,592,367**	**$1,338,839**	**$13,679,146**

4.3 Total Immediate Recovery Water Projects

Table 4-7. Combined Immediate Recovery Water Projects – Economic Impacts

Type	Jobs	Labor Income	Intermediate Expenses	Taxes/ Profits	Total Output
Direct	968	$34,428,732	$40,985,001	$917,070	$76,330,803
Indirect	94	$4,382,037	$7,645,570	$3,009,509	$15,037,116
Induced	141	$6,295,678	$8,135,971	$5,401,338	$19,832,988
Total	**1,202**	**$45,106,446**	**$56,766,542**	**$9,327,918**	**$111,200,906**

Table 4-8. Combined Immediate Recovery Water Projects – Tax Impacts

Type	Sub County	Special Districts	County	State	Federal	Total
Direct	$78,104	$121,585	$60,388	$706,787	$6,012,195	$6,979,059
Indirect	$169,450	$250,858	$129,457	$542,055	$890,143	$1,981,964
Induced	$200,568	$297,126	$153,255	$661,681	$1,317,730	$2,630,360
Total	**$448,122**	**$669,569**	**$343,101**	**$1,910,523**	**$8,220,068**	**$11,591,383**

5. Combined Water Projects

The total capital budget for Chapter-specific and Infrastructure Capital Improvement water projects within each of the nine Chapters is just over $100 million.

Table 5-1. Combined Chapter-Specific and Infrastructure Capital Improvement Water Project Budgets by Chapter

Chapter	Cap Ex Budget
Bodaway Gap	$17,576,892
Cameron	$18,950,551
Coalmine Canyon	$5,255,913
Coppermine	$20,858,248
Kaibeto	$12,153,488
Leupp	$1,019,462
Tolani Lake	$2,176,561
Tonalea	$11,891,825
Tuba City	$11,449,534
Total	**$101,332,475**

6. Total Economic Impacts of all 2020 Recovery Plan Water Projects

The Chapter-specific water projects within each Chapter are primarily residential and would improve water service to 4,017 houses within the FBFA at the cost of $79 million.

The 2020 Recovery Plan shows a total implementation budget of $3.6 billion, including $582 million for the two regional pipeline projects, the Western Navajo Pipeline and the C-aquifer Leupp to Dilkon Pipeline.

A total of $22.5 million is budgeted for seven Infrastructure Capital Improvement Plan water projects, primarily water and sewer lines.

Within the Immediate Recovery category, the Little Colorado River Valley Farms Project accounts for most water development within that category. The total budget for Immediate Recovery water projects is $76 million.

The total direct investment for the various water projects within the 2020 Recovery Plan is $760 million, and the resulting total economic impact is almost $1.2 billion. This economic activity would create a total of 11,600 1-year jobs.

Table 6-1. Economic Impacts by Project Category

Economic Impacts by Project Category					
Total Economic Impact of Nine Chapter-Specific Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	740	$36,398,510	$46,699,524	($4,265,611)	$78,832,423
Indirect	122	$5,719,126	$8,803,889	$4,308,524	$18,831,538
Induced	152	$6,820,291	$8,813,915	$5,851,975	$21,486,181
Total	1,014	$48,937,927	$64,317,327	$5,894,888	$119,150,143
Total Economic Impact of the Regional Chapter-Specific Water Projects					
Impact Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	6,955	$345,306,346	$336,883,901	-$99,661,801	$582,528,447
Indirect	714	$34,769,383	$57,608,160	$24,236,780	$116,614,323
Induced	1,375	$61,484,566	$79,456,969	$52,755,387	$193,696,922
Total	9,044	$441,560,295	$473,949,030	-$22,669,634	$892,839,692
Total Economic Impact of Infrastructure Capital Improvement Plan Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	268	$13,282,720	$13,017,013	($3,799,830)	$22,499,902
Indirect	28	$1,346,041	$2,228,993	$939,050	$4,514,083
Induced	53	$2,366,526	$3,058,280	$2,030,542	$7,455,348
Total	348	$16,995,287	$18,304,286	($830,239)	$34,469,334

Economic Impacts by Project Category					
Total Economic Impact of Immediate Recovery Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	968	$34,428,732	$40,985,001	$917,070	$76,330,803
Indirect	94	$4,382,037	$7,645,570	$3,009,509	$15,037,116
Induced	141	$6,295,678	$8,135,971	$5,401,338	$19,832,988
Total	1,202	$45,106,446	$56,766,542	$9,327,918	$111,200,906
Grand Total Economic Impact of All Water Projects					
Type	**Jobs**	**Labor Income**	**Intermediate Expenses**	**Taxes/ Profits**	**Total Output**
Direct	8,931	$429,416,307	$437,585,439	($106,810,171)	$760,191,575
Indirect	958	$46,216,586	$76,286,612	$32,493,862	$154,997,061
Induced	1,721	$76,967,062	$99,465,134	$66,039,243	$242,471,439
Total	**11,608**	**$552,599,955**	**$613,337,185**	**($8,277,066)**	**$1,157,660,074**

7. Water Supply Excerpts from the 2008 Recovery Plan

7.1 2008 Recover Plan Excerpts

7.1.1 Water Demand and Supply Plans

The following section is taken directly from the 2008 Recovery Plan Section 3.9.6.1.

Development can only occur when sufficient water is available. Without it, development is either impossible or cannot be supported or sustained. Water planning to establish demand, potential water sources, availability, and water supply is the driver of development. With water availability, development is possible; without it, it is not.

As the 2008 Water Resource Development Strategy draft states:

The lack of infrastructure, the lack of economic development, and sustained poverty are closely connected. Throughout the arid southwest, and especially on the Navajo Nation, a reliable water supply is essential for jump-starting and sustaining economic development.

The development plans discussed in the Recovery Plan are contingent on sufficient water planning to support them. Close coordination with Water Resources is crucial to establish the conditions under which development becomes possible in the area, whether to support current residents without access to water other than water hauling or support new residents to the area, or to support current or future businesses, industry, recreational opportunities, or community facilities.

The latest report from Water Resources that was fully adopted was completed in 2000, laying out the Water Resources Management Strategy for the Navajo Nation. This report is currently being updated, and there is a draft dated 2008 in circulation. There are two regional water supply projects included that will improve water supply in the FBFA if implemented.

- *Western Navajo Pipeline*: appraisal level study completed as part of the North Central Arizona Water Supply Study by the Bureau of Reclamation, which is now seeking feasibility level study authority. The Western Navajo Pipeline is key to establishing a sustainable water supply in the area.
- *C-aquifer Leupp to Dilkon Pipeline:* Project alignment and preliminary cost estimate complete as of 2008, with further studies ongoing.

Full funding of the recommendations contained in this excellent study is highly recommended and included in the project lists.

Two projects included in the 2000 Water Resources Management Strategy that would have helped serve the FBFA over the next forty years have been de-emphasized in the 2008 draft.

- *Alternative Water Supply for Black Mesa,* which was to be either a Lake Powell Peabody Pipeline or a C-aquifer Black Mesa Pipeline originally proposed in the 1999 LCR Agreements in Concept
- *Three Canyon Water Supply Project,* also proposed in the 1999 LCR Agreements in Concept.

The 2008 strategy plan also includes specific plans for developing and rehabilitating local water supply infrastructure, as well as addressing small domestic and municipal systems not connected to a regional water supply project. Additionally, the 2008 draft strategies ways to improve water service delivery to uses without

direct access to public water systems, provide irrigation to agricultural projects, and encourage water conservation and water reuse.

Associated with this effort, the U.S. Bureau of Reclamation conducted an assessment in 2003-2004 of the Navajo and Hopi water supply for a study area that includes the entire FBFA, among other locations.

This "Assessment of Western Navajo and Hopi Water Supply Needs, Alternatives, and Impacts" estimates water supply demand with assumed population growth across the Nation of 2.48% and water supply alternatives for three demand scenarios – low, medium, and high.

Future development must be coordinated with Water Resources (see **Section** Error! Reference source not found., which is currently working on a plan for needs and water use. All estimates of water availability and quantity should be investigated through Water Resources.

IHS, NTUA, and BIA also have ongoing planning efforts for local water and wastewater utility service provisions, which should be incorporated into future planning efforts for the FBFA (see **Section** Error! Reference source not found.).

7.1.2 Water Delivery

The provision of water to residents in remote areas remain mainly a policy decision about how far it is reasonable to expect a resident to travel to haul water from a safe drinking water source and how far to go to accommodate those choosing to live in remote conditions. These decisions must be balanced with the fact that many living too far from a regulated drinking water source will resort to using water intended to livestock, which is not monitored for quality or protected from bacterial and other contaminants. Water Resources also has a good discussion of water hauling and its financial impacts on residents already stretched by challenging economic conditions in its Strategy document for the Nation.

Because the best policy solution for providing water to scattered homesites has not been identified, the project list seen in **Section** Error! Reference source not found. estimates an average cost per scattered home of providing solutions for water delivery at $20-30,000. This per home cost was multiplied by the number of scattered homes (assumed to be 1,200 sq. ft. each) in the Chapter needing water to calculate a total project cost. These funds could be pooled by residents to purchase their own water hauling trucks or pooled across Chapters to purchase multiple trucks and start a regular service delivery.

The approach taken in this plan is based on identifying the solution will require (1) political and policy decisions, (2) more technical study of potential solutions, and (3) a more narrowly focused planning effort to zero in on both the problems and the best approach to provide water locally from each community to each scattered home.

Appendix C – Response to Public Comments

Submission #	Category	Consideration	Comment	Response
001	Livestock grazing	D. Already addressed	Trespass livestock that originate from Navajo Nation lands cross onto NPS administered land resulting in adverse impacts. Because the proposed plan may result in increased livestock grazing opportunities on Navajo Nation lands adjacent to NPS administered land could lead to additional trespass livestock issues within the park.	The Integrated Resource Management Plan (IRMP) does not contemplate any changes to existing grazing permits. Grazing would continue based on existing permits. Any future changes to grazing permits, including the number of authorized livestock per permit, would be developed through a Former Bennett Freeze Area (FBFA) Range Management Plan or individual Grazing District Range Management Plans. The Bureau of Indian Affairs (BIA), in coordination with the Former Bennett Freeze District Grazing Committee (FBF DGC), would establish a Livestock Management Program to directly manage all livestock within the FBFA within 2 calendar years from the Navajo Nation's adoption of the IRMP. Unauthorized livestock includes, but is not limited to, unbranded, unpermitted, and free-ranging livestock, such as Navajo free-ranging horses. This program would conduct a comprehensive, accurate, and independent livestock tally for use as a tool to reduce the number of unauthorized livestock. Establishing a Livestock Management Program would require additional National Environmental Policy Act (NEPA) analysis, which could tier to the PEA. The IRMP includes in its goals and objectives the enforcement of grazing regulations and permit requirements (see pp. 106-108). The IRMP also references efforts to ensure fencing complies with Navajo Grazing Regulations. The PEA references enforcement of grazing regulations and range unit fencing/repair on page 5. These measures could potentially reduce incidents of trespass.
001	Recreation	C. Beyond scope	As developments in the Cameron area are implemented, the GCNP has concerns that these developments may promote increased visitation through the East Entrance of the Park and within the Desert View Area. GCNP encourages the BIA and Navajo Nation to plan infrastructure such as parking and visitor use facilities that would be able to support increased tourism demands.	Comment noted.
001	Water Quality and Quantity	D. Already addressed	GCNP strongly encourages the BIA to consider the impacts of the Pump Storage Project in this draft IRMP and PEA , and any subsequent NEPA analysis.	The Draft PEA does consider the impacts of the Big Canyon Pumped Hyrdo Storage Project as a reasonably foreseeable future action. However, no details on the Pump Storage Project related to the construction and operation of the project or the amount of water that could be used/lost are available at this time. The analysis of impacts from the Big Canyon Pumped Hydro Storage Project is outside the scope of the IRMP PEA. The Big Canyon Pumped Hydro Storage project is in the feasibility evaluation stage, and it would be subject to National Environmental Policy Act (NEPA) analysis and would involve approvals from several agencies to move forward. The Draft PEA recognizes that future development in the FBFA is likely to increase water use--whether or not the FBFA IRMP is adopted. The IRMP does not identify any specific projects that would use measurable amounts of water. It is unknown when, where, or from what source or the actual water quantity needed to meet future demand or actions. In the future, when a project is proposed, it would be subject to site-specific NEPA analysis, and the effects from water depletion or withdrawals would need to be analyzed at that time. The Pumped Hydro Storage Project would be required to analyze impacts to water quantity and quality in the NEPA and Section 7 permitting processes.
002	Water Quality and Quantity	C. Beyond scope	The East rim is a remote area that lacks infrastructure. The area experiences a drought annually. Propose cistern containers for each homesite to contain water.	The FBFA IRMP is a resource management plan and does not address homesite leases or individual developments. Each Chapter would determine future development in the FBFA in their respective Land Use Plan. These plans may include providing cistern containers; however, these types of actions are outside the scope of the IRMP. The Draft IRMP references the significant water infrastructure deficiencies in the FBFA. For example, it was a critical issue of concern identified by the core team members and FBFA residents. See IRMP, p. 12 ("The lack of adequate domestic and municipal water is the greatest water resource problem facing the Navajo Nation."). In Section 5.2, "Water," the objectives under Goal 1 contain actions that pertain to improving water infrastructure.
002	Land Use	C. Beyond scope	Propose the owners of the home site leases receive help with resources to build their homes. This could include solar panels.	The FBFA IRMP is a resource management plan and does not address homesite leases or individual developments. Each Chapter would determine future development in the FBFA in their respective Land Use Plan. These plans may include providing solar panels or other energy sources; however, these types of actions are outside the scope of the IRMP.

Submission #	Category	Consideration	Comment	Response
002	Cultural Resource	D. Already addressed	Propose all developers and government to be mindful of cultural significant sites.	Adopting the IRMP would not approve any site-specific development. All development projects across the Navajo lands are culturally inventoried (archaeologically surveyed) for compliance with Section 106 (36 CFR 800) under the National Historic Preservation Act (NHPA). See pages 94-95 in the Draft PEA, which explains the Section 106 requirements and that all federal agencies are required to consider the effects of undertakings on historic properties. Additionally, on page 95, the IRMP states, "known TCPs will be reviewed at the NNHHPD, and ethnographic surveys will be conducted to provide guidance prior to any proposed undertaking.". Any future proposed development in the FBFA would be inventoried for cultural resources and Traditional Cultural Properties.
003	Cultural Resource	D. Already addressed	The confluence, the canyon, needs to be protected from any structures. … Some areas should be marked as sacred areas…	The FBFA IRMP is a resource management plan and does not address developments such as homesites or other structures. Each Chapter would determine future development in the FBFA in their respective Land Use Plan. See pages 94-95 in the Draft PEA, which explains the Section 106 requirements and that all federal agencies are required to consider the effects of undertakings on historic properties. Additionally, on page 95, the IRMP states, "known TCPs will be reviewed at the NNHHPD, and ethnographic surveys will be conducted to provide guidance prior to any proposed undertaking." Any future projects would be required to undergo a NEPA analysis and Section 106 consultation to evaluate potential impacts to cultural or natural resources.
003	Public Health and Safety	C. Beyond scope	The area needs waterlines for livestock and people … electricity and decent roads.	On page 115 of the IRMP, under Goal 1 of Land Use and Administration, it states, "Coordinate with the Office of Environmental Health to determine the unmet need for waterline projects and septic tanks." The FBFA IRMP is a resource management plan, and it does identify the need for improved infrastructure but does not propose any site-specific projects. Each Chapter would determine future development in the FBFA in their respective Land Use Plan. Any future development would be required to undergo a NEPA analysis to evaluate potential impacts on cultural or natural resources.
003	Livestock grazing	C. Beyond scope	There also needs to be livestock reduction as the area is very dry and hardly any vegetation	The Draft IRMP does not contemplate any changes in existing grazing permits. Any future changes to grazing permits, including the number of authorized livestock per permit, would be developed through a FBFA Range Management Plan or individual Grazing District Range Management Plans, which would tier to the analysis in the PEA. Several "Rangeland" goals and objectives in the IRMP (Section 5.7, pp. 106-108) apply to the management of grazing activities and conservation/protection of rangelands.
004	Planning process and alternatives	B. Resolve through policy or administration	Respectfully request that the Bureau of Indian Affairs (BIA) and Navajo Nation delay the current 30-day comment period for the draft Programmatic Environmental Assessment (PEA) … If a delay is not possible, I ask that you grant an extension for public comment for an additional 30 days and schedule 4 additional public presentations.	The BIA recognizes the challenges for Navajo Nation residents related to virtual meetings during the Covid-19 Pandemic. The agency is not required to extend the public comment period for an Environmental Assessment. The Council on Environmental Quality's (CEQ) regulations implementing NEPA, 40 C.F.R. Parts 1500-1508, 85 Fed. Reg. 137 (July 16, 2020) (promulgated on September 14, 2020) state that "[a]gencies shall involve the public, State, Tribal, and local governments, relevant agencies, and any applicants, to the extent practicable in preparing environmental assessments." 40 C.F.R. § 1501.5(e). Additionally, the comments to the CEQ regulations explain that "[t]here is no single correct approach for public involvement. Rather, agencies should consider the circumstances and have discretion to conduct public involvement tailored to the interested public, to available means of communications to reach the interested and affected parties, and to the particular circumstances of each proposed action." 85 Fed. Reg. 43,323. Similarly, DOI regulations implementing NEPA provide that bureaus "must, to the extent practicable, provide for public notification and public involvement when an environmental assessment is being prepared. However, the methods for providing public notification and opportunities for public involvement are at the [BIA's] discretion." 43 C.F.R. § 46.305(a). In this case, because the IRMP is the Tribe's strategic plan for managing its own resources, BIA chose to maximize opportunities for public input and participation in the PEA process. CEQ and DOI regulations do not require public scoping for environmental assessments, but BIA opted to conduct public scoping to increase public participation and feedback on the draft IRMP and PEA. Additionally, the BIA opted for a longer scoping period due to the COVID-19 pandemic, which has limited BIA's and the Nation's ability to hold in-person meetings with FBFA community residents and other stakeholders. CEQ and DOI regulations also do not require the publication of a draft EA for public review and comment. However, DOI regulations provide that

Submission #	Category	Consideration	Comment	Response
				"[b]ureaus may seek comments on an environmental assessment if they determine it to be appropriate, such as when the level of public interest or the uncertainty of effects warrants, and may revise environmental assessments based on comments received without the need of initiating another comment period." 43 C.F.R. § 46.305(b). In this situation, the BIA determined that the level of public interest among the Nation's Chapters and community members within the FBFA warranted publication of a draft PEA for public review and comment. Therefore, the BIA held a 30-day public comment period on the draft PEA. Additionally, at the beginning of the 30-day public comment period, BIA held four virtual public meetings with translation services provided. BIA also made meaningful efforts to notify the public of the comment period, make the draft PEA and draft IRMP available, and provide user-friendly access to the virtual public meetings. Although the BIA acknowledges the challenges of holding a public comment period during a pandemic, the BIA determines that it has sufficiently involved the public, Tribal governments and relevant agencies in the PEA process to the extent practicable. A delay or extension of the public comment period, therefore, is not legally required or otherwise warranted. The BIA has diligently worked to inform community members and others throughout the NEPA process. Adopting the IRMP does not approve any actions. The IRMP is a natural resource plan, and it does not address community development which would be done through Community Land Use Plans developed by each Chapter's residents to meet their specific needs. Any future development would be required to undergo a NEPA analysis to evaluate potential impacts on cultural or natural resources.
005	Water Quality and Quantity	C. Beyond scope	How long will the water process take for Black Mesa project and the Western Water Line?	These projects are under the direction and management of the Navajo Nation Water Resources Division. BIA does not know the current status. These projects are not contemplated as part of the IRMP—but have been identified by the Navajo Nation as future development in the FBFA.
008	Planning process and alternatives	C. Beyond scope	Participant will share project information with USDA NRCS and chapter Facebook pages.	Comment noted.
006	Socioeconomic Considerations	C. Beyond scope	Does the plan come with any funding mechanisms?	The BIA knows there are a number of activities currently underway with the Navajo Nation and other entities. The IRMP allows for improved communication and integrated management. The IRMP does not establish any enforceable legal obligation on the part of the Navajo Nation or BIA to fund the management actions identified in the IRMP-Section 5. However, at the program level, implementation of the IRMP includes comparing existing program budgets with the vision, goals, and objectives of the IRMP. Programs should periodically evaluate their budgetary needs with the aim of achieving consistency with the IRMP. Prioritizing implementation of management actions may depend on funding availability, and programs may use the IRMP to support their future funding requests.
004	Water Quality and Quantity	C. Beyond scope	I see the dam proposal in the draft plan what are your thoughts considering we are in a drought and should be looking at climate change and that Bodaway Gap and Cameron have opposed all dam projects.	The BIA has not received any applications for any approvals for dam projects.
007	Livestock grazing	C. Beyond scope	I know that BIA wants the range permittees to do a range management plan … We haven't heard anything lately. … I wanted to know long that process would be …and a lot of people have questions but are afraid to ask. …due to Covid-19. New permittees need to be educated about drought and overgrazing. We do need to talk about climate change.	The Range and Cropland Management Plan for District 3 is currently underway. There is a draft plan that is being reviewed. The final plan will be adopted at the end of September. It was on hold for about one year to develop the IRMP. The Range and Cropland Management Plan for District 3 is a program plan that will require a separate NEPA analysis.

Appendix D – List of Projects Eligible for Categorical Exclusion

Categorical exclusion (CE) means a category of actions that do not have a significant effect on the human environment, and which have been found to have no such effect and for which; therefore, neither an environmental assessment nor an environmental impact statement is required (CEQ 2020). Many of the management activities that may occur in the Former Bennett Freeze Area (FBFA) are eligible as CEs, according to the Bureau of Indian Affairs (BIA).

According to the BIA National Environmental Policy Act (NEPA) guidance manual, "Most federal actions do not result in significant environmental impacts. The CEs are categories of actions that federal agencies have determined do not have a significant effect on the quality of the human environment and neither an Environmental Assessment (EA) nor an Environmental Impact Statement (EIS) is required." (BIA 2012). According to this BIA NEPA guidance, "The majority of federal actions reviewed by the BIA fall under CEs."

The BIA compiled their list of activities that would be eligible for CEs in coordination with the Council on Environmental Quality (CEQ) and published them in the Federal Register for public review. The United States Department of the Interior Manual for BIA Part 516 DM10 includes the final lists of actions designated as CEs (CEQ 2020). Some of the activities that are included in the Integrated Resource Management Plan that are eligible as CEs according to the BIA are listed in Table C-1.

Appendix Table D-1. Categorical Exclusions Relevant to the Former Bennett Freeze Area Integrated Natural Resource Management Plan

Agency/Type of Action	Categorical Exclusions
Operation, maintenance, and replacement of existing facilities	▪ Operation, maintenance, and replacement of existing facilities that involve normal renovation of buildings, road maintenance, and rehabilitation of irrigation structures. ▪ Transfer of existing operation and maintenance activities of federal facilities to tribal groups, water user organizations, or other entities where the anticipated operation and maintenance activities are agreed upon in a contract, follow BIA policy, and no change in operations or maintenance is anticipated.
Self-Determination and Self-Governance	▪ Self-Determination Act contracts and grants for BIA programs listed as categorical exclusions, or for programs in which environmental impacts are adequately addressed in earlier NEPA analysis. ▪ Self-Governance compacts for BIA programs listed as categorical exclusions or for programs in which environmental impacts are adequately addressed in earlier NEPA analysis.
Rights-of-way (ROW)	▪ A ROW inside another ROW or amendments to a ROW where no deviations from or additions to the original ROW are involved and where there is an existing NEPA analysis covering the same or similar impacts in the ROW area. ▪ Service line agreements to an individual residence, building, or well from an existing facility where installation will involve no clearance of vegetation from the ROW other than for placement of poles, signs (including highway signs), or buried power/cable lines. ▪ Renewals, assignments, and conversions of existing ROW where there would be essentially no change in use and continuation would not lead to environmental degradation.
Roads and Transportation	▪ Approval of utility installations along or across a transportation facility located in whole within the limits of the roadway right-of-way. ▪ Construction of bicycle and pedestrian lanes and paths adjacent to existing highways and within the existing ROW. ▪ Activities included in a "highway safety plan" under 23 CFR 402. ▪ Installation of fencing, signs, pavement markings, small passenger shelters, traffic signals, and railroad warning devices where no substantial land acquisition or traffic disruption will occur. ▪ Emergency repairs under 23 U.S.C. 125. ▪ Acquisition of scenic easements. ▪ Alterations to facilities to make them accessible for the elderly or handicapped. ▪ Resurfacing a highway without adding to the existing width.

Agency/Type of Action	Categorical Exclusions
	▪ Rehabilitation, reconstruction, or replacement of an existing bridge structure on essentially the same alignment or location (e.g., widening, adding shoulders or safety lanes, walkways, bikeways, or guardrails). ▪ Approvals for changes in access control within existing rights-of-way. ▪ Road construction within an existing right-of-way, which has already been acquired for a HUD housing project and for which earlier NEPA analysis has already been prepared.
Forestry	▪ Approval of free-use cutting, without permit, to Indian owners for on-reservation personal use of forest products, not to exceed 2,500 feet board measure when cutting will not adversely affect associated resources such as riparian zones, areas of special significance, etc. ▪ Approval and issuance of cutting permits for forest products not to exceed $5,000 in value. ▪ Approval and issuance of paid timber cutting permits or contracts for products valued at less than $25,000 when in compliance with policies and guidelines established by a current management plan addressed in earlier NEPA analysis. ▪ Approval of Fire Management Planning Analysis detailing emergency fire suppression activities. ▪ Approval of emergency forest and range rehabilitation plans when limited to environmental stabilization on less than 10,000 acres and not including approval of salvage sales of damaged timber. ▪ Approval of forest stand improvement projects of less than 2,000 acres when in compliance with policies and guidelines established by a current management plan addressed in earlier NEPA analysis. ▪ Approval of prescribed burning plans of less than 2,000 acres when in compliance with policies and guidelines established by a current management plan addressed in earlier NEPA analysis. ▪ Approval of forestation projects with native species and associated protection and site preparation activities on less than 2000 acres when consistent with policies and guidelines established by a current management plan addressed in earlier NEPA analysis. ▪ Harvesting live trees not to exceed 70 acres, requiring no more than 0.5 mile of temporary road construction. Such activities: • Shall not include even aged regeneration harvests or vegetation type conversions. • May include incidental removal of trees for landings, skid trails, and road clearing. ▪ May include temporary roads, which are defined as roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be part of the BIA or Tribal transportation systems and not necessary for long-term resource management. Temporary roads shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources; and ▪ Shall require the treatment of temporary roads constructed or used to permit the reestablishment by artificial or natural means, of vegetative cover on the roadway and areas where the vegetative cover was disturbed by the

Agency/Type of Action	Categorical Exclusions
	construction or use of the road, as necessary to minimize erosion from the disturbed area. Such treatment shall be designed to reestablish vegetative cover as soon as practicable, but at least within 10 years after the termination of the contract. Examples include, but are not limited to: • Removing individual trees for sawlogs, specialty products, or fuelwood. • Commercial thinning of overstocked stands to achieve the desired stocking level to increase health and vigor. ▪ Salvaging dead or dying trees not to exceed 250 acres, requiring no more than 0.5 mile of temporary road construction. Such activities: • May include incidental removal of live or dead trees for landings, skid trails, and road clearing. • May include temporary roads, which are defined as roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be part of the BIA or Tribal transportation systems and not necessary for long-term resource management. Temporary roads shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources; and • Shall require the treatment of temporary roads constructed or used to permit the reestablishment, by artificial or natural means, of vegetative cover on the roadway and areas where the vegetative cover was disturbed by the construction or use of the road, as necessary to minimize erosion from the disturbed area. Such treatment shall be designed to reestablish vegetative cover as soon as practicable, but at least within 10 years after the termination of the contract. ▪ For this CE, a dying tree is defined as a standing tree that has been severely damaged by forces such as fire, wind, ice, insects, or disease, such that in the judgment of an experienced forest professional or someone technically trained for the work, the tree is likely to die within a few years. Examples include, but are not limited to: • Commercial and non-commercial sanitation harvest of trees to control insects or disease not to exceed 250 acres, requiring no more than 0.5 miles of temporary road construction. Such activities: • May include removal of infested/infected trees and adjacent live uninfested/uninfected trees as determined necessary to control the spread of insects or disease; and • May include incidental removal of live or dead trees for landings, skid trails, and road clearing. ▪ May include temporary roads, which are defined as roads authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be part of the BIA or tribal transportation systems and not necessary for long-term resource management. Temporary roads shall be designed to standards appropriate for the intended uses, considering safety, cost of transportation, and impacts on land and resources; and

Agency/Type of Action	Categorical Exclusions
	▪ Shall require the treatment of temporary roads constructed or used to permit the reestablishment, by artificial or natural means, of vegetative cover on the roadway and areas where the vegetative cover was disturbed by the construction or use of the road, as necessary to minimize erosion from the disturbed area. Such treatment shall be designed to reestablish vegetative cover as soon as practicable, but at least within 10 years after the termination of the contract. Examples include, but are not limited to: • Land Conveyance and Other Transfers. Approvals or grants of conveyances and other transfers of interests in land where no change in land use is planned. ▪ Reservation Proclamations. Lands established as or added to a reservation pursuant to 25 U.S.C. 467, where no change in land use is planned.
Waste Management	▪ Closure operations for solid waste facilities when done in compliance with other federal laws and regulations and where cover material is taken from locations that have been approved for use by earlier NEPA analysis. ▪ Activities involving remediation of hazardous waste sites if done in compliance with applicable federal laws such as the Resource Conservation and Recovery Act (P.L. 94-580), Comprehensive Environmental Response, Compensation, and Liability Act (P.L. 96-516) or Toxic Substances Control Act (P.L. 94-469).
Other	▪ Data gathering activities such as inventories, soil and range surveys, timber cruising, geological, geophysical, archeological, paleontological, and cadastral surveys. ▪ Establishment of non-disturbance environmental quality monitoring programs and field monitoring stations including testing services. ▪ Actions where BIA has concurrence or co-approval with another Bureau and the action is categorically excluded for that Bureau. ▪ Approval of an Application for Permit to Drill for a new water source or observation well. ▪ Approval of leases, easements, or funds for single-family homesites and associated improvements, including but not limited to, construction of homes, outbuildings, access roads, and utility lines, which encompass five acres or less of contiguous land, provided that such sites and associated improvements do not adversely affect any tribal cultural resources or historic properties and are in compliance with applicable federal and tribal laws.

Reference: Council on Environmental Quality. 2020. Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act. Federal Register. Vol 85, No. 137. July 16, 2020.

Appendix E - Land Use Development Analysis Process

Appendix Table E-1. Land Use Development Analysis Process

Constraint /Feature	Details of Constraint/ Feature	Buffer (mi)	Data Source	Resource Area	Description of Resource Area
Hydrology Resource Protection	tanks, windmills, wells	0.5	Data collected from an Ecosphere/WHPacific project. 2017-2018	Conservation Area	These areas were derived to protect resources such as threatened or endangered species, cultural resources and traditional cultural properties (TCPs), and Navajo-Hopi Intergovernmental compact areas, as well as protect water quality in streams and other water sources
Hydrology Resource Protection	wells	0.5	Navajo Nation water wells data	Conservation Area	These areas were derived to protect resources such as threatened or endangered species, cultural resources and traditional cultural properties (TCPs), and Navajo-Hopi Intergovernmental compact areas, as well as protect water quality in streams and other water sources
Hydrology Resource Protection	seeps, springs	0.5	Data collected from an Ecosphere/WHPacific project. 2017-2018 Excluding from analysis the ones marked "non-existent"	Conservation Area	These areas were derived to protect resources such as threatened or endangered species, cultural resources and TCPs, and Navajo-Hopi Intergovernmental compact areas, as well as protect water quality in streams and other water sources
Hydrology Resource Protection	wetlands	0.25	NWI data downloaded 7/7/2020. Data source vintage 12/6/2019. Excluded "Riverine" features from analysis.	Conservation Area	These areas were derived to protect resources such as threatened or endangered species, cultural resources and TCPs, and Navajo-Hopi Intergovernmental compact areas, as well as protect water quality in streams and other water sources

Constraint /Feature	Details of Constraint/ Feature	Buffer (mi)	Data Source	Resource Area	Description of Resource Area
Hydrology Resource Protection	National Hydrography Dataset	0.25	National Hydrography Dataset downloaded 7/7/2020 from United States Geological Survey.	Conservation Area	These areas were derived to protect resources such as threatened or endangered species and to protect water quality in streams and other water sources.
Biological Preserve	Navajo Nation Resource Conservation Areas		Downloaded 9/1/2019 from https://www.nndfw.org/clup.htm	Conservation Area	These areas were derived to protect resources such as threatened or endangered species, cultural resources and traditional cultural properties (TCPs), and Navajo-Hopi Intergovernmental compact areas, as well as protect water quality in streams and other water sources
Highway	Hwys 89, 160, 64, 264	0.25	Transportation dataset provided by Navajo Land Department	Development Focus Area	These areas include corridors along primary and secondary highways and roads where development is proposed or expected to occur and include communities such as Cameron and Tuba City that are expected to expand.
Road	BIA 6110, 20, 21	0.25	Transportation dataset provided by Navajo Land Department	Development Focus Area	These areas include corridors along primary and secondary highways and roads where development is proposed or expected to occur and include communities such as Cameron and Tuba City that are expected to expand.
Population Center	Tuba City: 5 Cameron, Bodaway Gap: 2 Tonalea: 3	Variable	Census data (see change log)	Development Focus Area	These areas include corridors along primary and secondary highways and roads where development is proposed or expected to occur and include communities such as Cameron and Tuba City that are expected to expand.

Constraint /Feature	Details of Constraint/ Feature	Buffer (mi)	Data Source	Resource Area	Description of Resource Area
Abandoned Uranium Mines		0.25	United States Environmental Protection Agency provided 5/16/19.	Restricted Development Area	These areas include abandoned uranium mines or other safety hazards where development or agriculture is discouraged.
Land Use Restriction	Floodplain	0	Navajo Nation Floodplain data provided by Navajo Nation Land Department.	Restricted Development Area	These areas include abandoned uranium mines or other safety hazards where development or agriculture is discouraged.