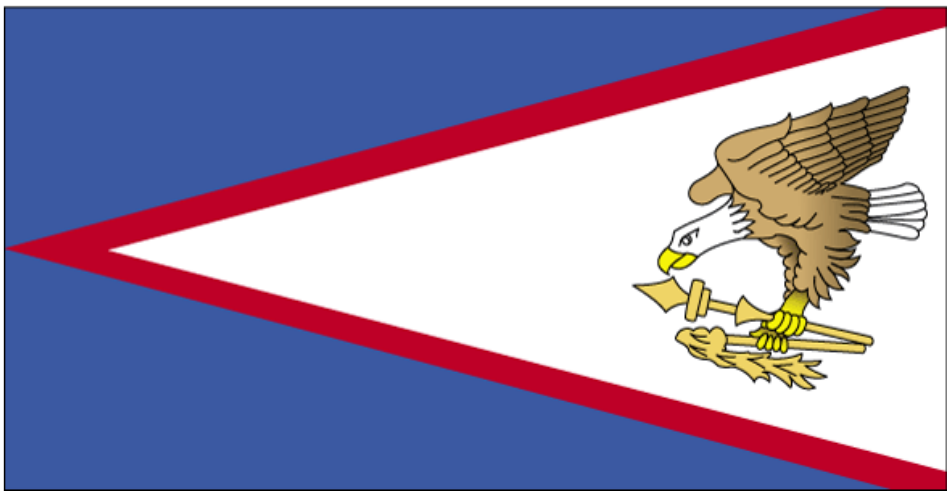


American Samoa
Revision and Update of the Territory Hazard Mitigation Plan

April 28, 2008

2007 Project Team

Territorial Emergency Management Coordinating Office
Office of the Governor
P.O. Box 997755
Pago Pago, American Samoa 96799
Phone: 011 (684) 699-6482
Fax: 011 (684) 699-6414
Email: governorsoffice@asg-gov.com
Website: http://www.asg-gov.com/agencies/temco.asg.htm

American Samoa Disaster Recovery Office
American Samoa Government
Nu'uuli #26-500 P.O. Box 50018
Pago Pago, American Samoa 96799
Phone: 011 (684) 699-1330
Fax: 011 (684) 699-5005
Email: asdro@samoatelco.com
Website: http://www.asg-gov.com

JAMIE CAPLAN CONSULTING LLC
Emergency Management Services

Jamie Caplan Consulting LLC
351 Pleasant Street, #208
Northampton, MA 01060 USA
Phone: 1(413) 586-0867
Fax: 1(413) 303-0412
Email: jamie@jamiecaplan.com
Website: http://www.jamiecaplan.com

2003 Project Team

Territorial Emergency Management
Coordinating Office
Office of the Governor
P.O. Box 997755
Pago Pago, American Samoa 96799
Phone: 011 (684) 699-6482
Fax: 011 (684) 699-6414
Email: governorsoffice@asg-gov.com
Website: http://www.asg-gov.com/agencies/temco.asg.htm

East West Center
1601 East-West Road
Honolulu, HI 96848-1601 USA
Phone: 1 (808) 944-7111
Fax: 1 (808) 944-7376
Email: ewcinfo@EastWestCenter.org
Website: http://www.EastWestCenter.org

Pacific Disaster Center
1305 N. Holopono St. #2
Kihei, HI, 96753-6900 USA
Phone: 1 (808) 891-0525
Fax: 1 (808) 891-0526
Email: info@pdc.org
Website: http://www.pdc.org

Social Science Research Institute
University of Hawaii at Manoa
2424 Maile Way
Saunders Hall, Suite 704
Honolulu, HI 96822 USA
Phone: 1 (808) 956-8930
Fax: 1 (808) 956-2884
Email: ssri@hawaii.edu
Website:
http://www.socialsciences.hawaii.edu/ssri/

The 2007 American Samoa Hazard Mitigation Plan was developed by a consulting team from Jamie Caplan Consulting LLC, and the Lieutenant Governor, the Territorial Emergency Management Coordinating Office, the staff of the American Samoa Disaster Recovery Office, the Territorial Hazard Mitigation Council and Directors and technical staff of the American Samoa Government. This updated and revised plan meets the current FEMA guidelines posted in the Multi-Hazard Mitigation Planning Guidance November, 2006.[1] For information regarding this plan please contact Jamie Caplan Consulting LLC at 1 (413) 586-0867.

The 2003 American Samoa Hazard Mitigation Plan was developed under contract for the American Samoa Territorial Emergency Management Coordinating Office (TEMCO) by the Pacific Disaster Center and the East-West Center. For background information on the methodology and data used to develop this report, please contact The Pacific Disaster Center at 1 (808) 891-7913.

NOTICE: The following report is a collaborative research effort. It is not a promise or guarantee, nor is it predictive of any outcome or effect. All liability is therefore disclaimed for this report and any of its contents.

The Pacific Disaster Center is a public/private partnership sponsored by the PDC Program Office (ASD/NII). The content of the report does not necessarily reflect the position or policy of the U.S. Government and no official Government endorsement should be inferred. Since 2002, the East-West Center has been the managing partner of the Pacific Disaster Center. This report does not necessarily reflect the views of the East-West Center.

For permission to redistribute this report, please contact TEMCO, phone 011 (684) 699-6482.

[1] Multi-Hazard Mitigation Planning Blue Book, FEMA, November 2006.

Executive Summary

The significance of the *American Samoa Hazard Mitigation Plan* is that it provides American Samoa with a comprehensive and consensus mitigation strategy for prioritizing projects, programs, and activities that will save lives and reduce losses from the impacts of natural disasters. This plan defines responsibilities and analyzes local capacities and capabilities to manage mitigation projects. It also fulfills the Federal Emergency Management Agency's requirement for a mitigation planning process that first, ensures federal assistance to the people of American Samoa following future significant disasters and second, allows the American Samoa Government to compete for several million dollars of mitigation project assistance annually. This Mitigation Plan defines risks and vulnerability in a systematic manner, and analyzes the vulnerability of critical structures with respect to mapped known natural hazard areas. It also provides a framework for informed decision-making regarding prioritization of mitigation projects that will insure both the protection of life and property and cost-effective use of taxpayers' funds.

American Samoa is required to revise and update its current Territorial Hazard Mitigation Plan every three years to be eligible for non-emergency public assistance from FEMA, Pre-Disaster Mitigation project grants, Hazard Mitigation Grant Program funding and Flood Management Assistance Grants. "At a minimum, review and, if necessary, update the Standard State Mitigation Plan by November 1, 2003 and every three years from the date of the approval of the previous plan in order to continue program eligibility."2 The first plan was approved in 2003. Eligible mitigation projects include emergency debris removal and emergency protective measures and for repair and restoration of roads and bridges, water control facilities, buildings and equipment, utilities, and parks and recreation. This updated plan has identified new mitigation projects to minimize the disruption and damages due to the prevalent identified natural hazards affecting American Samoa. In addition, the initial mitigation projects were reviewed; some have been completed, and some are no longer priority. The top twenty-five projects are listed in priority order in Table 1.

The American Samoa Territorial Hazard Mitigation Council has been active since the mitigation planning process in 2003. This Council has worked to assure that the updated plan has met the requirements of FEMA and the American Samoa Government. The plan makes sustainable development a priority, helping to ensure safer future development. The planning process encouraged inter-departmental and inter-agency coordination on the islands regarding mitigation planning and emergency management.

The Plan was updated with cost-effective mitigation recommendations that maintain or enhance the current natural and built environment, maintain or enhance the current quality of life on the American Samoa Islands, foster local resiliency to disasters, and identify and respond to local concerns and issues. The updated Territorial Hazard Mitigation Plan recognizes the unique qualities and characteristics of American Samoa's environment, economy, and culture. It focuses on the prevalent, identified natural hazards from the 2003 plan, including tropical cyclones, landslides, earthquakes, droughts, floods and tsunamis. Climate change, hazardous materials and wildfire have been added to the list of studied

[2] Federal Register / Vol. 67, No. 38 / Tuesday, February 26, 2002 / Rules and Regulations §201.4 (3).

hazards. Hazard and risk information was updated. Meetings were held with the Territorial Hazard Mitigation Council, the Lieutenant Governor and the directors and technical staff of each relevant department and organization to gather their input regarding the updated plan goal, objectives and mitigation strategies. The plan meets the requirements of the Disaster Mitigation Act of 2000 and guidelines provided by FEMA's Multi-hazard Mitigation Planning Blue Book, November 2006. The Plan prioritizes the top 25 most important and cost-beneficial mitigation projects for future funding (Table ES-1). The Plan also reviews past mitigation projects and accomplishments as well as documents American Samoa's stewardship of financial and project management of mitigation projects completed over the past fifteen years.

2007 Hazard Mitigation Goals and Objectives

The **Goal** of the 2007 *Updated and Revised American Samoa Hazard Mitigation Plan,* endorsed by the Territorial Hazard Mitigation Council, is to:

Reduce the risks of all identified hazards to the Territory, thus alleviating loss of life and property from drought, earthquake, flood, global warming and climate change, landslide, tropical cyclone (including storm surge and high winds), tsunami and wildfire and insure the overall well being of the people of American Samoa.

The **Objectives** of the Plan are to:

1. **Promote effective land use planning** and regulation and public awareness in order to reduce damage from hurricanes, floods, storm waves and storm surge, landslides, tsunamis, and droughts.

2. **Improve infrastructure development standards** with special attention to mitigating the increasing flood hazard.

3. **Develop and implement hazard mitigation projects** aimed at reducing the risk of damage and destruction of existing assets and infrastructure from the full range of natural disasters threatening the territory.

Table 1 provides a summary of prioritized mitigation projects listing submitting organization, and objectives.

Table 1 Mitigation Projects in Priority Order, listing Submitting Organizations. Each project is detailed in Appendix C.

Project Priority #, and Project Title	AGENCY	Objectives
1. Tualauta County Flood Mitigation, Department of Public Works	DPW	To mitigate the spread of stream runoff as well as the natural runoff of the land within the watershed of Tualauta County, by means of improving and defining a natural waterway that runs from the village of Pava'ia'l to Nuu'uli. To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. Currently, Route 001 (main road), Route 014 (airport road), Route 019 (Fagaima road) undergo heavy flooding during periods of heavy rain due to blockage or the nonexistence of an outlet. This project will minimize this flooding problem currently experienced within the district, as well as be a means for the protection and safety for residents within the area and more so for the general public. The proposed project will serve the villages of Iliili and Futiga in the Tualauta District.
2. Futiga Road Mitigation Project, American Samoa Telecommunications Authority	ASTCA	The proposed activity will reduce and/or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both Fiber Optics and Copper) and replacing them in underground conduits with underground cables.
3. Tafuna Powerplant Wall Upgrading, American Samoa Power Authority	ASPA	To prevent damage to ASPA Tafuna Power Plant in the event of a cyclone or tropical storm. The proposed project will harden the plant against cyclones and storms. Installation and upgrading of the walls of the existing facility will also reduce noise emissions and enhance protection of the power generation equipment from the weather.
4. Underground Power Lines Poloa – Fagamalo, American Samoa Power Authority	ASPA	The plan is to shift the single phase tapline to run along the main road. The project will be done in three phases; first phase is from Poloa to Fagalii, second phase is from Fagalii to Malota, third phase from Malota to Fagamalo. Project involves: undergrounding the main primary lines and terminating wires in padmount fiber boxes, underground services to hotel, the retirement home, and water wells.
5. Rockfall Mitigation 6-sites, Department of Public Works	DPW	To minimize the danger of approaching traffic due to rockfalls on the following sites: Matalesolo Pt. – bet. Alofau and Fogaau Village Anapepe Pt. – bet. Afulie and Amaua Village Tifa Pt. – bet. Alega and Avaio Village Lafiga Pt. – bet. Lauliituai and Aumi Village Sinamanoo Pt. – bet. Amaluai and Asili Village Atauloma (Mu Pt.) – Afao, Nua and Seetaga Village Scale. Unstable/loose rocks that are potentially dangerous to approaching traffic to reduce the severity of rockfall damage. Install earthen berms, fences and signs to warn the approaching traffic of potential rockfall sites.

Project Priority #, and Project Title	AGENCY	Objectives
6. Leone Underground Mitigation Project, American Samoa Telecommunications Authority	ASTCA	The proposed activity will reduce and/or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, and other windstorms and hazards by removing ASTCA's Aerial Cables (both Fiber Optics and Copper telephone) and replacing them in Underground Conduits with Underground cables. The proposed project will serve the villages of in the Tualauta District consisting of the following villages: Lepuapua, Taputimu and Leone.
7. Underground Power lines from Cost-U-Less store to Ottoville, American Samoa Power Authority	ASPA	Project involves undergrounding main primary lines, terminating wires in distribution vaults and fiber boxes, underground services to hotel, churches, retirement home, and water wells.
8. Tago Stream, Department of Public Works	DPW	Mitigation to prevent the spread of stream runoff towards the residential and commercial settlement and ponds on low spots within the area. The proposed project is also to prevent future encroachments due to developments by redefining/structurally hardening the stream bankline. The proposed project is located on the village of Nuu'uli and adjacent to the famous Shoe Tree Commercial Building.
9. Permanent Landslides Mitigation Project, Department of Public Works	DPW	To minimize the effect and damage of landslide during rainy days and to avoid closure of Route 11; Masausi Road. This road is an access from the Villages of Masausi and Sailele to Fagaitua and other important government facilities like the hospital and other parts of the island. The proposed project calls for slope stabilization which includes excavation and benching to resist movement of loose material on the lower part of the slide. Install/construct drainage improvement to control surface and subsurface flow. Placing retaining walls or crib walls as deemed necessary to prevent further spread of the slide on the access road.
10. Underground Nuuuli - Malaeimi/Atuu-Laulii, American Samoa Power Authority	ASPA/ASTCA	To underground existing overhead powerlines to underground powerlines to provide secure, reliable and maintainable power supply to ASPA Water Wells and ASPA Water Booster Stations This project will also benefit private businesses with large freezers and frozen inventory, church buildings and schools, which can be used as shelters and stores for food and supplies. This will also harden the ASPA Power system and increase ASPA's reliability to the community.
11. Atu'u to Breaker's Point Mitigation Project,	ASTCA	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, and other windstorms and hazards by removing ASTCA's aerial cables (both fiber optics and copper telephone) and replacing them in underground conduits with underground cables.

Project Priority #, and Project Title	AGENCY	Objectives
American Samoa Telecommunications Authority		The proposed project will serve the following villages in the Maopuatasi County: Atu'u, Leloaloa, Lepua, Aua, Afono, Vatia and Lauli'I (Breaker's Point).
12. Fagaitua Seawall, Department of Public Works	DPW	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road)
13. Ta'u to Fitiuta Mitigation Project, American Samoa Telecommunications Authority	ASTCA	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both fiber optics and copper) and replacing them in underground conduits with underground cables. The proposed project will serve the village of Fitiuta in the Manu'a District.
14. Tafuna PowerPlant, American Samoa Power Authority	ASPA	To prevent/minimize the disruption of power in the event of a cyclone or tropical storm. The proposed project will harden the distribution system against damage from cyclones or storms and reduce the failure rate of feeders 5,6,7,9 and the tie line. This project will harden the distribution switch system from cyclones and storms by replacing the exposed overhead switches and solid blades with underground pad mounted switches.
15. Utumoa, American Samoa Power Authority	ASPA	To protect the reinforced concrete spring intake structure from bounders and mud due to landslide and high flood waters. To prevent damage to the raw water screen house from erosion of the river bank during high flow.
16. Fagatogo, American Samoa Power Authority	ASPA	To prevent rocks, soil and other debris from being deposited into the raw water reservoir. To protect the river bank from eroding due to high stream flow and stop the river from overflowing into the MFP building and damaging the equipment.
17. Auto Road Seawall, Department of Public Works	DPW	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road). Supply and install rock reinforcing to vulnerable shoreline in Auto as per USACE shoreline inventory assessment.
18. Nuu'uli Seawall, Department of Public Works	DPW	Construction of seawalls along the road network.
19. Aua Seawall, Department of Public Works	DPW	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road) A rock revetment or seawall is required to stop further erosion and to protect roadway from strong waves. Also, it shall provide additional shoulder

Project Priority #, and Project Title	AGENCY	Objectives
		width for vehicles to pull over. This project will allow the road to remain operational and safe after disasters for the public to commute to and from the hospital.
20. Enhancement of American Samoa Vertical Control, Department of Public Works	DPW	To reestablish intermediate benchmarks for leveling and recheck the vertical and horizontal controls for coordinate verification. Rechecking these controls can determine how far our island has sunk and moved if the controls have changed due to global warming and plate movements.
21. Relocation of Government Gas Station in Tafuna, Department of Public Works	DPW	To relocate existing government gas station to new proposed site inside the fence of the government compound to ensure security of the station from the public. Also the new plan will provide easier access for vehicles to enter and exit gas station.
22. Alternate Road Routing, Department of Public Works	DPW	FS/Design preparation for hospital alternate route.
23. Evacuation Shelters, Department of Public Works	DPW	Design and construction of shelters. Construction of access roads.
24. Hazardous Materials Warehouse, Office of Procurement	OP	Reinforce the facility so that it will withstand cyclones and other hazards.
25. Stream Retaining Wall, Development Bank of American Samoa	DBAS	The project proposes to make flood mitigation improvements along 200 feet of stream that borders the bank building.

Assurances

American Samoa will continue to comply with all applicable Federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR 13.11c, and will amend its plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).[3]

In acknowledgement of all the stakeholders involved in the mitigation planning process, the strengths and accomplishments of the plan development process have been numerous. The American Samoa Government has endorsed *The 2007 Updated and Revised American Samoa Hazard Mitigation Plan* with an Executive Order signed by the Governor. The Governor, Lieutenant Governor, Director of the Territorial Emergency Management Coordinating Office (TEMCO), the TEMCO staff, American Samoa Disaster Recovery Office (ASDRO) and ASDRO staff, and the Territorial Hazard Mitigation Council has provided strong leadership and advocacy throughout the Territory, ensuring a continuous mitigation planning process. Adequate funding and technical guidance from the Federal Emergency Management Agency for mitigation planning projects, coupled with annual funding incentives for competitive mitigation grants, have continued to drive the mitigation planning process.

Accomplishments of this planning project include the American Samoa Hazard Mitigation Council (HMC) leadership, American Samoa Government agency support and commitment, public participation, hazard and loss estimation research, geographic information system mapping of critical facilities and hazards, project development, and analysis of mitigation issues through the focus group planning process.

And finally, this Mitigation Plan builds on a growing record of mitigation successes in American Samoa and technical expertise involved in composing the *American Samoa Hazard Mitigation Plan 2003.*

[3] Federal Register 1 Vol. 67, No. 38 /Tuesday, February 26, 2002 / Rules and Regulations *§201.4(c)(7).*

Executive Order

OFFICE OF THE GOVERNOR
PAGO PAGO, AMERICAN SAMOA 96799

TOGIOLA T.A. TULAFONO
GOVERNOR

AITO[illegible]LE T.F. SUNIA
LIEUTE[illegible]NT GOVERNOR

TELEPHONE: (684) 633-4116
FACSIMILE: (684) 633-2269

EXECUTIVE ORDER NO. 013 - 2007

AN ORDER ADOPTING THE AMERICAN SAMOA REVISION AND UPDATE OF THE TERRITORY MULTI-HAZARD MITIGATION PLAN.

Section 1. Authority

This Executive Order is issued under the authority granted to the Governor in Article IV, Sections 6 and 7 of the Revised Constitution of American Samoa, and Sections 4.0111 and 26.0105, American Samoa Code Annotated.

Section 2. Preamble

WHEREAS, American Samoa has suffered substantial losses of life and property from natural disasters. The flash floods of 2003, Hurricane Heta in 2004, Hurricane Olaf in 2005, constant heavy rain during hurricane season, and severe landslides have caused considerable human suffering and damage to homes, businesses, government buildings, and infrastructure. Population growth and development continue to increase the vulnerability of American Samoa to natural disasters and unless steps are taken to reduce the risk, disaster losses will continue to increase in the future; and

WHEREAS, American Samoa has taken steps to mitigate the risk of disaster losses. Strides in building codes and standards, land use procedures and proactive outreach mitigation awareness programs have been considerable factors in alleviating the impact of disasters. New constructions face stringent regulations in Special Hazard Flood Areas (SHFA) prone to flooding, tsunamis, high surf, landslides, and other hazards; and

WHEREAS, the United States Congress adopted the Disaster Mitigation Act (DMA) of 2000, commonly known as the 2000 Stafford Act, amended on October 10, 2000. On October 30, 2000, the President signed the bill into law, creating Public Law 106-390. The purpose of the DMA is to amend the Stafford Act, which established a national program for Pre-Disaster Mitigation (PDM). The PDM provides funds for mitigation planning and mitigation projects to communities. The law also requires local

and Tribal governments to develop and submit mitigation plans to FEMA for approval in order to qualify for future PDM funding. The law also stipulates Hazard Mitigation Grant Program (HMGP) funds for planning purposes, and increases HMGP from 7.5% to 20% for states meeting enhanced planning criteria. The Plan outlines the requirement for the Flood Mitigation Assistance (FMA) for flood planning and small projects; and

WHEREAS, in 2002, the American Samoa Hazard Mitigation Council was established to assist the Territorial Emergency Management Coordination Office (TEMCO) in the development of the American Samoa Hazard Mitigation Plan. TEMCO was assisted also by the Pacific Disaster Center/East-West Center and the University of Hawaii's Social Research Institute to facilitate development of a draft plan. The Mitigation Council and its sub-committees met several times to review building codes and standards, land use regulations, and infrastructure standards and flooding. The Mitigation Council also met to formulate and identify mitigation projects and prioritize the projects accordingly. The product of this combined effort is contained in the American Samoa Hazard Mitigation Plan; and

WHEREAS, in 2007, the American Samoa Hazard Mitigation Plan matured to the state three year updated plan requirement. This is the updated plan mandated by the Disaster Mitigation Act of 2000.

Section 3. Order

The American Samoa Revision and Update of the Territory Multi-Hazard Mitigation Plan, dated September 27, 2007, is hereby adopted pursuant to ASCA Title 26, Chapter 01, the Stafford Act, and 44 CFR 201.4(c)(6).

Section 4. Effective Date

This Order shall take effect immediately.

Dated: October 25, 2007.

TOGIOLA T.A. TULAFONO

Distribution: Per standard list.

Table of Contents

EXECUTIVE SUMMARY V

2007 HAZARD MITIGATION GOALS AND OBJECTIVES VI

ASSURANCES XI

EXECUTIVE ORDER XII

1. CHAPTER 1 - INTRODUCTION 1

1.1. CHAPTER 2 – THE HAZARD MITIGATION PLANNING PROCESS 2

1.2. CHAPTER 3 – RISK AND VULNERABILITY ASSESSMENT 2

1.3. CHAPTER 4 – CAPABILITY ASSESSMENT 2

1.4. CHAPTER 5 – HAZARD MITIGATION STRATEGIES 2

1.5. CHAPTER 6 – PLAN MAINTENANCE PROCEDURES 3

1.6. CHAPTER 7 - ACRONYMS 3

1.7. CHAPTER 8 AND 9 - RESOURCES 3

1.8. APPENDICES 3

2. CHAPTER 2 - THE HAZARD MITIGATION PLANNING PROCESS 4

2.1. INTRODUCTION TO HAZARD MITIGATION PLANNING IN AMERICAN SAMOA 4

2.1.1. Methods and Approach 4

2.2. FEMA RECOMMENDATIONS FROM THE 2003 PLAN CROSSWALK 4

2.2.1. FEMA Recommendations: Risk and Vulnerability Assessment Chapter 5

2.2.2. FEMA Recommendations: Hazard Mitigation Strategy Chapter 5

2.3. DEVELOPMENT OF 2007 REVISED AND UPDATED MULTI-HAZARD MITIGATION PLAN 5

2.4. NARRATIVE DESCRIPTION OF THE PLAN PREPARATION 6

2.4.1. Work Plan 6

2.4.2. Gap Analysis 7

2.4.3. Information Provided by Departments to Update Plan 9

2.4.4. June 4 – 9, 2007 Meetings with Lead Contractor, James Buika 12

2.5. DEVELOPMENT OF 2003 MULTI-HAZARD MITIGATION PLAN 21

2.6. Territorial Emergency Management Coordinating Office (TEMCO) 22
2.7. American Samoa Disaster Recovery Office (ASDRO) 22
2.8. Duties and Responsibilities of the Territory Hazard Mitigation Officer 22
2.9. The American Samoa Territorial Hazard Mitigation Council 22
2.10. Composition of the American Samoa Territorial Hazard Mitigation Council in 2003 23
2.10.1. Responsibilities of the Territorial Hazard Mitigation Council in 2003 23
2.11. Land Use Planning, Management and Regulation, and Flood Plain Management 24
2.12. Coordination among Federal and Territorial Agencies 24
2.12.1. How All Interested Organizations Participated in 2003 24
2.12.2. How Coordination with Federal and Territorial Agencies Changed Since 2003 25
2.13. Integrating with Other Territorial Planning Efforts 26
2.14. Integrating with FEMA Mitigation Programs and Initiatives 27
2.15. 2007 Hazard Mitigation Goals and Objectives 28
2.16. Comparison of the Planning Process in 2003 and 2007 28
3. CHAPTER 3 – RISK AND VULNERABILITY ASSESSMENT 30
3.1. Introduction 30
3.2. General Information 31
3.2.1. Geography 32
3.2.2. Climate 32
3.2.3. Population 33
3.3. Collecting Data and Using GIS 33
3.4. Critical Facilities 34
3.4.1. GIS Analysis Process 35
3.5. Hazard Identification 41
3.6. Profiling Hazards 44
3.7. Climate Change 44

3.7.1. Introduction to Climate Change *44*

3.7.2. Profile of El Niño *45*

3.7.3. Profile of La Niña *45*

3.7.4. Conditions that Increase Vulnerability to Climate Change *45*

3.7.5. Sea Level Rise *45*

3.7.6. History of Climate Change *46*

3.8. DROUGHT 47

3.8.1. Profile of Drought *47*

3.8.2. Conditions that Impact Vulnerability to Drought *47*

3.8.3. Probability of Occurrence and Magnitude of Event of Drought *47*

3.8.4. History of Drought *48*

3.9. EARTHQUAKE 52

3.9.1. Introduction to Earthquake *52*

3.9.2. Profile of Earthquake *52*

3.9.3. Conditions that Impact Vulnerability to Earthquake *53*

3.9.4. Probability of Occurrence and Probable Magnitude of Events of Earthquake *54*

3.9.5. Geographical Extent of Earthquake *54*

3.9.6. Fault explanations *54*

3.9.7. History of Earthquake *59*

3.10. FLOOD 60

3.10.1. Introduction to Flood *60*

3.10.2. Profile of Flood *60*

3.10.3. Probability of Occurrence and Magnitude of Flooding Event *62*

3.10.4. History of Flood *68*

3.11. HAZARDOUS MATERIALS 70

3.12. LANDSLIDES 71
3.12.1. Introduction to Landslides 71
3.12.2. Conditions that Impact Vulnerability to Landslides 71
3.12.3. Probability of Occurrence and Magnitude of Landslide Events 72
3.12.4. Geographical Extent of Landslides 73
3.12.5. History of Landslides 76
3.13. TROPICAL CYCLONES 78
3.13.1. Introduction to Tropical Cyclones 78
3.13.2. Profile of Tropical Cyclones 78
3.14. TSUNAMI 87
3.14.1. Introduction to Tsunami 88
3.14.2. Profile of Tsunami 88
3.14.3. Conditions that Impact Vulnerability to Tsunami 89
3.14.4. Probability of Occurrence and Magnitude of Tsunami Event 89
3.14.5. Geographical Extent of Tsunami 89
3.14.6. History of Tsunami 89
3.14.7. Shoreline Erosion Status 93
3.15. WILDFIRE 99
3.15.1. Introduction to Wildfire 99
3.15.2. Profile of Wildfire 99
3.16. ASSESSING VULNERABILITY AND ESTIMATING POTENTIAL LOSSES BY JURISDICTION 99
3.17. CHANGES IN DEVELOPMENT FOR JURISDICTIONS IN HAZARD PRONE AREAS 102
3.18. SUMMARY 105
4. CHAPTER 4 - CAPABILITY ASSESSMENT 106
4.1. CURRENT PROGRAMS AND POLICIES 107
4.1.1. Government Organizations 107

4.1.2. Key American Samoa Mitigation Departments and Agencies 109

4.1.3. Territorial Emergency Management Coordinating Office (TEMCO) and Department of Homeland Security (DHS) 110

4.1.4. Government Department Roles in Mitigation 111

4.1.5. Laws and Regulations 117

4.1.6. Existing Mitigation Programs 121

4.2. COORDINATION WITH OTHER TERRITORIAL PLANS 123

4.2.1. Territorial General Plan, Department of Commerce 2003 123

4.2.2. ASG Tank Farm Terminal Operations Mitigation Plan 124

4.2.3. Pago Pago Bay Shoreside Development Plan 126

4.2.4. National Park of American Samoa Wildland Fire Management Plan 126

4.2.5. Other Environmental Initiatives, Programs, and Projects for Risk Reduction 127

4.3. TECHNICAL CAPABILITY 129

4.3.1. Emergency Alert System 129

4.3.2. American Samoa GIS Users Group 130

4.3.3. Tutuila Hazard Assessment Tool (T-HAT) 130

4.3.4. Emergency Shelter GIS Data Layer 130

4.4. FISCAL CAPABILITY 130

4.4.1. Funding Sources for Mitigation Programs and Projects 131

4.4.2. Past Territorial Mitigation Projects 132

4.4.3. Three Disaster Declarations (2003, 2004, 2005) and Their Impact 134

4.5. ANALYSIS AND EVALUATION OF CAPABILITY DATA 135

4.5.1. Evaluation of the Territory's Pre-Disaster Capabilities 135

4.5.2. Hazard Management Capabilities Changed Since 2003 135

4.5.3. Evaluation of the Territory's Post-Disaster Capabilities 136

4.6. CAPABILITY ASSESSMENT CONCLUSIONS 136

5. CHAPTER 5 - HAZARD MITIGATION STRATEGY 137

5.1. HAZARD MITIGATION GOALS AND OBJECTIVES 137

5.2. 2003 GOALS WERE ASSESSED AND DEEMED VALID FOR 2007 138

5.3. TERRITORY MITIGATION GOALS THAT GUIDE MITIGATION ACTIVITIES 138

5.3.1. How Mitigation Actions Coincide with Local Goals and Territory Goals 139

5.4. MITIGATION MEASURES SPECIFIC TO EACH HAZARD 139

5.4.1. Drought Mitigation Strategies 141

5.4.2. Earthquake Mitigation Strategies 141

5.4.3. Flood Mitigation Strategies 142

5.4.4. Global Warming and Climate Change 144

5.4.5. Hazardous Material Strategies 145

5.4.6. Landslide Mitigation Strategies 146

5.4.7. Tropical Cyclone/Storm Surge/High Wind Mitigation Strategies 146

5.4.8. Tsunami Mitigation Strategies 147

5.4.9. Wildfire Mitigation Strategies 147

5.5. MITIGATION PROJECTS 148

5.6. COST-BENEFIT REVIEW OF PROJECTS 149

5.6.1. Mitigation Actions Prioritized 149

5.7. MITIGATION PROJECTS FROM EACH ORGANIZATION 162

5.7.1. Project Priority 1 – Tualauta Flood Management – DPW 166

5.7.2. Project Priority 2 – Futiga Road Mitigation – ASTCA 168

5.7.3. Project Priority 3 – Tafuna Power Plant Wall – ASPA 170

5.7.4. Project Priority 4 – Underground Power Lines from Poloa to Fagamalo - ASPA 172

5.7.5. Project Priority 5 – Rockfall Mitigation (6 Sites) – DPW 174

5.7.6. Project Priority 6 – Leone Underground Mitigation – ASTCA 176

5.7.7. Additional Mitigation Projects 178

5.8. MITIGATION PROJECT FUNDING 178

5.8.1. Joint Projects 178

5.8.2. Potential Funding Sources within FEMA 178

5.9. HOW THE TERRITORY SUPPORTS LOCAL MITIGATION THROUGH FUNDING AND TECHNICAL ASSISTANCE 180

5.9.1. Historical Support 180

5.9.2. Criteria for Prioritizing Who Receives Support 180

5.9.3. Future Support 181

6. CHAPTER 6 - PLAN MAINTENANCE PROCEDURES 182

6.1. MONITORING, EVALUATING AND UPDATING THE PLAN 182

6.1.1. Method and Schedule for Monitoring and Updating the Plan 182

6.1.2. Method and Schedule for Evaluating the Plan 183

6.1.3. Analysis of Previous Plan – What Worked and What Was Changed 183

6.2. MONITORING PROGRESS OF MITIGATION STRATEGIES 184

6.2.1. Mitigation Strategies will be monitored 184

6.2.2. Mitigation Goals will be monitored 184

6.2.3. A System for Reviewing Progress or Implementing Mitigation Strategies 184

6.2.4. Were Mitigation Strategies Implemented as Planned? 185

CHAPTER 7 - LIST OF ACRONYMS 187

CHAPTER 8 - 2007 RESOURCES 190

CHAPTER 9 - 2003 RESOURCES 195

2003 DATA RESOURCES 197

APPENDIX A – GIS DATA 199

APPENDIX B – CRITICAL FACILITIES 200

APPENDIX C – PROJECT PROFILES 208

PROJECT PRIORITY 1 – TUALAUTA FLOOD MANAGEMENT – DPW 208

PROJECT PRIORITY 2 – FUTIGA ROAD MITIGATION – ASTCA 210

PROJECT PRIORITY 3 – TAFUNA POWER PLANT WALL – ASPA 212

Table of Contents

PROJECT PRIORITY 4 – UNDERGROUND POWER LINES FROM POLOA TO FAGAMALO - ASPA 214

PROJECT PRIORITY 5 – ROCKFALL MITIGATION (6 SITES) – DPW 216

PROJECT PRIORITY 6 – LEONE UNDERGROUND MITIGATION – ASTCA 218

PROJECT PRIORITY 7 – UNDERGROUND POWER LINES FROM COST U LESS TO OTTOVILLE – ASPA 220

PROJECT PRIORITY 8 – TAGO STREAM BANKLINE IMPROVEMENT NUU'ULI VILLAGE – DPW 222

PROJECT PRIORITY 9A – PERMANENT LANDSLIDE REPAIR ROUTE 11 – DPW 224

PROJECT PRIORITY 9B – PERMANENT LANDSLIDE REPAIR ROUTE 5 – DPW 226

PROJECT PRIORITY 10 – UNDERGROUND POWER LINES FROM NUUULI AIRPORT TO MALAEIMI – ASPA 228

PROJECT PRIORITY 11 – ATU'U BREAKER'S POINT MITIGATION - ASTCA 230

PROJECT PRIORITY 12 – FAGIATUA SEAWALL - DPW 232

PROJECT PRIORITY 13 – TA'U TO FITIUTA MITIGATION – ASTCA 234

PROJECT PRIORITY 14 – TAFUNA POWER PLANT SWITCH – ASPA 236

PROJECT PRIORITY 15 – UTUMOA RIVER BANK STABILIZATION – ASPA 238

PROJECT PRIORITY 16 – FAGATOGO RESERVOIR RETAINING WALL – ASPA 239

PROJECT PRIORITY 17 – AUTO ROAD SEAWALL – DPW 241

PROJECT PRIORITY 18 – NUUULI SEAWALL – DPW 243

PROJECT PRIORITY 19 – AUA ROAD SEAWALL – DPW 245

PROJECT PRIORITY 20 – ENHANCEMENT OF AMERICAN SAMOA VERTICAL & HORIZONTAL CONTROLS – DPW 247

PROJECT PRIORITY 21 – RELOCATION OF GOVERNMENT GAS STATION IN TAFUNA – DPW 249

PROJECT PRIORITY 24 – HAZARDOUS MATERIALS WAREHOUSE – OP 251

PROJECT PRIORITY 25 – STREAM RETAINING WALL – DBAS 254

AFONO CULVERT IMPROVEMENT – DPW 256

AIRPORT AVIATION FUEL FARM RELOCATION – DPA 258

AIRPORT RUNWAY SHORELINE PROTECTION – DPA 260

PAGO PAGO INTERNATIONAL AIRPORT TERMINAL ROOF REHABILITATION – DPA 262

APPENDIX D – LIST OF MITIGATION PROJECTS FROM 2005 MITIGATION PLAN UPDATE 264

Table of Tables

Table 1 Mitigation Projects in Priority Order, listing Submitting Organizations. Each project is detailed in Appendix C. vii

Table 2 Gap Analysis Main Points 8

Table 3 Chapter Outline Comparison between 2003 and 2007 9

Table 4 Agencies Participatingin the Mitigation Planning Process 10

Table 5 Mitigation Projects in Priority Order 16

Table 6 Numbers of Buildings at Risk/Total Buildings 35

Table 7 Lists of Critical Facilities Shown in Maps 2 to 5 41

Table 8 Hazards Included in the Plan 41

Table 9 Summary of Probability of Occurrence 43

Table 10 FEMA Declared Disasters 44

Table 11 Summaries of Significant Droughts 49

Table 12: Summary of Significant Flooding Events 69

Table 13: Summary of Significant Landslides Events 77

Table 14 Summary of Significant Cyclone Events 83

Table 15: Summary of Significant Tsunami Events 91

Table 16 Loss Estimation Criteria 99

Table 17 Tutuila Island Earthquake Hazard Vulnerability 101

Table 18: Tutuila Island Riverine Flood Hazard Vulnerability 101

Table 19: Tutuila Island Landslide Hazard Vulnerability 101

Table 20: Estimated Losses to Critical Facilities for Identified Hazards per County 102

Table 21 Building Counts and New Structures 104

Table 22 Capability Assessment Components 106

Table 23 Government Department Roles in Mitigation 113

Table 24 Project Notification and Review Board Membership & Responsibilities 120

Table 25 Ofa, Val, Heta and Olaf Mitigation Projects 132

Table of Tables

Table 26 Hazard Mitigation Strategies *139*

Table 27 Prioritizations by Listing Benefits and Costs *151*

Table 28 Project Priority List with Impact Analysis *158*

Table 29 Mitigation Strategies Prioritized for Technical Feasibility and Cost Effectiveness *159*

Table 30 Mitigation Projects Sorted by Organization *163*

Table 31 Department of Public Works Priority Project List *164*

Table 32 American Samoa Telecommunications Authority Priority Project List *164*

Table 33 American Samoa Power Authority Project List *164*

Table 34 Office of Procurement/Development Bank of American Samoa Project List *165*

Table of Figures

Figure 1 Mitigation Planning Process 2

Figure 2 Step 1 – Organize Resources 4

Figure 3 Project Team Organization Chart 5

Figure 4 Task Timeline 6

Figure 5 2003 Mitigation Planning Organization 21

Figure 6 Step 2 – Assess Risks 30

Figure 7 the Territory of American Samoa 31

Figure 8 GIS Analysis Process 35

Figure 9 Comparison of Rainfall Amounts, Drought Occurrence and ENSO 51

Figure 10 Tropical Cyclone Concurrence with El Niño 86

Figure 11 Proposed Improvements to Faga'alu Park 126

Figure 12 Step 3 Develop the Mitigation Plan 137

Table of Maps

Map 1 Locations of Mitigation Projects numbered in Table 1 19

Map 2 Pago Pago Harbor Critical Facilities at Greatest Risk 37

Map 3 Faga'itua Bay Critical Facilities at Greatest Risk 38

Map 4 Fagamalo Village Critical Facilities at Greatest Risk 39

Map 5 Fagatele Village Critical Facilities at Greatest Risk 40

Map 6 Tutuila Island Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.) 56

Map 7 Pago Pago Harbor Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.) 57

Map 8 East Tafuna Plain Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.) 58

Map 9 West Tafuna Plain Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.) 58

Map 10 Historic Earthquakes 1[29] 59

Map 11 Historic Earthquakes 2[30] 59

Map 12 Tutuila and Aunu'u Islands Flood Hazard Zones 63

Map 13 Pago Pago Harbor Flood Hazard Zones 64

Map 14 Ofu and Olosega Villages Flood Hazard Zones 67

Map 15 Pago Pago Harbor Landslide Risk Areas 74

Map 16 East Tafuna Plain Landslide Risk Areas 75

Map 17 American Samoa Islands Historical Cyclone Storm Tracks 82

Map 18 Tutuila Island - Tafuna Plain, USACE Shoreline Inventory 96

Map 19 Velocity Wave Hazard Areas for Tutuila 97

Map 20 Increased Risk Areas 103

Table of Pictures

Picture 1 2007 Territorial Hazard Mitigation Council Meeting *12*

Picture 2 2007 Project Proposal Presentation *14*

Picture 3 Star-Kist Samoa's Cannery *33*

Picture 4 Hazard Mitigation Council and Technical Staff Meeting June 7, 2007 ..... *107*

Picture 5 ASPA Project Definition Meeting June 5, 2007 ..... *109*

Picture 6 PDM Flood Control Project. Mitigation for chronic flooding to LBJ Hospital *130*

1. Chapter 1 - Introduction

The purpose of the *American Samoa Hazard Mitigation Plan* (Plan) is to provide America Samoa with a comprehensive examination of all natural hazards affecting the Territory and to provide a framework for informed decision-making regarding the selection of cost-effective mitigation projects. These mitigation projects, when implemented, will reduce American Samoa's risk and vulnerability from natural hazards. The plan also documents the mitigation planning process that is required by the *Disaster Mitigation Act of 2000*. This mitigation planning process is a requirement for continued federal assistance to the people of American Samoa following any Presidential disaster declarations. This updated and revised plan meets the current FEMA guidelines posted in the Multi-Hazard Mitigation Planning Guidance November, 2006.[4]

The original 2003 *American Samoa Hazard Mitigation Plan,* as well as this updated and revised 2007 Plan, is the result of a collaborative effort between many stakeholders representing the American Samoa community, including government officials, village leaders, and the business sector. Throughout the development of the Plan, the American Samoa Territorial Hazard Mitigation Council, a formal advisory council to the American Samoa Government, provided mitigation planning leadership. The Territorial Hazard Mitigation Council reviewed the mitigation goals and objectives, reviewed research on the natural hazard risk and vulnerability assessment, identified and prioritized mitigation actions, and prepared a mitigation implementation strategy with recommendations designed to save lives and reduce losses from future disasters caused by natural hazards.

The 2003 planning process included the Territorial Hazard Mitigation Council, the Governor, Lieutenant Governor, Director and staff of the Territorial Emergency Management Coordinating Office (TEMCO), and a technical consulting team from the Pacific Disaster Center and the University of Hawaii's Social Science Research Institute, Hawaii. The 2007 planning process was supported and facilitated by a consulting team from Jamie Caplan Consulting LLC, together with the Lieutenant Governor, the Territorial Emergency Management Coordinating Office manager and staff and the staff of the American Samoa Disaster Recovery Office, the Territorial Hazard Mitigation Council and Directors and technical staff of American Samoa Government Departments.

Below is a summary of the American Samoa Hazard Mitigation Plan chapters, referencing the appropriate FEMA guidelines and requirements. Figure 1 represents FEMA's recommended mitigation planning process. This process was followed in 2003 and again in 2007.

[4] Multi-Hazard Mitigation Planning Blue Book, FEMA, November 2006.

Figure 1 Mitigation Planning Process

1.1. Chapter 2 – The Hazard Mitigation Planning Process

Chapter 2, The Hazard Mitigation Planning Process, documents the methods and approach of the hazard mitigation planning process and meets the Federal Emergency Management Agency's (FEMA) 11-JUL-02 Interim Final Rule plan criteria section 201.4(c)(6 and 7). The chapter summarizes: 1) significant meeting and focus group proceedings, accomplishments, and actions; 2) research, agency cooperation, and procedures for developing the natural hazards Risk and Vulnerability Assessment; 3) the decision-making process to reach committee consensus on mitigation recommendations and mitigation project identification, development, selection, and prioritization; as well as 4) coordination amongst agencies, and integration with other planning efforts. The planning process for this updated plan focused on reviewing current mitigation strategies and researching three additional hazards, climate change, hazardous materials and wildfire.

1.2. Chapter 3 – Risk and Vulnerability Assessment

Chapter 3, Natural Hazards Risk and Vulnerability Assessment for American Samoa, is formatted to meet FEMA's Interim Final Rule plan criteria section 201.4(c)(2)(i, ii, iii). FEMA requires American Samoa to identify and profile each hazard, to assess vulnerability and estimate potential losses by jurisdiction, and to assess vulnerability and estimate potential losses to critical facilities. FEMA realizes that some data may not be available to create a complete risk assessment. Within this context, the assessment indicates where data is available and where there are information gaps. This chapter includes updated maps and risk assessment information based on data available for the identified hazards.

1.3. Chapter 4 – Capability Assessment

Chapter 4, Capability Assessment, provides a complete analysis of American Samoa's ability to mitigate risks prior to and post-disaster. As an update to the 2003 plan, the Capability Assessment has its own chapter and thoroughly reviews past mitigation actions. The combination of the information contained in the risk assessment and the capability assessment leads to the analysis in the chapter on hazard mitigation strategies.

1.4. Chapter 5 – Hazard Mitigation Strategies

Chapter 5, Hazard Mitigation Strategies, provides a blueprint for reducing losses identified in the Risk and Vulnerability Assessment and meets FEMA's Interim Final Rule plan criteria section 201.4(c)(3)(i, ii, iii, iv). The chapter presents: 1) the hazard mitigation goal and three objectives; 2) mitigation measures, recommendations, and prioritized mitigation projects for future funding; and 3) an identification of mitigation funding sources. The Mitigation Planning and Coordination chapter from the 2003 plan has been omitted and that information incorporated throughout this updated and revised plan.

1.5.Chapter 6 – Plan Maintenance Procedures

Chapter 6, Plan Maintenance Procedures, describes the established system and mechanism for periodically monitoring, evaluating, and updating the Plan. This chapter conforms to FEMA's Interim Final Rule plan criteria section 201.4(c)(5)(i, ii, iii). It also includes the FEMA required information regarding evaluating the 2003 plan and continuing to update the mitigation plan.

1.6.Chapter 7 - Acronyms

A list of acronyms is provided.

1.7.Chapter 8 and 9 - Resources

Two comprehensive resource sections include the sources used in 2007 and 2003.

1.8.Appendices

The final section of the plan includes Appendices that support the Mitigation Plan. The appendices include a list of critical facilities and a list of the project profiles for all of the identified mitigation projects, and the interim 2005 modified list of mitigation projects, updated from the 2003 plan. The Map Appendix C from the 2003 plan has been omitted; all of the pertinent maps and figures now reside in the plan itself.

As a separate product, the geographic information system data, collected as part of this project, is available through the Government of American Samoa in CD-Rom format.

2. Chapter 2 - The Hazard Mitigation Planning Process

2.1.Introduction to Hazard Mitigation Planning in American Samoa

The hazard mitigation planning process in American Samoa has followed the guidance and requirements provided by the Federal Emergency Management Agency of the Department of Homeland Security (Figure 2). The guidance standardizes the overall process but allows flexibility in determining how the planning process would best be adapted to each jurisdiction. In American Samoa, traditional leaders and chiefs retain authority and respect along with the territorial government. Any planning process must respect the Samoan culture or "fa'asamoa" - the Samoan way of life. It is recommended that the fa'asamoa concept be nurtured into the planning framework. Unlike the 50 states, the Territory of American Samoa maintains an unyielding cultural dominion that dates back to some 3,500 years of chieftain hierarchy.

The hazard mitigation planning process for American Samoa will continue to be guided by federal requirements and by the people and government of American Samoa. This chapter describes the planning process for developing the *2007 Revision and Update of the Territory Hazard Mitigation Plan.*

Figure 2 Step 1 – Organize Resources

2.1.1. Methods and Approach

The methods used in the hazard mitigation planning process were drawn from the FEMA's State and Local Mitigation Planning how-to guides. *Getting Started – Building Support for Mitigation Planning* (FEMA 386-1), *Understanding Your Risks – Identifying Hazards and Estimating Losses* (FEMA 386-2), *Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies (*FEMA 386-3), and *Using Benefit-Cost Review in Mitigation Planning* (FEMA 386-5) were the primary references used in mitigation planning.

The American Samoa Hazard Mitigation Strategy chapter (5) addresses the full range of natural hazards threatening American Samoa: climate change, drought, earthquake, flood, hazardous materials, landslides, tropical cyclone (including storm surge), tsunami, and wildfire. The Risk and Vulnerability Assessment in Chapter 3 is the basis for the strategies outlined in Chapter 5.

2.2.FEMA Recommendations from the 2003 Plan Crosswalk

For the 2007 Plan Update, the following FEMA recommendations from the 2003 Plan Crosswalk were considered and incorporated into the updated plan.

2.2.1. FEMA Recommendations: Risk and Vulnerability Assessment Chapter[5]

Identifying hazards: An adequate addressing and analysis of each risk was performed. Risk from earthquake is minimal, yet those facilities on American Samoa judged to be "critical," such as the cannery, hospital, schools and government buildings are on high-risk soils. Chance of earthquake was calculated using acceptable methods, and it was noted that risk is minimal enough to be put down this list in terms of mitigation priority.

"Suggestion for future updates: a note on possibility of wild land fire risk. As this doesn't appear to be a primary risk, it could be a single sentence showing that this possibility was explored."[5]

2.2.2. FEMA Recommendations: Hazard Mitigation Strategy Chapter[5]

Mitigation Measures: Well defined and easy to follow from risk analysis to project descriptions.

"Suggestion: an in-depth profile of how to implement mitigation measures for the tsunami risk, and the relative merit of each method; i.e., installing tsunami detection buoys may be something that is more appropriate for NOAA to undertake, and will be addressed in the future funding for the buoy program under the National Data Buoy Program, National Ocean Service. Perhaps American Samoa, as a first step, should consider the National Weather Service's criteria and certification for a Tsunami Ready Community."[5]

2.3. Development of 2007 Revised and Updated Multi-Hazard Mitigation Plan

Jamie Caplan Consulting assembled an experienced Project Team that facilitated this revised and updated mitigation plan. The Project Team was lead by Jim Buika. Mr. Buika was the Project Leader for the 2003 Plan and has an established working relationship with FEMA and the American Samoa Government (ASG). Mr. Buika directly supervised the on-island Project Liaison, John Goeke. Mr. Goeke lives and works in American Samoa and is familiar with FEMA programs. He used his knowledge and relationships with the ASG to collect updated data and mitigation project information. Mr. Goeke was the Project Team's spokesperson on the island and met regularly with the ASG Project Monitor as well as the Territorial Hazard Mitigation Council members.

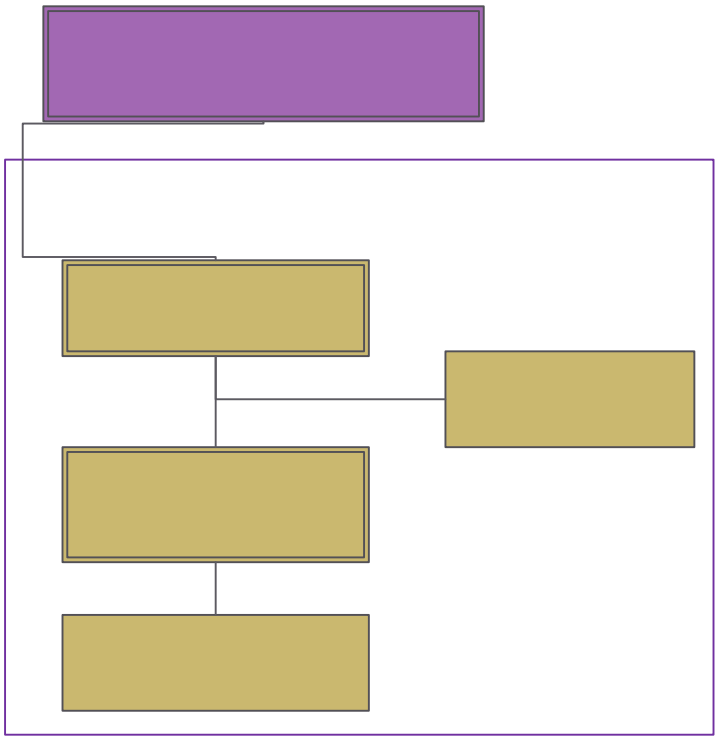


Figure 3 Project Team Organization Chart

[5] 2003 Crosswalk

Jamie Caplan was the Assistant Project Manager. Ms. Caplan has written a number of FEMA-approved, hazard mitigation plans. She collected all of the data and information from the Project Leader, Project Liaison and the GIS Specialist. In addition, Ms. Caplan researched recent hazard information, American Samoa growth and development and recent hazard studies for inclusion in this updated plan. Ms. Caplan documented the revised plan as well as all preliminary reports, PowerPoint presentations and project correspondences. Ms. Caplan directly supervised Mr. Gale Foss, GIS Specialist for the project. Mr. Foss has participated in multiple pre-disaster mitigation plan risk assessments. Mr. Foss analyzed current data and made recommendations for additional data sets to expand the scope and accuracy of the plan.

The consulting team was monitored by Lima Fiatoa, Project Monitor. Ms. Fiatoa works for the ASG and streamlined the information flow from the HMC and the ASG departments to the consulting team. In addition, Ms. Fiatoa facilitated meetings for Mr. Buika and Mr. Goeke with ASG departments, the Territorial Hazard Mitigation Council and other island stakeholders and dignitaries.

The Project Team respects the Samoan culture or "fa'asamoa" and has worked with respect to "fa'asamoa". In addition, the project focused on FEMA requirements for the updated pre-disaster mitigation plan. In this regard, the consulting team was in close contact with FEMA Region 9 and reviewed the November 2006 Multi-hazard Mitigation Planning Blue Book.[6]

2.4.Narrative Description of the Plan Preparation

The hazard mitigation planning process for American Samoa was prepared and organized according to the following Work Plan Tasks, Gap Analysis, Meetings, and Project Priority Deliberations:

2.4.1. Work Plan

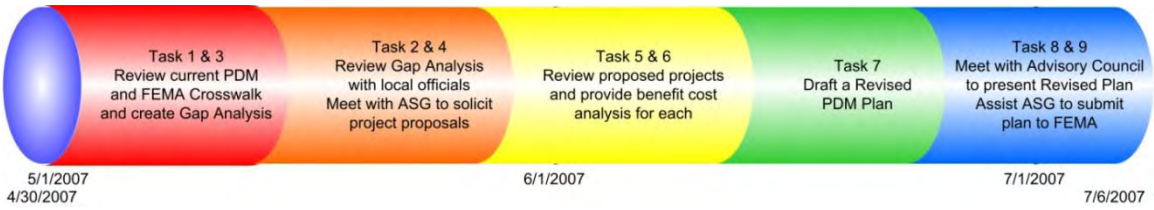


Figure 4 Task Timeline

2.4.1.1. Tasks

- Review the Current Territory Hazard Mitigation Plan (the "Plan") and propose any changes needed to bring it into compliance with current FEMA and all other federal laws and regulations. Review the FEMA "Crosswalk" evaluation of the current Plan and propose changes to comply with the FEMA recommendations.

- Review the Plan with Territorial officials, to include all members of the Territorial Hazard Mitigation Council, in order to make any changes needed to bring the Plan into compliance with

[6] Multi-Hazard Mitigation Plan Blue Book, FEMA, November 2006.

local laws, policies and procedures. Meet with American Samoa Government departments and agencies to explain the Hazard Mitigation Program and to solicit proposals for projects.

- Assist the ASG in reviewing and evaluating proposed projects, including estimating whether any project could comply with FEMA Benefit Cost requirements for funding. Assist the ASG in estimating Benefit Cost numbers for proposed projects.

- Complete a Draft of Revised Plan.

- Meet with the Hazard Mitigation Advisory Council to present the proposed Revised Plan. Assist the ASG in submitting the Revised Plan to FEMA and responding to comments and questions.

2.4.2. Gap Analysis

The Gap Analysis was created by careful review of five primary resources of information for each of the five main plan chapters. The sixth resource, plan layout, was omitted from the final plan. In addition, the plan was re-organized and Chapter 4 Territorial Mitigation Planning and Coordination was combined with Chapter 2. Finally, a Chapter 4 Capability Assessment was created to stand alone; it was previously part of the Mitigation Strategy chapter.

Five resources:

1. FEMA 2003 Crosswalk
2. FEMA Requirements
3. Plan Maintenance Procedures
4. Planning Process
5. Additional Data

Five Main Plan Chapters:

1. Chapter 2 - The Hazard Mitigation Planning Process
2. Chapter 3 - Risk and Vulnerability Assessment
3. Chapter 4 – Capability Assessment
4. Chapter 5 – Hazard Mitigation Strategy
5. Chapter 6 - Plan Maintenance Procedures

The following page, Table 2, is a Gap Analysis Main Points Matrix. This table shows rows for each of the five main chapters of the plan. Reading across each row is plan-update information taken from each of the five resources. Following the matrix is a detailed analysis regarding the information gaps for each of the five main chapters.

Table 2 Gap Analysis Main Points

Gap Analysis Main Points					
Review Criteria → / Plan Chapters ↓	**FEMA 2003 Crosswalk Review**	**FEMA Requirements**	**Plan Maintenance Procedures**	**Planning Process**	**Additional Data**
Hazard Mitigation Planning Process	No FEMA comments	Describe planning process; describe parts of past plan that required an update.	Look at TEMCO annual plan reviews if available	Collect information from the outer islands; meet with HMC and ASG Departments.	Not applicable
Risk and Vulnerability Assessment Chapter	Look at earthquake risk to critical facilities, add wildfire risk.	Describe newly identified hazards; improve hazard descriptions; revise maps; incorporate new studies; update critical facilities.	Not applicable	Run new hazard scenarios based on new data collected.	Improve/add earthquake risk, wildfire, tsunami, global warming and climate change to critical facilities.
Hazard Mitigation Strategy and Capability Assessment	Recommends in depth profile of mitigation measures for tsunami risk.	Reconsider goals & objectives, new and unmet; identify completed, deleted or deferred mitigation activities.	Review HMC and TEMCO mitigation activity reviews.	Basic benefit-cost analysis will be conducted; strategies will include tsunami risk and wildfire risk.	Analyze current strategies and their implementation, collect additional strategies including from outer islands.
		Describe pre & post hazard management policies; programs and capabilities; name changes, update funding capabilities.	Was TEMCO able to review the plan annually, and was the HMC able to review mitigation priorities annually?	Collect updated information and review past project successes and challenges.	New or revised funding and technical capabilities, new or revised Federal and ASG policies.
Hazard Mitigation Planning Process – Was "Territorial Mitigation Planning and Coordination Chapter"	No FEMA comments	Describe obstacles to implementation plan; current and potential funding sources; discuss how effectively the plan was monitored and implemented.	Review the structure of the HMC and the communication between participating stakeholders for effectiveness.	Review with ASG and their departments what makes sense; meet all FEMA requirements.	More efficient implementation plan with support of ASG and key stakeholders.
Plan Maintenance Procedures	No FEMA comments	System to track mitigation actions, info about what challenged past strategies from implementation, and what contributed to success.	Create a Plan Maintenance procedure that includes all lessons learned from 2003 plan and all TEMCO annual reviews.	Review with ASG and their departments what makes sense; meet all FEMA requirements.	Maintenance plan in chart format.

Table 3 Chapter Outline Comparison between 2003 and 2007

2003 Mitigation Plan Chapter Outline	2007 Mitigation Plan Chapter Outline
Chapter 1 Introduction	Chapter 1 Introduction
Chapter 2 The Hazard Mitigation Planning Process	Chapter 2 The Hazard Mitigation Planning Process
Chapter 3 Risk and Vulnerability Assessment	Chapter 3 Risk and Vulnerability Assessment
Chapter 4 Hazard Mitigation Strategy	Chapter 4 Capability Assessment
Chapter 5 Territorial Mitigation Planning and Coordination	Chapter 5 Hazard Mitigation Strategy
Chapter 6 Plan Maintenance Procedures	Chapter 6 Plan Maintenance Procedures

The planning team reviewed each section of the 2003 mitigation plan and made some decisions regarding the content and layout of the 2007 plan. The table above reflects these changes. The 2007 Mitigation Plan Chapter Outline was determined by considering several sources, specifically, the Gap Analysis, FEMA's 2003 Crosswalk recommendations and FEMA's mitigation plan update requirements named in their Blue Book. It was determined that the Capability Assessment should have its own chapter. The Capability Assessment is a key part of the mitigation plan because it clearly describes what the Territorial can reasonably achieve pre and post disaster.

2.4.3. Information Provided by Departments to Update Plan

All Territorial agencies and departments were solicited by the GAR in a formal communications to review the current mitigation plan, to participate in the Plan update, to review the current hazard mitigation project list and to submit additional mitigation projects. All new projects were written up for Council review in a common format in consultation with the Planning Project Engineer, John Goeke.

The key government organizations responsible for mitigation have a seat on the Hazard Mitigation Council. Council members serve for a three-term and meet on an ad-hoc basis, called by the GAR, and have been meeting, at a minimum of two times per year since 2003.

Since most of the hazard mitigation projects in the 2007 Plan update are sponsored by or are the responsibility of Public Works, ASPA and ASTCA, these three organizations have set up a standing working group to coordinate development, funding, and prioritization of each project via this tripartite review arrangement. This agency coordination has been mandated by the GAR, Hazard Mitigation Council, and the Directors of Public Works, ASPA and ASTCA.

The agencies listed in the table below (Table 4) participated in the updated planning process in many ways. They reviewed and contributed to the risk assessment, capability assessment, mitigation strategies and education and preparedness.

Table 4 Agencies Participatingin the Mitigation Planning Process

Agency or Department	Risk Assessessment	Capability Assessessment	Mitigation Strategies	Education and Preparedness
DHS & TEMCO	Evaluation of risk assessment	Council coordination. FEMA point of contact	Develop overall mitigation program and strategies for islands Develop PDM proposals on behalf of AmSam Gov	All hazards training to schools, government, and
ASDRO	Evaluation of risk assessment	Project fiscal management	Manage mitigation strategy project plans	Benefit Cost Analysis expertise and implementation
ASPA	Evaluation of power lifelines, prioritization of powerliine mitigation projects	Experts contribute to project development Director is Council member Developing a Master Mitigation Plan to underground utilities with ASTCA and Public Works Response and recovery capabilities	Powerline and power plant projects submitted to Updated Mitigation Plan	
ASTCA	Evaluation of communications lifelines	Developing a Master Mitigation Plan to underground utilities with ASPA and Public Works Director is a Council member	Communications projects submitted to Updated Mitigation Plan	
Public Works	Responsible for input on Landslide and infrastructure risk	Mitigation identification and mitigation project assessment. Flood control planning and implementation Director is Council Member Developing a Master Mitigation Plan to	Projects submitted to Updated Mitigation Plan	

Agency or Department	Risk Assessment	Capability Assessment	Mitigation Strategies	Education and Preparedness
		underground utilities with ASTCA and ASPA Reviews code compliance for all proposed development projects on island as part of the PNRS.		
Education	Input on schools at risk and update on schools mitigated	Director is Council member	Mitigation of schools to storm surge and flooding	Preparedness programs
Commerce	Coastal Zone Management Program Housing all data bases, managing online land use hazard assessment for project planning, amanging risk assessment and GIS user group	Director is Council member Development and Implementation of the Permit Notification and Review System with Public Works	Coastal zone environmental management	Education programs for public, schools and government.
ASEPA	Hazardous materials data base	Works with Public Works and USEPA on hazardous materials remediation programs	Projects are funded independently	School programs and school remediation
NOAA/NWS	Weather and all hazards warning responsibilities	Implementation of warning system		
FAA	Critical facilities database	Port security, safety and rescue	Mitigation projects are funded independently. Projects have been included in past Mitigation Plan updates but have been eliminated from current project priority list due to	Airport and port security drills.

Agency or Department	Risk Assessessment	Capability Assessessment	Mitigation Strategies	Education and Preparedness
			independent funding source.	
Canneries	Canneries identified in risk database	Work closely with all government agencies during disasters	Drought mitigation projgram	Preparedness Education programs
Procurement Office		Response capability for airport and government	Developed projects to strengthen facilities and to isolate hazardous materials	Response planning for AS government
Development Bank of American Samoa		Bank funding for mitigation and development projects	Developed flood mitigation project	

2.4.4. June 4 – 9, 2007 Meetings with Lead Contractor, James Buika

During June 4-9, 2007, Jim Buika conducted meetings in American Samoa, with the purpose of conducting two Territorial Hazard Mitigation Council meetings, assisting key ASG departments to finalize development of previously submitted hazard mitigation projects, conducting a mitigation project tour, and interviewing department personnel in order to gather information and data required to augment and update the existing plan. Data collection was based on the Plan Update Gap Analysis Matrix. Jim Buika represented the Project Team to facilitate the FEMA required update of the American Samoa Hazard Mitigation Plan.

Picture 1 2007 Territorial Hazard Mitigation Council Meeting

2.4.4.1. June 4, 2007 Meeting with Lt. Governor & Territorial Hazard Mitigation Council Meeting

Prior to the Council meeting, Jim Buika met with the Lt. Governor to brief him on the project and the projects requirements.

The Lt. Governor, as Governor's Authorized Representative (GAR) and Chairman of the Territorial Hazard Mitigation Council (HMC), conducted the meeting. All Council members were present except the Department of Commerce Director.

- Aitofele T. F. Sunia – Lt. Governor – Chairman
- Savali Talavou Ale – Speaker of the House
- Muagututi'a Tuato'o – Senator
- Dr. Claire Poumele – Director, Department of Education
- Aleki Sene – CEO, AS Telecom Authority (ASTCA)
- Taeaotui Punaofo Tilei – Director, Department of Public Works
- Faleseu Eliu Paopao – Director, Department of Commerce
- Nu'utai S. Thompson – Director, Administrative Services
- Andra Samoa – CEO, AS Power Authority
- Staff : AS Disaster Recovery Office (ASDRO), Hazard Mitigation Grant Program

Jim Buika briefed the HMC on programs and plan update requirements. Jim Buika produced and delivered parts of a Handout Packet, including hard copies of the mitigation project list from the 2005 mitigation plan update. This list is Appendix D of this document. Additional mitigation projects were formally submitted for review during an open submittal period in April and May, 2007. The ASDRO staff provided each Council member with hard copies of project descriptions for each of these new projects for review.

As background for understanding project accomplishments in American Samoa through the Hazard Mitigation Grant Program, the Council was briefed on all the existing Hazard Mitigation projects completed since 1990 as well as pending projects to be completed:

- Hurricane Ofa, DR-0855, 1990, three projects, total cost: $3,946,064.
- Hurricane Val, DR-0927, 1991, twenty-two projects, total cost: $13,773,719.
- Severe Flooding, DR- 1477, 2003, one project, total cost: $1,029,000.
- Hurricane Heta, DR-1506, 2004, eight projects, total cost: $1,268,763.
- Hurricane Olaf, DR-1582, 2005, three projects, total cost: $834,676.

Two Pre-disaster Mitigation Grant projects have been approved since the Plan acceptance in 2004 for a total cost of $3,098,317.

These funded projects included a substantial cost share by American Samoa. The total dollar amount for hazard mitigation projects, including Federal and local costs, is nearly $25,000,000, with accomplishments to include major flood control projects, utility underground projects, shoreline protection, and hardening of schools, critical facilities, lifelines, and government buildings.

The current Plan Mitigation Goal, Objectives, and Project Review Criteria were presented to the Council for review and concurrence. These were deemed valid with minor changes that were debated during the June 7, 2007 Council meeting.

Following questions and answers regarding the FEMA programs and the Plan Update requirements, the Chairman requested that all pending projects be reviewed later in the week in front of Council for final prioritization. Key agencies submitting projects were ASPA, ASTCA, and Public Works. Both the Procurement Office and Development Bank of American Samoa also submitted one additional new project proposal per agency. The meeting concluded with a full understanding that each department and agency must fully brief the Council members in order to fully educate them on the project scope, costs, and benefits. The Chairman also asked that each Department internally prioritize each of their projects for funding and completion.

2.4.4.2. June 5 – 6 2007, Project Proposal Development Follow-up Meetings

Picture 2 2007 Project Proposal Presentation

On June 5 and 6, each department continued to fully define the scope for each mitigation project proposal for Hazard Mitigation Council review on June 7. Jim Buika consulted with each department in formal follow-up meetings to discuss each of their project proposals.

At the ASPA meeting, Andra Samoa, CEO, introduced Reno Vivao, COO, and Denman, Engineering Services Division Director. There were a total of 12 engineers in attendance. ASPA agreed to get GIS shape files for some of ASPA utility data. ASPA had revised their project list in Sept 2006 for submission to Council for review.

ASTCA submitted five projects before Mr. Buika met with James Taylor and Dave Alaga. They agreed to give a brief on ASTCA mitigation strategies. These projects are part of a master strategy.

Department of Public Works submitted three stream projects to FEMA for funding under the PDM Grant Program. The DPW is interested in getting Benefit-Cost Analysis training locally from FEMA. Discussions included project scope for the Tualauta Flood Control Project.

2.4.4.3. June 7, 2007 Territorial Hazard Mitigation Council Meeting

The Territorial Hazard Mitigation Council deliberated during a seven-hour project review meeting to prioritize the 25 projects. The Lt. Governor, as Governor's Authorized Representative and Chairman of the Territorial Hazard Mitigation Council, conducted the meeting. All Council members were present except for the Department of Commerce Director.

To open the meeting, the Lt. Governor and Chairman recapped the purpose of the meeting to update the Mitigation Plan by concurring on a priority list of mitigation projects comprised of new and existing projects. The new projects were formally submitted for review and prioritization during an open submittal period in April and May, 2007.

2.4.4.4. Project Review Criteria

The Council members reviewed the Mitigation Goal, Objectives, and Project Review Criteria. The Project Review Criteria are:

- Meets FEMA's Pre-disaster Mitigation Grant Program Eligibility
- Improve Building Codes and Standards
- Improve Land Use Management and Regulation
- Mitigate Chronic Flood Hazards
- Minimize Multiple Known Risks
- Provide Environmental and Cultural Benefits
- Meets internal department prioritization of projects

Considering the number of critical mitigation projects being reviewed and prioritized, the Building Code Objective and Criteria language was discussed and deemed unnecessary to continue inclusion by the Chairman and the Public Works Director. The Plan Update will reflect this change.

To begin the project review process, the Council was briefed by TEMCO and TOFR representatives on the status of completed projects as well as projects for which available funding has been committed by ASG. These committed projects are still under some level of technical or administrative review, principally by the Federal Emergency Management Agency. Copies of the current Hazard Mitigation Project Status Worksheets were also delivered to Council members by ASDRO.

Next, the current list of 44 projects from the 2005 update plan listed in Appendix D was reviewed in detail to determine which projects have already been funded and which projects have been deleted and or eliminated. Several airport-related projects were eliminated from the list due to funding jurisdiction by FAA. Three additional DPW projects were eliminated: Center for Disaster Information, MNO Building Facility Upgrade, and Road marking and striping. One project, the Afono School Flood Management Project was tabled pending ASDRO's follow up with FEMA to understand its funding status under the Hurricane Heta HMGP.

For approximately four hours, technical representatives from five departments and offices presented detailed mitigation strategies and accompanying hazard mitigation projects. All questions from the Council members were answered satisfactorily. The benefit to the extensive project review process and question and answer period was that each Council member was fully educated about each project and, therefore, able to make decisions about each project's priority ranking within the Project Review Criteria guidelines.

2.4.4.5. Project Priority Deliberations

Following the technical project presentations, the Council dismissed the technical teams and deliberated for one hour to prioritize the 27 projects presented. Each Department also submitted prioritized project lists to help guide Mitigation Council decisions. Two projects were combined between ASPA and ASTCA regarding underground utility projects. Thus, a total of 25 projects are presented in Table 5 below. Following the table is Map 1 illustrating the location of each project.

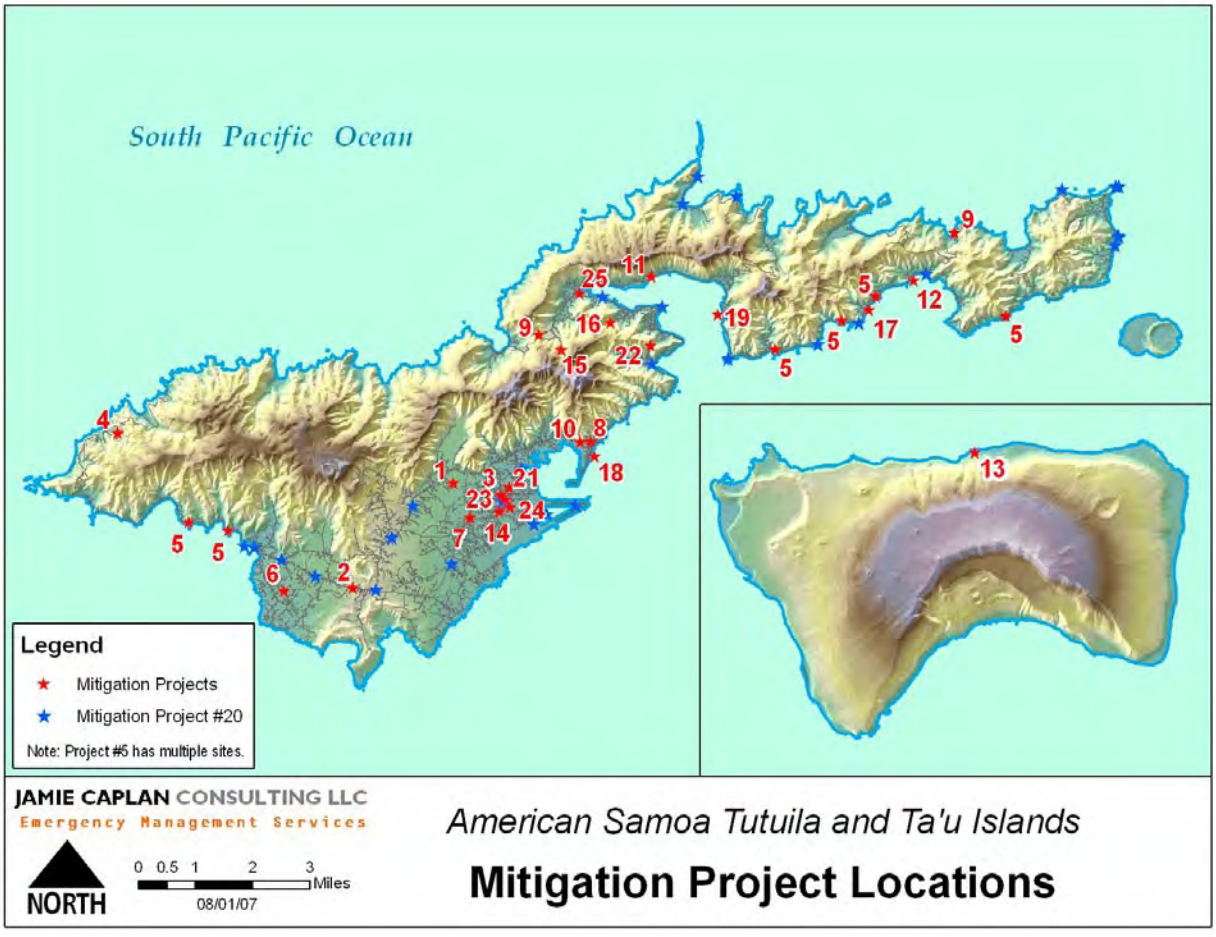
Table 5 Mitigation Projects in Priority Order

No.	PROJECT TITLE	PROJECT OBJECTIVE	AGENCY	ESTIMATED COST
1	Tualauta County Flood Mitigation	To mitigate the spread of stream runoff as well as the natural runoff of the land within the watershed of Tualauta County, by means of improving and defining a natural waterway that runs from the village of Pava'ia'l to Nuu'uli. To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. Currently, Route 001 (main road), Route 014 (airport road), Route 019 (Fagaima road) undergo heavy flooding during periods of heavy rain, due to blockage or the nonexistence of an outlet. This project will minimize this flooding problem currently experienced within the district, as well as be a means for the protection and safety of residents within the area and more so for the general public.	DPW	$3,000,000.00
2	Futiga Road Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and traffic accidents.	ASTCA	$2,457,044.00
3	Tafuna Powerplant Wall Upgrading	To prevent or minimize the disruption of power in the event of a cyclone or tropical storm. The proposed project will harden the distribution system against damage from cyclones or storms and reduce the failure rate of feeders 5,6,7,9 and the tie line.	ASPA	$155,000.00
4	Underground Poloa - Fagamalo	To install underground power lines to lessen chances of having long hours waiting power restoration. To help maintain reliability of available electrical sources to and within ASG and Public Facilities when disaster strikes. Some of the ASG and Public facilities that will be used as shelters will rely mostly on the availability of power to accommodate any immediate needs. This project will also improve location of existing overhead lines which are set far away from equipment access.	ASPA	$864,500.00
5	Rockfall Mitigation 6-sites	To minimize the danger of approaching traffic due to rockfalls on the following sites.	DPW	$700,000.00
6	Leone Underground	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes,	ASTCA	$1,188,309.81

No.	PROJECT TITLE	PROJECT OBJECTIVE	AGENCY	ESTIMATED COST
	Mitigation Project	tropical cyclones, other windstorms and traffic accidents.		
7	Underground from Cost-U-Less	Objective is to underground existing overhead power lines to all the above mentioned critical facilities. This new proposed underground project will maintain adequate and reliable electrical supply to private business in the area, private schools, the water well field, which supplied water to LBJ medical and part of eastern side of the village as well as to the canneries.	ASPA	$1,375,000.00
8	Tago Stream	Mitigation to prevent the spread of stream runoff towards the residential and commercial settlement and ponds on low spots within the area. The proposed project is also to prevent future encroachments due to developments by redefining/structurally hardening the stream bankline.	DPW	$500,000.00
9	Permanent Landslides Mitigation Project	To minimize the effect and damage of landslide during rainy days and to avoid closure of Route 11: Masausi Road. This road is an access from the Village of Masausi and Village of Sailele to Fagaitua and to other important government facilities like the hospital and other parts of the island.	DPW	$750,000.00
10	Underground Nuuuli - Malaeimi/Atuu-Laulii	To make existing overhead power lines underground power lines that will provide secure, reliable and maintainable power supply to ASPA Water Wells and ASPA Water Booster Stations	ASPA/ASTCA	$2,591,326.36
11	Atu'u to Breaker's Point Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and will offer protection from vehicle accidents.	ASTCA	$1,644,622.86
12	Fagaitua Seawall	Construction of seawalls along the road network.	DPW	$400,000.00
13	Ta'u to Fitiuta Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and protection from vehicle accidents.	ASTCA	$772,177.00
14	Tafuna Power Plant Switch	To prevent or minimize the disruption of power in the event of a cyclone or tropical storm. The proposed project will harden the distribution system against damage from cyclones or storms and reduce the failure rate of feeders 5,6,7,9 and the tie line.	ASPA	$155,000.00
15	Utumoa	To protect the reinforced concrete spring intake structure from bounders and mud due to landslide	ASPA	$250,000.00

No.	PROJECT TITLE	PROJECT OBJECTIVE	AGENCY	ESTIMATED COST
		and high flood waters. To prevent damage to the raw water screen house due to erosion of the river bank during high flow.		
16	Fagatogo Reservoir	Construction of seawalls along the road network.	ASPA	$300,000.00
17	Auto Road Seawall	Construction of seawalls along the road network.	DPW	$1,000,000.00
18	Nuuuli Seawall	Construction of seawalls along the road network.	DPW	$1,000,000.00
19	Aua Seawall	Construction of seawalls along the road network.	DPW	$1,000,000.00
20	Enhancement of American Samoa Vertical Control	Field surveys of the islands. Checking vertical controls.	DPW	$100,000.00
21	Relocation of Government Gas Station in Tafuna	Construction of concrete platform, security fence, shelter and storage house. Installation of security alarms.	DPW	$200,000.00
22	Alternate Road Routing	FS/Design preparation for hospital alternate route.	DPW	$3,000,000.00
23	Evacuation Shelters	Design and construction of shelters. Construction of access roads.	DPW	$2,000,000.00
24	Hazardous Materials Warehouse	A separate facility built to specifications for the purpose of chemical storage that will guarantee safe storage of hazardous materials is required. A relocation of all hazardous materials to its own facility is highly desirable	OP	$85,000.00
25	Stream Retaining Wall	The project proposes to make flood mitigation improvements along 200 feet of stream that borders the bank building	DBAS	$75,000.00
Additional Projects				
	Afono Culvert Improvement	Mitigation to prevent Afono Elementary School from flooding during heavy downpour due to over flow from the stream on the lower bankline adjacent to the school and the insufficient capacity of the existing culvert to convey this stream runoff towards the shore.	DPW	$250,000.00
	Airport Aviation Fuel Farm Relocation	To relocate the existing Aviation Fuel Farm and associated pipelines to new proposed site. This is to ensure that the public and airport users are safe from the high hazard that the existing Fuel Farm location poses when cyclones or natural disasters occur.	DPA	$6,500,000.00
	Airport Runway Shoreline	To protect the runways, security perimeter fence and road from the strong waves, flooding and	DPA	$3,175,000.00

No.	PROJECT TITLE	PROJECT OBJECTIVE	AGENCY	ESTIMATED COST
	Protection	erosion occurring along the Airport Shoreline. Allow the Runways and Airport to remain operational, safe and secure after cyclones and storms. This will allow urgent aid and help to arrive by air.		
	Pago Pago International Airport Terminal Roof Rehabilitation	To protect and secure the Pago Pago International Airport Terminal and all operations that it houses at all times during a cyclone or natural disaster so that airport will be operational at all times after a major disaster. Protecting and securing the airport terminal with the construction of a stronger and more secure roof will help allow the airport administration and operations are operational during and after a cyclone.	DPA	$2,000,000.00
				$34,303,480.03



Map 1 Locations of Mitigation Projects numbered in Table 1

2.4.4.6. June 9, ASPA Follow up meeting

ASPA, ASTCA, and ASDRO met on June 8, following the HMC meeting to determine which projects they could work on together in order to boost the Benefit-Cost Review. These three departments will work closely together now to achieve project efficiencies.

ASPA would like to add documentation and repair cost documentation to the ASTCA Underground project submission to PDM in February 2008.

2.4.4.7. Final Steps for Plan Completion

The final steps for Plan completion were discussed by the Chairman. The consulting team will deliver the updated Plan draft to ASDRO and TEMCO for distribution to each of the Council members for review and comment. They will be given two weeks to comment. This will be the final comment and review period before a final Plan revision will be completed for submission to FEMA by the Lt. Governor.

2.4.4.8. Individual Agency Interviews

Jim Buika conducted capability assessment and hazard assessment interviews with the following agencies on the respective dates:

- June 6, Interview with Faamao Asalele, American Samoa Environmental Protection Agency
- June 7, Interview with Akapo Akapo, Warning Meteorologist, NOAA Weather Station
- June 8, Interview with Paul Anderson, Dept. of Commerce, GIS
- June 9, ASPA Follow up meeting on project formulation

The results of these interviews are detailed in Chapter 4, Capability Assessment.

2.4.4.9. History of Territorial Hazard Mitigation Council Meetings & Yearly Plan Update

Following the completion and acceptance of the Hazard Mitigation Plan by FEMA in May 2004, the Territorial Hazard Mitigation Council met a total of seven times in 2004. Lt. Governor Sunia, Chairman of the Council, chaired every meeting. Council meetings were conducted on the following dates:

June 2, Sept 7, Sept 15, and Sept 22, 2004 to make decisions on projects to nominate and complete for the FEMA Pre-disaster Mitigation Grant Program.

December 8, 14, and 20, 2004 to finalize and submit the Pre-disaster Mitigation Grant Program applications and to review the projects and accept the existing project list. For these meetings, agencies developed and added new projects for inclusion and prioritization in the Plan. Departments were given the responsibility for completing their projects on line through the Grants Program, for TEMCO review. Each department was issued passwords to add projects to the egrants application web site. These meetings also provided the Council with education and explained the status of the Hazard Mitigation Grant Program projects.

Each year, following the 2004 initial application period for Pre-disaster Mitigation Grant Program, the departments completed projects that were selected by the Mitigation Council for submission to meet

early January and February FEMA application deadlines. Mitigation Council meetings were conducted on the following dates in 2005 and 2006:

- April 14, 2005
- September 14 and October 10, 2006

At the September 14, 2006 Council meeting new Council members were selected for the Council and introduced and briefed on mitigation programs and their roles and responsibilities. This membership represents the current Council members. The Council met again on October 10, 2006 to review projects. Council members are elected to a two-year term.

2.5.Development of 2003 Multi-Hazard Mitigation Plan

Below is a summary of the 2003 Hazard Mitigation Planning Process to develop the 2003 Multi-Hazard Mitigation Plan:

The Lieutenant Governor convened the American Samoa Territorial Hazard Mitigation Council with support from the Territorial Emergency Management Coordinating Office (TEMCO).

TEMCO contracted a consulting team from the Pacific Disaster Center/East-West Center and PPG Consulting to conduct the Risk and Vulnerability Assessment and facilitate the planning process. In this section, this team is subsequently referred to as the Project Team.

The Mitigation Council agreed on 1) the general goals and objectives for the Mitigation Plan; 2) an approach to the planning process; and 3) the formation of subcommittees to address building codes and standards; land use management and regulations; infrastructure standards; flood issues; and data needs and analysis.

The Project Team worked with American Samoa Government Agencies and the Geographic Information Systems User Group to compile digital maps and other data and conducted a risk and vulnerability assessment.

Results of the Risk and Vulnerability Assessment, including maps, were presented to the Mitigation Council and the general public and input was solicited on the Risk and Vulnerability Assessment and mitigation options.

Council subcommittees met to assess the adequacy of 1) building codes and standards, 2) the Project Notification and Review System and other land use planning and management initiatives, and 3) infrastructure standards and the *American Samoa Flood Mitigation Plan*.

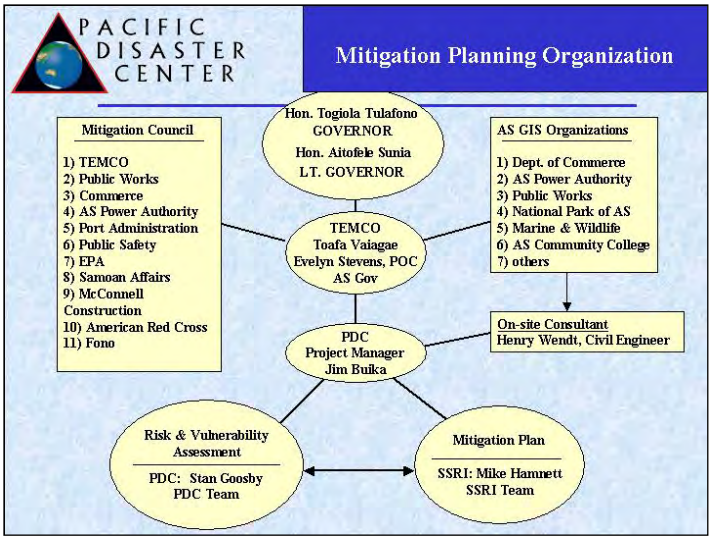


Figure 5 2003 Mitigation Planning Organization

TEMCO issued a request for proposals for hazard mitigation projects to be included in the plan, and a fifth subcommittee was appointed to screen projects proposed by American Samoan Government agencies for inclusion in the plan.

The Mitigation Council met to review the recommendations of the subcommittees, consider and adopt recommendations of the subcommittees, and make final decisions on the mitigation projects to be included in the plan.

An Executive Order was drafted to appoint the American Samoa Territorial Hazard Mitigation Council as the standing body to coordinate mitigation planning and implementation, as well as formally adopt the plan.

The 2003 Mitigation Planning Organization Chart is presented in Figure 5.

2.6.Territorial Emergency Management Coordinating Office (TEMCO)

As stated in the Executive Order adopting the 2003 *American Samoa Hazard Mitigation Plan*, the Territorial Emergency Management Coordinating Office (TEMCO), through the approval of the American Samoa Territorial Hazard Mitigation Council, has been responsible for administering the funds and facilitating the implementation of the mitigation projects identified and supported by the Pre-Disaster Mitigation (PDM) Grant Program, Hazard Mitigation Grant Program (HMGP), Public Assistance (PA) Program, Flood Mitigation Assistance (FMA), Repetitive Flood Claims (RFC), and Severe Repetitive Loss (SRL) as approved by FEMA. TEMCO has also been responsible for coordinating all mitigation activities through the authority of the American Samoa Territorial Hazard Mitigation Council.

2.7.American Samoa Disaster Recovery Office (ASDRO)

In 2007, the American Samoa Disaster Recovery Office, under the Territorial Office of Fiscal Reform managed the Hazard Mitigation Plan development and above grant programs for TEMCO. The TEMCO organization is currently under reorganization by the Territorial Fono legislative body. Since October 1, 2007 TEMCO has been involved in the Hazard Mitigation Plan development.

2.8.Duties and Responsibilities of the Territory Hazard Mitigation Officer

The Territory Hazard Mitigation Officer (SHMO) is the official representative of the Territorial government and the primary point of contact with FEMA, other Federal agencies, and local governments in mitigation planning and implementation of mitigation programs and activities required under the Stafford Act.

The SHMO is the person with primary responsibility for the American Samoa Hazard Mitigation Plan. The SHMO reports to the Governor's Authorized Representative (GAR), who is the chairman of the American Samoa Territorial Hazard Mitigation Council. The SHMO shall report to the HMC on the maintenance activities of the Plan.

2.9.The American Samoa Territorial Hazard Mitigation Council

The American Samoa Territorial Hazard Mitigation Council, appointed by the Governor, will insure that building codes and standards and land use regulation are adequate to mitigate the risk to life and property from tropical cyclones, floods, tsunamis, landslides, droughts, and other natural hazards. The

Council will identify and prioritize hazard mitigation projects and oversee the implementation of the American Samoa Hazard Mitigation Plan and subsequent plans adopted by the Council.

2.10. Composition of the American Samoa Territorial Hazard Mitigation Council in 2003

As stated in the 2003 Executive Order, the American Samoa Territorial Hazard Mitigation Council consists of the following:

- Lieutenant Governor/GAR
- Member of the Legislature/House
- Member of the Legislature/Senate
- Secretary of Samoan Affairs
- Director of the Department of Commerce
- Director of the Department of Port Administration
- Director of the Department of Public Works
- Director of the American Samoa Power Authority

2.10.1. Responsibilities of the Territorial Hazard Mitigation Council in 2003

The agencies and organization represented on the Council were responsible for all relevant planning, regulatory, and disaster management functions in the Territory of American Samoa, as summarized in the Territorial Capability Assessment. The Council may invite representatives of other agencies and organizations to the meetings to contribute to the mitigation risks of the hazards in American Samoa.

The American Samoa Territorial Hazard Mitigation Council will:

Assist the Governor's Office and the Government of American Samoa in identifying hazard mitigation issues and opportunities facing the Territory of American Samoa for the purpose of developing a comprehensive hazard mitigation strategy.

Prepare strategies, policies, and reports on hazard mitigation issues, including hazard mitigation policy recommendations to the Governor, the Fono, and key territorial agencies involved in mitigation related areas within their normal agency missions.

Ensure that territorial agencies collaborate and cooperate fully to develop and execute sustainable hazard mitigation actions that will reduce the risks posed by all hazards to the Territory.

Coordinate with and support territorial agencies' efforts in obtaining and administering federal and other grants, including post-disaster mitigation grants available pursuant to the *Robert T. Stafford Disaster Relief and Emergency Assistance Act*, for the purposes of promoting hazard mitigation opportunities within the Territory.

The Council identified and prioritized mitigation activities, on an annual basis, for funding under the Pre-Disaster Mitigation Program, Hazard Mitigation Grant Program, Flood Mitigation Assistance, Public Assistance, Repetitive Flood Claims, Severe Repetitive Loss, and other mitigation funds that become available. The Council will also encourage and support the solicitation of grant support through other Territorial agencies for hazard mitigation activities.

2.10.1.1. Memorandum of Understanding

Members of the Territorial Hazard Mitigation Council signed a Memorandum of Understanding, agreeing to participate in the risk and vulnerability assessment, to share and provide information for the risk and vulnerability assessment, and participate in the hazard mitigation planning process.

2.11. Land Use Planning, Management and Regulation, and Flood Plain Management

The Department of Commerce, under its statutory responsibility, will be responsible for insuring that changes in the planning and land use management systems adopted as part of this plan are implemented. These changes should be coordinated through the HMC. The Project Review and Notification System will continue to serve as the primary means for insuring that future development does not increase the vulnerability of American Samoa to natural disasters.

The Department of Commerce will also be the lead agency for insuring that the *American Samoa Flood Hazard Mitigation Plan* adopted as part of this Plan is implemented. These efforts will be coordinated through the Hazard Mitigation Council.

2.12. Coordination among Federal and Territorial Agencies

2.12.1. How All Interested Organizations Participated in 2003

TEMCO entered into an Agreement with a team from the Pacific Disaster Center/East West Center (PDC/EWC) in collaboration with the University of Hawaii Social Science Research Institute (SSRI) and a local engineering and consulting firm to conduct a Risk and Vulnerability Assessment and facilitate the hazard mitigation planning process. The scope of services specified the development a geographic information system (GIS)-based Risk and Vulnerability Assessment that includes: GIS layers of critical facilities; infrastructure; economically important assets; and existing hazard information for mapping floods, coastal inundation due to tsunamis and tropical cyclones, landslides, and other hazards. The scope required assessing the history of past disasters and potential impacts of future disasters on American Samoa. The Risk and Vulnerability Assessment was explicitly designed to meet FEMA requirements for this Plan.

The PDC/EWC and SSRI scope of services included facilitation of the planning process described in this Plan. This entailed working closely with TEMCO, whose staff organized and scheduled all Council meetings and subcommittee meetings, compiled information on past and current hazard mitigation activities, and drafted elements of this plan based on the deliberations of the HMC. The TEMCO PDM staff is responsible for coordination of activities to comply with FEMA regulations in documenting the planning process. An organizational chart of the mitigation planning effort is included.

The Territorial Hazard Mitigation Council and its five subcommittees served as the primary mechanisms for coordination among the agencies during the development of the plan. The Council included the directors of all relevant agencies and private sector representation, as well. The subcommittees allowed broader participation in the planning process by including additional staff from government agencies

represented on the HMC and involvement of people from private sector businesses, non-profit organizations, and the general public.

Coordination existed among agencies in less formal aspects of the planning process. The GIS Users Group accumulated and processed data for the Risk and Vulnerability Assessment. Staff from the DPW and the DOC assisted greatly in documenting past and current mitigation activities and in identifying mitigation initiatives for building codes and standards, as well as land use management and regulation. Agencies throughout the American Samoa Government also contributed to the development of the *American Samoa Flood Mitigation Plan* that has been incorporated into this Plan.

The HMC meeting on April 23 and the Subcommittee meetings on April 23 and 24, 2003 provided further opportunity for agency coordination, as well as for public participation in the planning process. Newspaper articles, radio, and television coverage publicized the mitigation planning process to the people of American Samoa and invited participation.

In addition, TEMCO and the DPW outlined the schedule for ensuring the full proposal development for submission by the October 6, 2003 deadline for the PDM Grant Program. The engineering analysis and the cost-benefit analysis still needed to be conducted. The four priority projects are under development, and are supported by this hazard mitigation planning effort.

2.12.2. How Coordination with Federal and Territorial Agencies Changed Since 2003

Financially, the Hazard Mitigation Grant Program has been managed by the American Samoa Disaster Recovery Office, under the Territorial Office of Financial Reform for all disasters since the enactment of the Hazard Mitigation Program in 1998 with the Robert T. Stafford Disaster Relief Act. This includes five Presidentially-declared disasters. The Pre-disaster Mitigation Grant Program is managed by TEMCO.

The Hazard Mitigation Grant Program is under good management, has successfully completed all mitigation projects funded for Hurricane Ofa, 1990 and Hurricane Val, 1991. All HMGP projects funded under the Flood DR-1473, Hurricane Heta DR-1508 and Hurricane Olaf DR-1578 are completed or funded and on track for completion in 2008.

The Pre-disaster Mitigation Grant Program continues to be managed by TEMCO and has completed one of two funded projects successfully. The completed project is the Fagaalu Flood Control Project to protect the LBJ Hospital from repetitive flooding. The second project, the Pago Pago Flood Control Project has completed an Environmental Assessment with a Finding of No Significant Impact and is finalizing the Deparrtment of Army Permit requirement, with an open public comment period ending June 9, 2007. After obtaining the Department of Army Permit, the project will go through the American Samoa Permit Notification and Review Process to obtain the proper land-use permit to proceed with the project. The project should begin in 2007.

ASG, Public Works, ASPA and ASTCA have been able to meet the financial match requirements for all mitigation projects funded to date.

As noted in Pacific Magazine, "Gov. Togiola T.A. Tulafono has established a local Department of Homeland Security in response to concerns voiced by the U.S. Department of Homeland over federal funding to American Samoa.

In an executive order dated Feb. 6 [2007] … the governor said the new department will consolidate four government offices: Territorial Office of Homeland Security (TOHS), Territorial Emergency Management Coordinating Office (TEMCO), Office of Vital Statistics and the Office of Territorial and International Criminal Intelligence and Drug Enforcement (OTICIDE).

In response to concerns that have been outlined by the Federal government, especially in regards to Homeland Security, he stated 'I have consolidated the four offices and these four agencies will become the Department of Homeland Security,'

Tulafono said he has appointed OTICIDE's executive director, Michael Sala as the interim acting director for the new department.

The department's functions include coordinating, consolidating, and collaborating the efforts of its component agencies into a cogent whole that supports the overall purposes of all-hazard preparedness, response, detection, deterrence, prevention and enforcement."[7]

In Samoa News, it was reported, "As of January 12, 2007, the U. S. Department of Homeland Security placed a freeze on funds to the territory after a draft report by DHS's office of Inspector General raised questions about $1.7 million in costs expended and claimed against grants as of Dec. 31, 2004, from an examination of $2.3 million in costs."[8]

2.13. Integrating with Other Territorial Planning Efforts

American Samoa has ensured integration of the *American Samoa Hazard Mitigation Plan* with other planning efforts through participation of the HMC, director and staff of the Territorial Emergency Management Coordinating Office with the Department of Commerce, the Office of Historic Preservation, the Department of Port Administration, the Department of Public Works, the American Samoa Environmental Protection Agency, the American Samoa Power Authority, the involvement of the Lieutenant Governor and the Speaker of the Fono, the Secretary of Samoan Affairs, and Commissioner of Public Safety. The individuals, agencies, and organizations represented on the HMC and subcommittees are responsible for the major planning functions within the American Samoa Government.

The Project Notification and Review System have insured on-going integration of new projects with existing territorial plans and regulations. The HMC's endorsement of land-use management improvements proposed by the DOC and the adoption of the *American Samoa Flood Mitigation Plan* provided additional integration with planning activities in the Territory.

[7] http://www.pacificmagazine.net/news/2007/02/09/american-samoa-establishes-local-department-of-homeland-security

[8] *Samoa News*, June 4, Fili Sagapolutele, Samoa News Correspondent

The Flood Mitigation Assistance Plan has been integrated into the HMP. HMC has identified the Tualauta Flood Control project as Territory's number one priority and is the top mitigation project identified in the plan. Other flood mitigation projects from the Flood Mitigation Assistance Plan have been prioritized into the Hazard Mitigation Plan 2007 update.

The Capitol Improvement Plans for Department of Public Works, American Samoa Power Authority and the American Samoa Telecommunications Authority are being coordinated with the HMP through TEMCO by providing matching funds to the HMP prioritized mitigation projects. Each of these Department Directors is on the Hazard Mitigation Council. Each of these Departmental technical engineers provides the input to HMP strategic planning. Through the GAR, all three key agencies are coordinating with each others' strategic development plans in meetings to ensure full coordination of utility mitigation and improvements for the Territory. Since undergrounding of utilities has been identified as a priority and effective mitigation strategy in the HMP, all undergrounding is being coordinated to ensure that these utility rights of way are being excavated and accessed only one time to improve, water, sewer, communications, and power, to improve the benefits and minimize the costs.

Other Mitigation Programs are monitored by TEMCO and the Hazard Mitigation Council. These mitigation programs are sponsored by the Federal Highway Administration, Environmental Protection Agency, and the Federal Aviation Administration. These Federal programs provide funds to mitigate coastal road hazards, hazardous materials abatement, and jet fuel tank farm relocation projects that have been identified as priority mitigation projects in the past by the Hazard Mitigation Council, 2003-2007.

2.14. Integrating with FEMA Mitigation Programs and Initiatives

TEMCO has worked with the Territorial Hazard Mitigation Council to submit additional PDM projects to FEMA in 2005, 2006, and 2007. The Territorial Hazard Mitigation Council represents the key Territorial agencies responsible for mitigation planning and programs in American Samoa. PDM Projects were not funded by FEMA in 2005 and 2006 due to insufficient documentation and or benefit-cost ratios that were not competitive nationally. Some of the rejected projects were underground utility projects submitted by ASTCA. As a result of the Mitigation Plan update process, ASTCA will work closely with ASPA and Public Works to submit the most efficient projects in order to increase the benefits and reduce the costs.

2.15. 2007 Hazard Mitigation Goals and Objectives

The **Goal** of the 2007 *Updated and Revised American Samoa Multi-Hazard Mitigation Plan,* endorsed by the Territorial Hazard Mitigation Council, is to:

Reduce the risks of all identified hazards to the Territory, thus alleviating loss of life and property from drought, earthquake, flood, global warming and climate change, landslide, tropical cyclone (including storm surge and high winds), tsunami and wildfire and insure the overall well being of the people of American Samoa.

The **Objectives** of the Plan are to:

- **Promote effective land use planning** and regulation and public awareness to reduce damage from hurricanes, floods, storm waves and storm surge, landslides, tsunamis, and droughts.
- **Improve infrastructure development standards** with special attention to mitigating the increasing flood hazard.
- **Develop and implement hazard mitigation projects** aimed at reducing the risk of damage and destruction of existing assets and infrastructure from the full range of natural disasters threatening the territory.

2.16. Comparison of the Planning Process in 2003 and 2007

The 2003 planning process was an inclusive process that engaged the proper cross section of American Samoa government and private industry representatives focused on understanding risks and identifying critical infrastructure most vulnerable to high risks – namely, flooding, winds and coastal hazards -- common to American Samoa. To coordinate over 100 planning participants, and their input from other island plans, four focus groups were formed to manage record and prioritize input on risk to known hazards. These hazards were the early 1990s hurricanes and 2003 flooding and landslide events. From this hazard experience and common understanding of infrastructure, planners and project managers representing key agencies identified critical vulnerabilities in the first GIS risk maps developed for the islands as part of the mitigation planning process. A total of four full months by several GIS analysts and many scientists, engineers, and local personnel were required to compose the preliminary GIS risk maps. The GIS risk maps inventoried both the hazards and risks. From earlier experience, American Samoa, with FEMA, established the long-standing American Samoa Disaster Recovery Office to financially manage FEMA HMGP project funds throughout the lifetime of project management. This standing experienced fiscal and management capacity, combined with the FEMA-guided mitigation planning process, established a consensus mitigation project prioritization. To compliment the data collection and public planning process, the Hazard Mitigation Council members were appointed to include public and private decision makers that witnessed and led the entire planning process, under the Governor's direction and leadership. The outcome of the 2003 planning has been to prioritize and fund, between 2003 and 2007, the 18 highest-priority mitigation projects identified in the 2003 Mitigation Plan, to include school and utility mitigation. To accomplish these eighteen projects, key agency expert personnel and Mitigation Council oversight have been continuously involved in the planning and

implementation process. Beyond the top 18 mitigation projects, the Council members and planning participants identified more than 30 additional projects for future funding in the 2003 Mitigation Plan.

Following the development of the 2003 Mitigation Plan, which included the landmark risk assessment, GIS maps, and project identification effort developed by over 100 participants in 2003, the planning process matured on a quarterly, semi-annual, and annual basis through review of existing projects and identification of new projects.

The 2007 Plan Update included a complete update of infrastructure and risk data collected and collated by a full-time, local engineer soliciting input from the Hazard Mitigation Council membership and representative agencies to include power, communications, and public works. The infrastructure inventory includes new structures, utilities, and roads layers and consideration of additional hazards. At the same time, the Governor's Authorized Representative reissued a solicitation for new and additional priority mitigation projects to be considered and prioritized by the Hazard Mitigation Council. This public and government participation process was chosen over the broader general public project participation because of the mature nature of the process through selection and implementation of 18 projects over the past three years. These new projects then were fully described by agency engineers via consultant training for ASPA, ASTCA, and Public Works in agency workshops conducted in June 2007. Each of the new project proposals was then presented collectively to the GAR, Council, and all agency representatives in a day-long session in June, 2007 and considered by the full Hazard Mitigation Council. The Council requested that each agency internally prioritize the competing project priorities as a means to further rank projects for future funding. This process was fully transparent and in full agreement by the GAR, Hazard Mitigation Council, and agency directors and technical personnel who presented the projects. The preparation and presentation process provided every project a full vetting and allowed the Council members to ask questions to fully understand each project. Thus, the 2007 planning process represented a much more mature and thorough understanding and selection of projects based on full project knowledge by Council members judged against mitigation goals, objectives, and the risk assessment. For example, the decision to spend mitigation resources on the Tualauta Flood Mitigation Project reach unanimous consensus amongst all Council members, agency directors, and technical representatives.

For the next three years, leading to plan revisions in 2010, American Samoa should hold yearly mitigation program meetings with selected village mayors and representatives from the outer Manua Islands as part of ongoing TEMCO and DHS preparedness efforts. These islands are separated from Tutuila and thus, are naturally limited in resources and at greater risk. Tutuila has mitigated public infrastructure through the HMGP that represents the highest cost to benefit ratio. The Council should now begin to further reach out to the economic sector to include potential at risk businesses, to include the two major cannery operations and harbor businesses. The Council should consider adding one to two additional private sector members to further understand and mitigate businesses at risk.

3. Chapter 3 – Risk and Vulnerability Assessment

Assessing risks is the second step in the four step mitigation plan process (Figure 6). The risk assessment step has four parts: identify hazards, profile hazard events, inventory assets and estimate losses. Conducting a risk assessment is a way of asking and answering "what if…" questions. For instance, what if the Territory receives several days of heavy rain?

Figure 6 Step 2 – Assess Risks

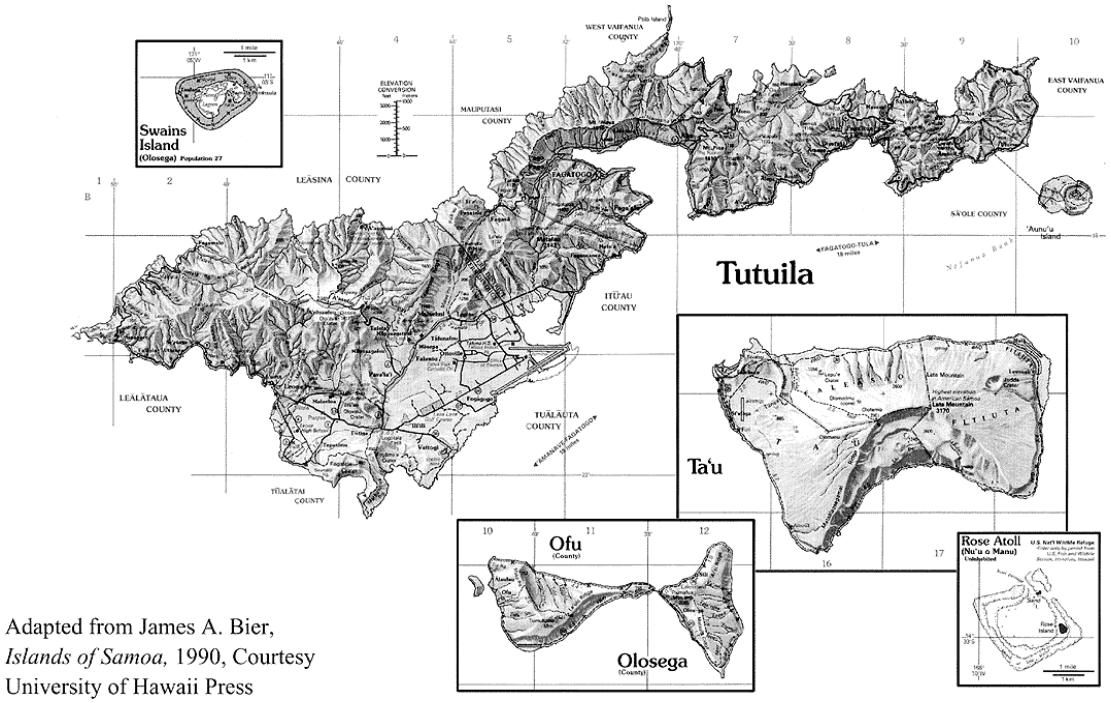
The risk assessment answers questions regarding history, probability and impact. These answers are then used in the third step of mitigation planning, developing a mitigation plan. They provide essential data to determine mitigation strategies and to define specific prioritized mitigation projects.

3.1. Introduction

The development of a comprehensive natural hazard risk and vulnerability assessment is necessary to gain an understanding of the risks of natural disasters to the people of American Samoa. The Project Team, in collaboration with ASG representatives, examined the vulnerability of critical infrastructure to various natural hazards. The Assessment provides a compilation of information and available data sets to American Samoa government officials for comprehensive planning purposes to save lives and reduce property losses in future disasters.

The risk assessment is formatted to meet the Federal Emergency Management Agency's Multi-Hazard Mitigation Planning Blue Book guidelines. FEMA requires American Samoa to profile each hazard event, to assess vulnerability and estimate potential losses by jurisdiction, and to assess vulnerability and estimate potential losses to critical facilities.

Using data compiled on historical natural hazard events between 1960 and 2007, the risk assessment discusses eight natural hazards: climate change, drought, earthquake, flood, landslide, tropical cyclones, tsunamis and wildfire and one man-made hazard, hazardous materials. Storm surge is treated as an associated hazard to tropical cyclones. In many cases, historical data is sparse, and in some cases conflicts in detail.



Adapted from James A. Bier, *Islands of Samoa,* 1990, Courtesy University of Hawaii Press

Figure 7 the Territory of American Samoa

3.2.General Information

A U.S. Territory since 1900, American Samoa is located in the central South Pacific Ocean, 2,300 miles south-southwest of Hawaii and 1,600 miles east-northeast of New Zealand. With a total land area of just over 76 square miles, American Samoa has three districts: the Western, Eastern, and the Manu'a Island District. It is comprised of 5 volcanic islands and 2 remote coral atolls. Tutuila, Aunu'u, Ofu, Olosega and Ta'u are the major inhabited islands (Figure 7). At 53 square miles, Tutuila is the largest and oldest of the islands, and is the center of government and business. It is a long, narrow island lying SW-NE, is just over 20 miles in length, and ranges from 1 to 2 miles wide in the eastern half, and from 2 to 5 miles wide in the western half. Home to 92% of the territory's 65,000 residents, Tutuila is the historic capitol (Pago Pago), the seat of American Samoa's legislature and judiciary (Fagatogo), as well as the office of the Governor. The tiny island of Aunu'u lies 1 mile off the southeastern coast of Tutuila. The three islands of Ofu, Olosega and Ta'u, collectively referred to as the Manu'a islands, lie 70 miles east of Tutuila with a population of about 5,200. Swains Atoll, with a population of approximately 30 lies 240 miles north of Tutuila, and the uninhabited Rose Atoll is a National Wildlife Sanctuary 180 miles to the east.

Approximately 95% of the landmass is held in the traditional land tenure system and under the direct authority of the Samoan chiefs known as "matais." Within this system, traditional land cannot be purchased or sold and the current reigning chief from within the family unit has final say over the disposition of a family's holdings. This system ensures the passage of assets to future generations and serves as the catalyst in the Territory of the Samoan culture.[9]

[9] American Samoa Government, *American Samoa*. Online. Available: http://www.asg-gov.com/islandinfo.htm [May 2003].

3.2.1. Geography

Emerging from the ocean floor two to three miles below the ocean's surface, American Samoa formed as a result of volcanic activity over a hot spot in the Pacific Plate. Tectonic uplifts and volcanic activity during the early formation period of the islands have led to steep inclines and sharp cliffs being the dominant geographical features of the main islands. Peak elevations reach 3,100 feet on Ta'u Island (Lata Mountain), and 2,142 feet on Tutuila Island (Matafao Peak). Only 34% or 16,695 acres of the land in American Samoa has a slope of 30% or less. Deep valleys radiating from the summit of each distinct volcanic cone provide natural drainage. Streams discharging at the heads of small embayments have developed small coastal plains. This topography causes flooding and landslide hazards.

Tutuila's natural deep-water harbor has given the islands their strategic value during the past two centuries. Narrow sand and coral rubble beaches rim approximately 25% of the coastline wherever fringing reefs exist. Such reefs are primarily on the calmer south shore of the islands and on average extend out to sea 200 feet. Exposed to severe marine erosion, the north shore coasts of the islands are primarily steep volcanic cliffs.

Proximity to the reef and salt spray exposure creates a highly corrosive marine environment, which has caused the construction industry to seriously reevaluate building materials. For instance, the expected useful life of standard metal guardrails is reduced by 50% as a result of the salt air. [10]

3.2.2. Climate

Located within the Tropic of Capricorn and 14˚ south of the equator, American Samoa has a maritime climate with copious rainfall and warm humid days and nights. Temperatures in the islands range between 73 and 93 degrees Fahrenheit and relative humidity ranges between 73 and 84 percent throughout the year. As a result, vegetation is moderately dense, with many coconut, banana, and other tropical fruit trees, grasses, and low-growing brush. Depending on topography, precipitation ranges from 125 inches in some areas, to approximately 250 inches in others. The village of Pago Pago, less than 4 miles north of the airport and open to the prevailing wind, receives nearly 200 inches of rain per year. The crest of the mountain range receives well above 250 inches. In recent years, the airport weather station has recorded at least trace amounts of rain about 300 days per year, with nearly 175 days receiving rainfall of 0.10 inch or more.

The drier months are June through September (southern winter) and the wettest, December through March (southern summer). However, the seasonal rainfall may vary widely in individual years, and heavy showers and long rainy periods can occur in any month. Thunderstorms are less frequent than might be expected, considering the moisture and instability of the tropical air mass that usually overlies the Samoa Islands. Flooding rains are common, and although some of these are associated with hurricanes and tropical storms, they can occur at other times as well.

June, July and August are the coolest months and January, February, and March, the warmest. Afternoon temperatures reach the upper 80s (F˚) in summer, and mid 80s (F˚) in the winter, while

[10] American Samoa Government, *American Samoa*. Online. Available: http://www.asg-gov.com/islandinfo.htm [May 2003].

nighttime temperatures fall to the mid 70s (F˚) in summer, and low 70s (F˚) in winter. The highest recorded temperatures at the airport were in the low 90s (F˚), and the lowest near 60 (F˚).

Easterly trade winds prevail throughout the year, and tend to be easterly December through March, but are predominantly from the ESE and SE during the rest of the year. The trade winds are less prevalent in summer than in winter, often interrupted by the proximity of small tropical storms, bands of converging winds, or one of the low pressure systems higher in the atmosphere, all of which help make summer the rainy season.

At other times, the absence of the trades is marked by periods of light and variable westerly to northerly winds and by land and sea breezes. Although strong at times, these winds are often quite light, and may reflect the nighttime drainage of cooled air from the mountains west and north of the airport.

3.2.3. Population

American Samoa's continuous population growth is impacting its environment and resources. Population is heavily concentrated in the Tafuna Plain, in the Western District, since this is the largest area of flat or gently sloping terrain. With nearly 60,000 residents, the population density on the main island of Tutuila has reached an alarming 4.8 people per acre of arable land. And while American Samoa's annual population growth rate in 1954 was 1%, in 1990 the growth rate had reached 3.7%. In addition, with the exception of hurricane construction, approximately 200 residential homes are built annually. Villages continue to grow in size and limited agricultural land is fast being converted to residential lands to accommodate such expansion. As population increases, greater numbers of people become potentially at risk from natural hazards. Assessing risk becomes a significant factor in planning and policy making for future development and hazard mitigation.

3.3.Collecting Data and Using GIS

Geographic Information Systems (GIS) software and spatial data were used to identify and map areas in American Samoa at risk for each of the nine hazards listed above. In most cases, the hazards are classified into High, Medium, and Low risk areas. GIS was also used to locate critical facilities such as the airport, hospital, government buildings, and schools in the hazard risk areas to determine the vulnerability of these structures to a profile of natural hazards. Using GIS software, analysts were able to determine the number of structures and the number of critical facility buildings at greatest risk to all hazards, as well as estimate the cost of replacing the "at risk" critical facilities that may be lost in a disaster. Appendix B is a table of data sources used for the risk assessment.

Picture 3 Star-Kist Samoa's Cannery

Spatial data of structures deemed to be critical facilities was derived from a vector file of building footprints that was taken from the U.S. Geological Survey (USGS) Digital Raster Graphics (DRG) of Tutuila updated for more recent

construction and assigned attributes such as structure name, cost, and contact persons, with inputs from the American Samoa Territorial Hazard Mitigation Council.

3.4.Critical Facilities

A list of all critical facilities can be found in Appendix B. In order to determine areas of greatest risk, four "all-hazard" summary maps were developed using GIS (Map 2 to Map 5). These layers include FEMA flood zones designated as AE and VE, soils other than bedrock (unconsolidated soils), and medium to high landslide risk areas. Intersecting hazard layers are shaded orange on the maps. Critical facilities in the most threatened areas – considered to be at greatest risk – are shaded in red. Critical facilities would also be at risk to island-wide hazards, such as drought and high winds, although there is a lack of available data that would allow more specific identification of geographic regions of risk for these particular hazards.

Maps 2 to 5 show the critical facilities at highest risk.

Map 2 displays the concentration of highest risk for critical facilities close to the Pago Pago Harbor.

There are nine critical facilities on this map either partially or entirely within greatest risk boundaries, and all are in Maoputasi County. Those facilities entirely within greatest risk boundaries include the Inter-Island Ferry Terminal, the Department of Public Safety Fire Division, the Container Dock in the village of Fagatogo, and the Lieutenant Governor's house in the village of Utulei. Critical facilities with either part of a building, or one to several buildings within greatest risk areas include parts of the VCS Samoa Packing Company in Atu'u village; the Star-Kist Samoa Company (Picture 3) in Satala village; one American Samoa Government building in Fagatogo; the Department of Education in the village of Utulei; and several of the Aua Elementary School buildings in Aua.

The critical facilities at greatest risk in Faga'itua Bay are shown in Map 3 and they are Faga'itua High School and the CCCAS Hall.

Map 4 shows one critical facility in Fagamalo Village at greatest risk, The CCCAS Church.

The only critical facility at greatest risk in the Fagatele Village is the CCCAS Hall, shown in Map 5.

Table 6 shows the number of critical facilities at risk depending upon the number of hazards. Four hundred and ninety-six facilities are at risk to multiple hazards. This table is based on a total of 1,132 facilities. Table 7 lists all of the critical facilities shown in Maps 2 to 5.

The GIS analysis process included selecting the total number of buildings in each hazard zone and then selecting the critical facilities from this total number. With this information, estimated losses were determined based on the values associated with each critical facility in the GIS data table. At this time, information regarding building construction date was not available.

Table 6 Numbers of Buildings at Risk/Total Buildings

Hazards	Risk	# of Buildings at Risk/Total Buildings	Percentage	Total	In Hazard Area
Multiple Hazards	High Risk	496/1132	44%	1132	496
1 Hazard (Flood)	Moderate Risk	364/1132	32%	1132	364
1 Hazard (Liquefaction)	Low Risk	1039/1132	92%	1132	1039
1 Hazard (Landslide)	Low Risk	101/1132	9%	1132	101

3.4.1. GIS Analysis Process

The GIS analysis process extracted critical facilities at risk to multiple hazards using the following criteria:

- Flood Hazard Zones - Flood Zone = AE or Flood Zone = VE (FHZ_AE-VE.shp)
- Earthquake Hazard Areas (soils) – Hazard = A (UnconsolidatedSoils.shp)
- Landslide Risk Areas – LS_Risk = MED or LS_Risk = High (LSR_M-H.shp)

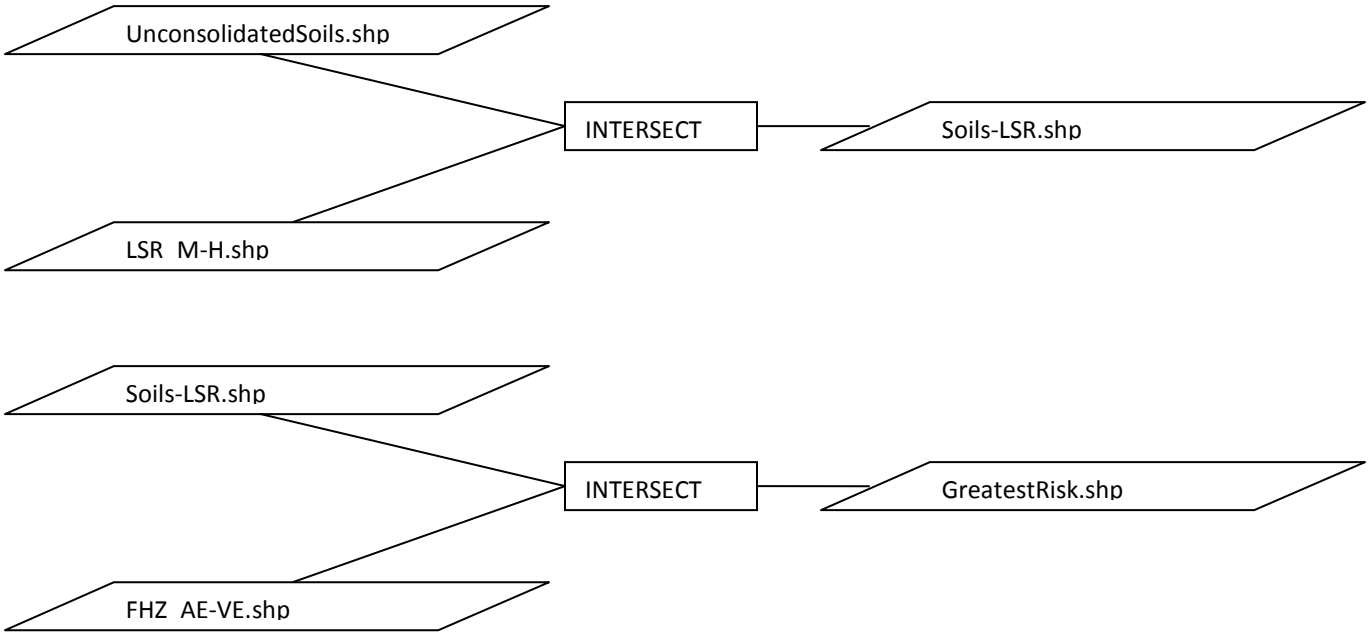
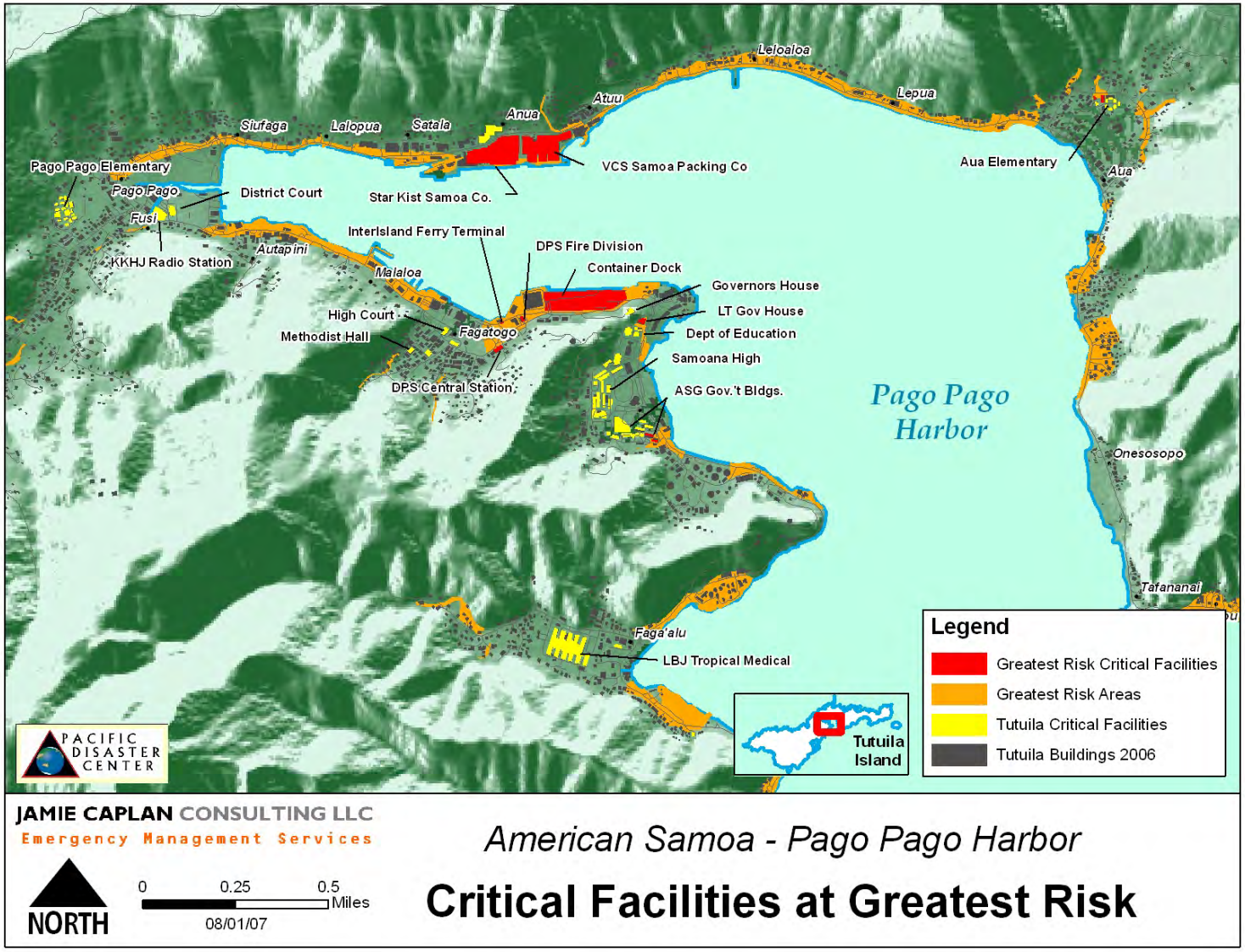


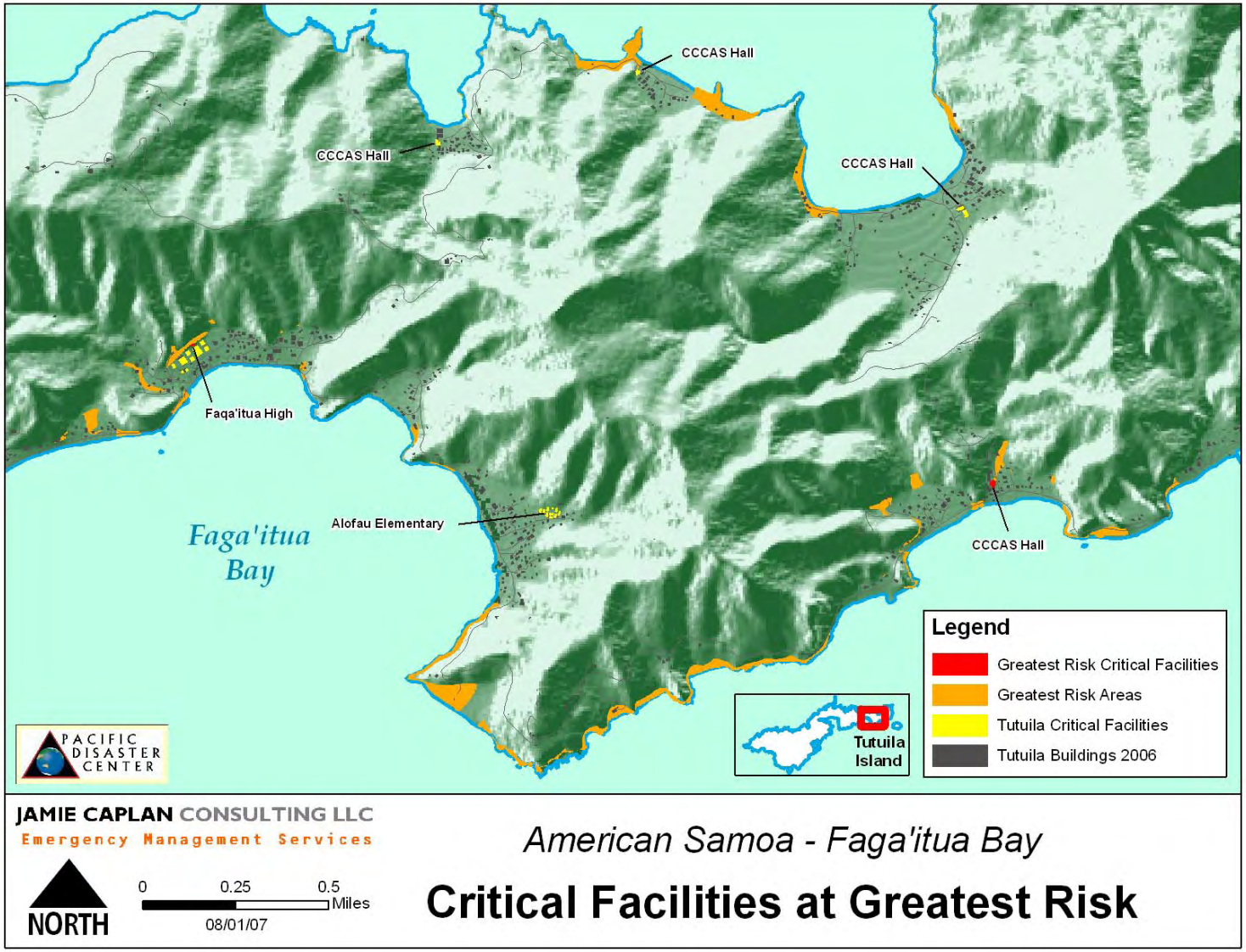
Figure 8 GIS Analysis Process

The GreatestRisk.shp file is used to overlay with critical facilities.

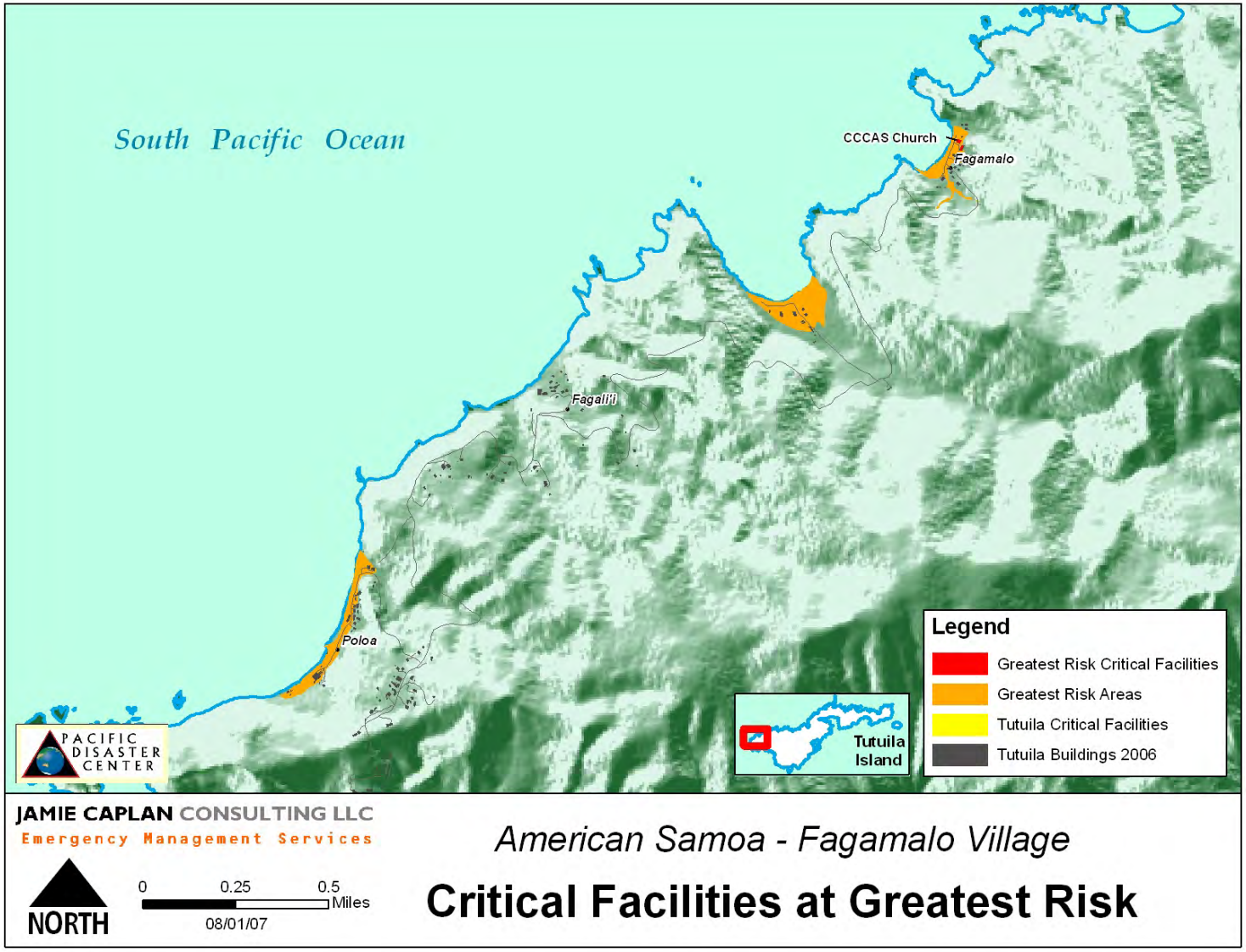
THIS PAGE LEFT INTENTIONALLY BLANK



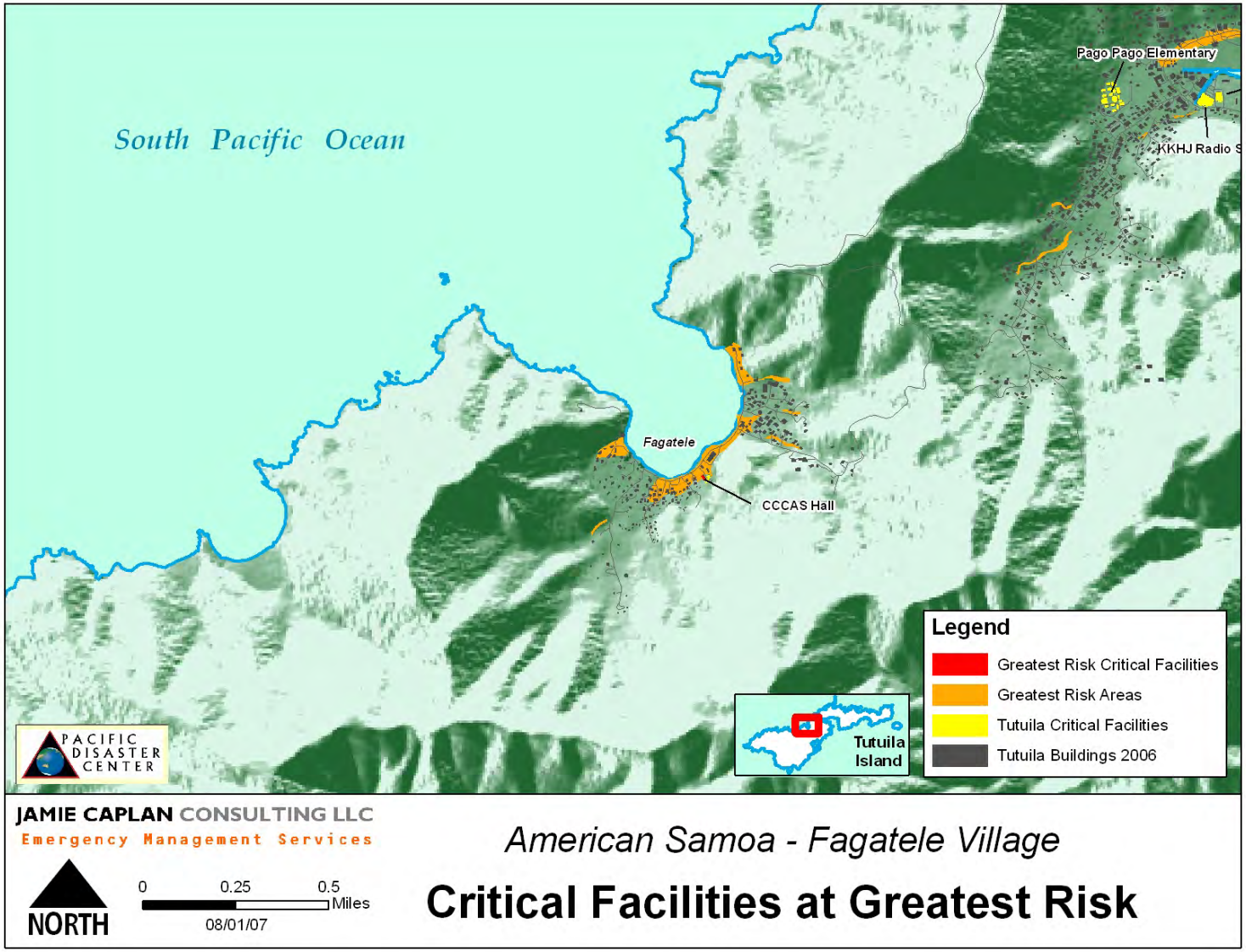
Map 2 Pago Pago Harbor Critical Facilities at Greatest Risk



Map 3 Faga'itua Bay Critical Facilities at Greatest Risk



Map 4 Fagamalo Village Critical Facilities at Greatest Risk



Map 5 Fagatele Village Critical Facilities at Greatest Risk

Table 7 Lists of Critical Facilities Shown in Maps 2 to 5

NAME	Count	#EMPLOYEES	ESTIMATE	FACILITY_TYPE	LOCATION	OWNERS
ASG Gov.'t Bldgs.	2		$14,000,000	Government	Fagatogo	ASG
Aua Elementary	2		$1,500,000	School/Shelter	Aua	ASG
CCCAS Church	2		$572,000	Church/Shelter	Fagamalo	CCCAS
CCCAS Hall	2		$560,000	Church/Shelter	Amouli	CCCAS
Container Dock	1	68	$18,131,380	Transportation	Fagatogo	ASG
DPS Central Station	1	230	$770,414	Police	Fagatogo	ASG
DPS Fire Division	2	25	$150,000	Fire	Fagatogo	ASG
Faqaitua High	1		$1,750,000	School/Shelter	Fagaitua	ASG
InterIsland Ferry T.	1		$400,000	Transportation	Fagatogo	ASG
LT Gov House	1			Government	Utulei	ASG
Seetaqa Elementary	1		$520,000	School/Shelter	Seetaga	ASG
Star Kist Samoa Co.	1	3000	$17,909,360	Commercial	Satala	Star Kist Samoa Co.
VCS Samoa Packing Co.	1	2400	$16,382,320	Commercial	Atuu	VCS Samoa Packing Co.

3.5.Hazard Identification

Hazard identification is the process of identifying the kinds of natural or man-made hazards that can affect the mitigation plan study area – in this instance the Territory of American Samoa. For the purpose of this plan, three hazards were added to the list from 2003. In all, nine hazards were studied: they are climate change, drought, earthquake, flood, hazardous materials, landslides, tropical cyclones, tsunami and wildfire. Table 8 indicates each hazard studied and the justification for inclusion in the mitigation plan.

Table 8 Hazards Included in the Plan

Hazard	Justification for Inclusion
Climate Change	Climate Change, specifically sea-level rise, directly impacts American Samoa by increasing flooding or drought conditions.
Drought	Drought occurs in American Samoa usually following a strong El Nino period.
Earthquake	The primary earthquake source for American Samoa is the northernmost section of the Tonga Trench (or Tonga-Kermadec Trench), more than 100 miles southwest of the Samoan island chain. The Tonga Trench is a seafloor geographic and tectonic feature created by the collision of the Pacific Plate that subducts westward beneath the Australian Plate. The Pacific-Australian subduction zone is considered an area of high seismic activity, and the collision of these two plates is a source of large but distant earthquakes felt in American Samoa.
Flood	Flooding has occurred numerous times in American Samoa due to rainfall. Flooding potential is increased during a tropical cyclone.
Hazardous	Small numbers of hazardous materials currently are on the Island or being imported into the Territory that are of great danger. Often times, the most dangerous hazardous

Hazard	Justification for Inclusion
Materials	materials are being abandoned, creating a safety and health issue to nearby dwellings and to the environment.
Landslides	Given the natural topography and history of landslides on Tutuila, a certain number of landslides will occur in the future.
Tropical Cyclones	All the major tropical cyclones affecting American Samoa during the past 50+ years have been classified between Categories 1 and 3 on the Saffir-Simpson Hurricane Scale. Historical records give no indication of any Category 4 or 5 hurricanes impacting this area. It appears that due to the relatively close proximity to the equator, 840 miles south of the 0 degree latitude line, the most intense tropical cyclones in the vicinity of American Samoa are rare.
Tsunami	The entire coastline of American Samoa would be affected in the event of a tsunami. Wave heights along the shoreline would be directly related to the energy of the wave and direction in which it was generated. The majority of the coastline of Tutuila is relatively protected by basalt cliffs and high seawalls; however the pocket coves and bays of the island would be at higher risk of damage due to shallow bathymetry and the amplifying affect of the wave energy as it nears the shore.
Wildfire	Wildfire is possible on American Samoa but unlikely due to the moist climate. However, a fire suppression plan does exist.

Hazard information collection and assessment was conducted for all hazards under consideration. Information sources used in the risk and vulnerability assessment included hazard mitigation plans, reports and studies conducted in the region, internet resources, local newspapers, and personal interviews conducted with government agency representatives, professional experts, and residents of American Samoa. These sources are referenced in the 2007 and 2003 Resources (Chapters 8 & 9).

To determine risk, data from the 2003 Mitigation Plan and some updated data was used. The hazards profiled in this report, potential impacts of each hazard, and summaries of the probability of occurrence for each hazard type based upon the frequency of significant historical events in American Samoa is shown in a Table 9. As the table shows, drought, floods, landslides and tropical cyclones are considered hazards with a "High" probability of occurrence. Hazards occurring with the greatest frequency are tropical cyclones and landslides respectively. Tropical cyclones emerge as the most potentially severe hazard due to the often island-wide impacts and devastating associated hazards such as high winds, storm surge, and flooding rainfall. The estimations of accumulated losses have been based upon historical loss information, which varies greatly, and is in many cases non-existent. The loss figures represent sums of the largest amounts recorded per event for each hazard type. Tropical cyclones again emerge as the cause of the greatest damage and losses to American Samoa. Table 10 shows a list of FEMA declared disasters since 1966.

Table 9 Summary of Probability of Occurrence

Hazard Type	Potential Impacts	Count	Time Period (years)	Frequency (% chance per year)	Probability of Occurrence	Estimation of Accumulated Losses ($)
Climate Change	Flooding	N/A			High	
Droughts	Water rationing; Food shortage; Cannery closures; School closures; Groundwater depletion; Depletion of wells and catchment; Economic recession;	3	24	12.5%	High	
Earthquakes	Damage to infrastructure and buildings; Injuries, loss of life	1	450	0.2%	Low	
Floods	Damage to roads, homes, businesses; Loss of access to emergency services; Inundation of urban and low-lying areas Erosion Landslides; Power failures	4	36	11%	High	$9,525,000
Hazardous Materials	Water contamination; Fire	N/A			Low	
Landslides	Injuries, loss of life; Loss of access to emergency services; Property loss; Blocked or damaged roads, buildings; Liquefaction of fill soil types; Amplified ground shaking of unconsolidated soils.	5	24	20.8%	High	
Tropical Cyclones (including storm surge)	Flooding rainfall; High wind damage to infrastructure and buildings; High surf, storm surge, coastal erosion	8	32	25%	High	$105,000,000
Tsunamis	Inundation of low-lying areas; Injuries, loss of life; Damage to buildings and infrastructure; Coastal erosion	2-3	50	4% to 6%	Medium	
Wildfire	Loss of natural and manmade resources.	0			Low	

Table 10 FEMA Declared Disasters[11]

Year	Date	Disaster Types	Disaster Number
2005	02/18	Tropical Cyclone Olaf, including high winds, high surf, and heavy rainfall	1582
2004	01/13	High winds, high surf and heavy rainfall associated with Tropical Cyclone Heta	1506
2003	06/06	Heavy rainfall, flooding, landslides, and mudslides	1473
1991	12/13	Hurricane Val	927
1990	02/09	Hurricane Ofa	855
1987	01/24	Hurricane Tusi	785
1981	03/24	Typhoon Esau	637
1979	11/09	Flooding, mudslides, landslides	610
1974	09/30	Drought	449
1966	02/10	Typhoon, high tides	213

3.6.Profiling Hazards

For the purposes of assessing risk and vulnerability of the Territory to natural hazards, it is crucial to understand the impacts of historical hazard events, and determine the likelihood of occurrence in the future, as well as the potential magnitude of each of these hazards. Historical data from the aforementioned sources is shown in each hazard section below. This section describes damages incurred on the islands of Tutuila, Ofu-Olosega, and Ta'u, such as costs of recovery; property damage; number of injuries; lives lost; to the extent practicable, the level of severity, including flood depth or extent; wind speeds; earthquake intensity; duration of the events, and the location, and dates of occurrence.

Each hazard is analyzed separately to include a description of the analysis used to determine the probability of future occurrence, potential magnitude or intensity, geographical extent, and conditions that increase or decrease vulnerability to hazards such as topography and soil conditions.

3.7.Climate Change

3.7.1. Introduction to Climate Change

Climate change was added to the list of hazards warranting study because it directly impacts American Samoa by potentially increasing flooding or increasing drought to the islands. The effects of El Niño, La

[11] http://www.fema.gov/news/disasters_state.fema?id=60

Niña and sea level change impact the islands of American Samoa by potentially flooding the islands. All of American Samoa is susceptible to the impacts of climate change.

3.7.2. Profile of El Niño

El Niño is characterized by unusually warm ocean temperatures in the equatorial Pacific. El Niño is a disruption of the ocean-atmosphere system in the Tropical Pacific having important consequences for weather and climate around the globe. El Niño is normally accompanied by a change in atmospheric circulation called the Southern Oscillation. Together, the ENSO (El Niño-Southern Oscillation) phenomenon is one of the main sources of interannual variability in weather and climate around the world. El Niño events tend to alternate about every three to seven years. However, the time from one event to the next can vary from one to ten years. El Niño may cause changes in sea level and changes in natural resources available to American Samoa.[12]

3.7.3. Profile of La Niña[13]

La Niña is characterized by unusually cold ocean temperatures in the equatorial Pacific. Typically, a La Niña is preceded by a buildup of cooler-than-normal subsurface waters in the tropical Pacific. Eastward-moving atmospheric and oceanic waves help bring the cold water to the surface through a complex series of events still being studied. In time, the easterly trade winds strengthen, cold upwelling off Peru and Ecuador intensifies, and sea-surface temperatures (SSTs) drop below normal. During the 1988- 89 La Niña, SSTs fell to as much as 4 degrees C (7 degrees F) below normal. Both La Niña and El Niña tend to peak during the Northern Hemisphere winter. La Niña conditions typically last approximately 9-12 months. Some episodes may persist for as long as two years. La Niña conditions may increase the intensity of hurricanes in American Samoa.[14]

3.7.4. Conditions that Increase Vulnerability to Climate Change

Vulnerability to climate change is increased by building in areas that may become flooded. Sustainable development is at the heart of American Samoa planning due in part to flooding caused by climate change.

3.7.5. Sea Level Rise

Sea level rise is directly impacting American Samoa. When the sea level rises, it can do so for a few reasons. It can rise due to thermal expansion—the tendency of warm water to take up more space than cooler water. It can rise due to the addition of water, for instance from melting glaciers. It can also rise due to changes in salinity; fresh water is less dense than salt water and therefore takes up slightly more space than an equal amount of salt water.[15]

Sea level rise can be a product of global warming through two main processes: expansion of sea water as the oceans warm, and melting of ice over land. Global warming is predicted to cause significant rises in sea level over the course of the twenty-first century.

[12] http://www.usgcrp.gov/usgcrp/Library/nationalassessment/overviewislands.htm
[13] http://www.elnino.noaa.gov/lanina_new_faq.html
[14] http://www.nationalgeographic.com/elnino/mainpage3.html
[15] http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=17300

3.7.5.1. Sea Level Rise Threatens Small Island Nations

Several Pacific island states are threatened with total disappearance and two uninhabited islands in the Kiribati chain have already disappeared due to sea level rise. The people of Funafti in Tuvalu and on Kiribati Island are lobbying to find new homes; salt water intrusion has made groundwater undrinkable, and these islands are suffering increasing impacts from hurricanes and heavy seas. In the village of Saoluafata in Samoa, villagers have noticed that their coastline has retreated by as much as 50 meters in the last decade. Many of these people have had to move further inland as a result.[16]

Jonathan Adams wrote an article titled "Rising Sea Levels Threaten Small Pacific Island Nations" on May 3, 2007.[17] He states in his article that "dire climate change predictions may seem like science fiction in many parts of the world. But in the tiny, sea-swept Pacific nation of Tuvalu, the crisis has already arrived. Tuvalu consists of nine low-lying atolls totaling just 26 square kilometers, or 10 square miles, and in the past few years the "king tides" that peak in February have been rising higher than ever. Waves have washed over the island's main roads; coconut trees stand partly submerged; and small patches of cropland have been rendered unusable because of encroaching saltwater. The government and many experts already assume the worst: Sometime in the next 50 years, if rising sea-level predictions prove accurate, the entire 11,800-strong population will have to be evacuated. The ocean could swallow Tuvalu whole, making it the first country to be wiped off the map by global warming."

3.7.6. History of Climate Change

3.7.6.1. El Niño[18]

Sea level in American Samoa did not vary significantly from July, August, and September to October, November and December during the strong and moderate El Niño years. The strong years are: 1951, 1958, 1972, 1982 and 1997. The moderate years are: 1963, 1965, 1969, 1974, and 1987. During July, August and September, these reverse and strong trade-winds cause water to pile up in South America. As a result, the sea level in South Pacific Islands (e.g., American Samoa) remains unchanged. By January, February, and March, the westerly winds strengthen and move to the center to south central region. Due to the shift of trade winds, American Samoa experiences a sea-level drop with a time lag of 3-6 months. During years that follow a strong El Niño, American Samoa experiences a period of prolonged dryness.

3.7.6.2. La Niña[19]

During the third quarter of 2004, the Southern Oscillation Index (SOI) has been moderately negative, with individual monthly index values of -0.7, -0.8, and -0.4, -0.3 during July, August, September, and October, respectively. Since January 2004, the average value of the SOI has been weakly negative, and since June 2004, the monthly values have been persistently negative. Nearly all El Niño events are

[16] http://www.panda.org/about_wwf/what_we_do/climate_change/problems/impacts/sea_levels/index.cfm
[17] http://www.iht.com/articles/2007/05/03/asia/pacific.php?page=1
[18] http://www.intute.ac.uk/sciences/worldguide/html/805_articles.html
http://www.soest.hawaii.edu/MET/Enso/peu/2004_4th/special_section.htm
http://www.pmel.noaa.gov/tao/elnino/nino-home.html#
[19] http://lumahai.soest.hawaii.edu/Enso/peu/2004_4th/soi.htm

associated with a persistently negative SOI near -1.0 or lower. During La Niña, the SOI is persistently positive, near +1.0 or higher. With weak El Niño conditions in the Pacific basin, the SOI should persist below zero for the next three to six months.

3.8.Drought

3.8.1. Profile of Drought

Although many people erroneously consider it a rare and random event, drought is a normal, recurrent feature of climate. Drought is a temporary aberration and differs from aridity, as the latter is restricted to low rainfall regions and is a permanent feature of climate. Other climatic factors such as high temperatures, high wind, and low relative humidity are often associated with drought in many regions, including the Pacific Basin. Drought occurs in virtually all climatic zones, varying significantly from one region to another, and can be defined according to meteorological, hydrological, or agricultural criteria.

Meteorological drought is usually based on long-term precipitation departures from normal, but there is no consensus regarding the threshold of the deficit or the minimum duration of the lack of precipitation that makes a dry spell an official drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, and as lake, reservoir, and ground water levels.

Agricultural drought occurs when there is insufficient soil moisture to meet the needs of a particular crop at a particular time. A deficit of rainfall over cropped areas during critical periods of the growth cycle can result in destroyed or underdeveloped crops with greatly depleted yields. Agricultural drought is typically evident after meteorological drought but before a hydrological drought.

Drought should not be viewed as merely a physical phenomenon or natural event. Its impacts on society result from the interplay between a natural event and the demand people place on water supply. Human beings often exacerbate the impact of drought. Recent droughts in both developing and developed countries, and the resulting economic and environmental impacts and personal hardships, have underscored the vulnerability of all societies to this "natural" hazard. All of American Samoa is susceptible to droughts.

3.8.2. Conditions that Impact Vulnerability to Drought

Drought vulnerability may be impacted by:

- Inadequate catchment, reservoir capacity, and wells relative to population
- Leaky water pipes
- Strong to very strong El Niño episodes
- Local thunderstorms temper less serious droughts in the Territory, but do little to ease a major drought.

3.8.3. Probability of Occurrence and Magnitude of Event of Drought

American Samoa, given its maritime location in the SW Pacific and normally abundant rainfall, infrequently experiences severe drought conditions. Available data suggests that El Niño occurrences

with strong to very strong classifications increase the chances for serious drought conditions. The strength and duration of El Niño periods increased during the 1990's, as compared with the previous two decades, perhaps coincident with global warming.

Research of historical rainfall totals, drought occurrences and revisit periods, and analysis of ENSO events contributed to the determination of probable occurrence for drought in American Samoa.

Three significant droughts have affected American Samoa during the past 30 years, all directly following or at the tail end of a moderate to strong or very strong El Niño occurrence. This trend, however, has not manifested with the moderate El Niño conditions experienced in 2002-2003. Normal rainfall has been reported thus far during American Samoa's southern hemisphere summer.

A moderately strong El Niño episode preceded the 1974-75 drought, while the 1983-84 and 1998 droughts occurred at the tail end of strong to very strong El Niño periods. While not all El Niño events during the 43-year period of study led to drought conditions, there appears to be a connection between El Niño events and drought in American Samoa. It can be inferred that when the first signs of a moderate to strong or very strong El Niño event is forecast several months in advance, American Samoa should prepare for what could become severe drought conditions. In turn, this implies that during neutral or La Niña phases of ENSO, there is little probability of drought conditions in these islands.

Using available historical data, the probability of occurrence for drought is 12.5%.

3.8.4. History of Drought

Average monthly rainfall amounts of less than three inches per month for three consecutive months are indicative of potential drought in American Samoa, as was the case in 1974 and 1983.[20] The 1998 drought was declared after 9 consecutive months of less than half the average monthly rainfall. The effects of drought tend to be long lasting throughout the Territory, as impact on agricultural crops is often devastating, and recovery time can be one or more growing seasons in length. Extended drought periods also present a fire hazard. Table 11 shows a summary of significant droughts.

The USGS has indicated that as long as the Territory receives steady rainfall, at least 16 million gallons of water seeps into the fresh water zone per day. In 1998, water usage per day averaged about 8 million gallons, with 2 million gallons utilized by the local canneries, 2 million gallons for residential use, 1 million gallons to other businesses, and 1 million lost through leaks.[21] The old underground pipes of Pago Pago and Fagatogo areas were notorious for leaks before recent mitigation efforts.

[20] *The Samoa News.* "American Samoa Governor Declares State of Emergency." June 7, 1998.
[21] *The Samoa News.* "Water Department Officials Take Water Conservation to the Schools." June 1, 1998.

Table 11 Summaries of Significant Droughts

Event Name, Data	Location	Severity	Impacts
Drought 1974-1975	All islands	Significant impact.	Dried up underground water sources. Sediment made water undrinkable. Vegetation dried up, many crops damaged, causing food shortages. Drought broke with several days of heavy rainfall that caused devastating landslides. Water rationing, closure of schools, curtailment of fish cannery operations, reduction of work hours for government employees. Territory-wide recession.
Drought 1983-1984	All islands	Greatest impact.	Water rationing, school closure for 1 week. Cannery closed for 6 months, coincident with renovations.
Drought 1998	All islands	Most severe, but less impact due to improved capacity.	Wells in Tualauta District started to taste salty as groundwater levels were depleted. Only 10.11 inches of rain recorded by the weather bureau at Tutuila's airport from April to August. Several wells and rivers dried up, the Aunu'u natural spring evaporated, and the catchment area at Malaeloa completely dried up.

3.8.4.1. Drought Event (1974-1975)

According to some sources, the 1974 drought was considered the most devastating in American Samoa during the past 50 years with major impacts to the islands resulting in water rationing, and closure of schools.[22] Four to five months without rain during the Territory's usually drier wintertime depleted underground water sources. From April to August, only 24.28 inches of rainfall was recorded at the airport weather station in Tutuila. Above ground water was unavailable, and sediment in ground water sources made water undrinkable in places. Vegetation dried up throughout the island, and many crops were damaged. Vegetable crops failed. Taro and banana, staples in the local diet, were drastically impacted, causing food shortages. Impacts were felt even after rainfall returned. Taro fields had to be replanted, and it was eight months before the crop was harvestable. Bananas were quicker to come back. The drought finally broke with several days of heavy rainfall that caused devastating landslides.

3.8.4.2. Drought Event (1983-1984)

According to the National Weather Service office on Tutuila, the 1983 drought lasted for 6 months, with major impacts on the Territory, causing water rationing and closure of schools for 1 week. One cannery closed for 6 months, coincident with renovations. American Samoa's Governor arranged for Department of the Interior funds to support employees during this time. Both the 1974 and 1983 droughts resulted in the curtailment of fish cannery operations, reduction of work hours for government employees, and a general territorial-wide recession.[23]

[22] *The Samoa News.* "Water Department Officials Take Water Conservation to the Schools." June 1, 1998.
[23] *The Samoa News.* "American Samoa Governor Declares State of Emergency." June 7, 1998.

3.8.4.3. Drought Event (1998)

A *Samoa News* article dated September 17, 1998 quoted the Executive Director of American Samoa Power Authority (ASPA), saying that the 1998 drought was "the worst one American Samoa has ever experienced."[24] ASPA is in charge of water operations in the territory. Wells in Tualauta District started to taste salty from the lack of rain as groundwater levels were depleted. Only 10.11 inches of rain were recorded by the weather bureau at Tutuila's airport from April to August. The previous record low rainfall for the same 5-month period was 18.52 inches in 1983. In contrast, another major drought year in 1974 recorded 24.28 inches during the same 5-month time period. Public response to the lack of rainfall in terms of subsequent reduced consumption on the part of the general public and the tuna canneries was particularly helpful. In another *Samoa News* article dated May 18, 1998, the acting Governor initiated a Water Conservation Campaign, urging ASG employees to "exercise the utmost discretion in the use of our public water resources."[25] Less than an inch of rain had been recorded in the first 3 weeks of the month of May. American Samoa received $267,000 from U.S. Office of Insular Affairs in drought mitigation funds during this drought, much of which went to the outer islands.

The NOAA Weather Service in Tafuna reported that September through December of 1997 received 50% less rainfall than the same 4-month period in 1996, and that January through April 1998 rainfall had decreased by almost 60% compared to the same period in 1997.[26] The month of May 1998 received less than 2 inches compared to 10 inches the previous year.

After an announcement of a possible drought in May 1998, ASPA launched a massive conservation campaign which included educational talks, visiting families with water consumption over 50,000 gallons, and repair of leaky pipes. ASPA noted that several wells and rivers had dried up, the Aunu'u natural spring had evaporated into nothing, and the catchment area at Malaeloa was completely dried up and more water outlets were predicted to follow suit.

By early June, Governor Tauese Sunia declared American Samoa in a Territory of Emergency, charging ASPA with the responsibility to continue conservation efforts, and to take additional actions to: procure water production equipment, inventory all water systems, extend transmission and distribution lines to residents not served by the ASG water system, and build new water storage facilities.

By August, water losses had been reduced by 21 percent, largely through a water-recycling project at the tuna canneries and the massive campaign to locate and repair leaks in the water delivery piping system, made possible through mitigation funding.

In October, American Samoa's drinking water sources remained in critical condition, and federal assistance legislation was in progress to purchase water purification equipment. Even with the return of regular rainfall, it takes years for the Territory to replenish its aquifer.

[24] *The Samoa News.* "ASPA Director Says This is American Samoa's Worst Drought." September 17, 1998.
[25] *The Samoa News.* "Drought Conditions Remain in American Samoa." May 18, 1998.
[26] *The Samoa News.* "Drought Conditions Developing in American Samoa." May 18, 1998.

While certainly the most severe drought experienced in American Samoa over the period discussed in this assessment, the 1998 drought did not have the greatest impact due to the islands' increased capacity to manage this type of event. Mitigation measures such as repair of leaking pipes, an increase in the number of ground wells, and greater catchment and reservoir capacity were implemented with good results. American Samoa now has a reserve capacity of 800,000 to 1 million gallons per day.

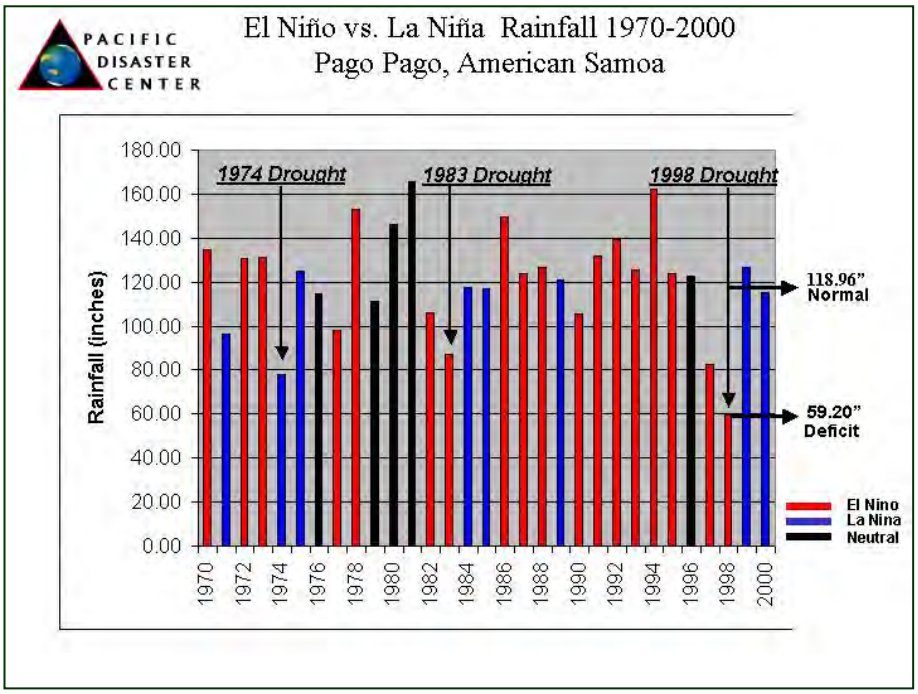


Figure 9 Comparison of Rainfall Amounts, Drought Occurrence and ENSO

Water loss due to leaky pipes is now a mere 18 to 20%. While "normal" usage stands at 8 million gallons per day, this usage can be successfully reduced to 5 million gallons during periods of drought.

The March 1998 Pacific ENSO Update, a bulletin issued by the Pacific El Niño-Southern Oscillation Applications Center, called the 1997/98 El Niño event "the most intense on record."[27] American Samoa was not the only Pacific island to experience very dry conditions that year. Record droughts had been forecasted for Guam, CNMI, Micronesia, the Marshall Islands, and Palau as well.

American Samoa lies in a region between the most extreme influences of the El Niño/Southern Oscillation (ENSO) cycle on rainfall in the Pacific. ENSO is an oceanic and atmospheric phenomenon typified by increased sea-surface temperatures and lower than normal atmospheric pressure in the eastern Pacific and the high negative values of the Southern Oscillation Index. Warm events generally cause wet conditions to occur north and east of the islands, and dry conditions to the south and west, with a somewhat variable impact on rainfall in American Samoa. Nevertheless, American Samoa's normally abundant rainfall can be affected by El Niño conditions, as the 1974, 1983, and 1998 droughts

[27] University of Guam (UOG) Water and Energy Research Institute (WERI), Pacific El Nino-Southern Oscillation (ENSO) Applications Center (PEAC). 1998. Update to Newsletter Issued 1st Quarter 1998, Vol. 4 No. 1. *Pacific ENSO Update – Special Bulletin, March 27, 1998.* National Oceanic and Atmospheric Administration (NOAA) Office of Global Programs.

illustrated. The National Drought Mitigation Center website offers a detailed description of the ENSO cycle and its relationship to drought in *Understanding ENSO and Forecasting Drought,* http://www.drought.unl.edu/whatis/elNiño.htm.

Figure 8 compares annual rainfall amounts for the village of Pago Pago over a 30-year period collected by NOAA's Tafuna Weather Station,[28] and identifies American Samoa's significant drought events. The various phases of the ENSO cycle were also identified that suggest a tendency for the Territory to experience prolonged dry periods in the years following intense El Niño events.

3.9.Earthquake

3.9.1. Introduction to Earthquake

The earth's surface or crust is composed of twelve large plates, or regions of the crust, that continually move over ductile mantle. Areas where these plates meet, and either grind past each other, dive under each other, or spread apart, are called plate boundaries. In the Pacific Ocean, earthquakes typically occur along plate boundaries, where fault lines, or weaknesses in the earth's crust can be found. When stress in the crust exceeds the strength of the surrounding rock, the rock generally breaks along either a pre-existing or new fault plane. Earthquakes are the sudden release of strain in the earth's crust, resulting in waves of shaking that radiate outward from the earthquake source. The point where an earthquake starts is termed the focus or hypocenter and may be many miles to several hundred miles deep within the earth. The point at the surface directly above the focus is called the earthquake's epicenter.

The metadata used to for the earthquake risk assessment is described as a component of the Geologic Resources Evaluation (GRE), a co-operative program between the Natural Resources Information Division (NRID), Inventory and Monitoring Program (I&M), and the Geologic Resources Division (GRD) of the National Park Service (NPS).

3.9.2. Profile of Earthquake

The earth's surface or crust is composed of twelve large plates, or regions of the crust, that continually move over a ductile mantle. Areas where these plates meet and either grind past each other, dive under each other, or spread apart, are called plate boundaries. In the Pacific Ocean, earthquakes typically occur along plate boundaries, where fault lines or weaknesses in the earth's crust can be found. When stress in the crust exceeds the strength of the surrounding rock, the rock generally breaks along either a pre-existing or new fault plane. Earthquakes are the sudden release of strain in the earth's crust, resulting in waves of shaking that radiate outward from the earthquake source. The point where an earthquake starts is termed the focus or hypocenter and may be many miles to several hundred miles deep within the earth. The point at the surface directly above the focus is called the earthquake's epicenter.

[28] National Oceanic and Atmospheric Administration, Local Climatological Data Annual Summary with Comparative Data. NOAA Tafuna Weather Station. 1985.

3.9.3. Conditions that Impact Vulnerability to Earthquake

The primary earthquake source for American Samoa is the northernmost section of the Tonga Trench (or Tonga-Kermadec Trench), more than 100 miles southwest of the Samoan island chain. The Tonga Trench is a seafloor geographic and tectonic feature created by the collision of the Pacific Plate that subducts westward beneath the Australian Plate. The Pacific-Australian subduction zone is considered an area of high seismic activity, and the collision of these two plates is a source of large but distant earthquakes felt in American Samoa.

Because American Samoa is far from Tongan Trench seismic activity, it rarely experiences violent or damaging shaking from earthquakes from this source. Over this distance, the earth filters and diminishes the seismic waves, creating only perceived strong-to-very strong shaking, and not violent shaking. No catalog for local earthquakes exists because American Samoa does not have any seismic recording instruments. The closest seismic recording instrumentation is located in the Independent Territory of Samoa, 50 miles away.

A secondary source for seismic activity is volcanic activity. The Samoan island chain was created by a 'hot spot' or soft spot in the earth's crust, which allows the escape of magma, creating submarine volcanoes that eventually form islands. The only active volcano in the American Samoa region is the submarine volcano Vanilulu'u. The Ofu-Olosega volcano last erupted in 1866, and the other volcanoes in the region have been silent for thousands of years. In 1995, a shallow earthquake swarm (concentrated events in time and space) was recorded in the region of the Vanilulu'u submarine volcano. These events are precursors to potential volcanic activity and are usually not a threat to the islands in regards to earthquakes.

Areas that may exceed the peak ground acceleration of 0.2g are designated as "other soil types" compiled from the USDA/NRCS Soil Survey Map of American Samoa (1984), and appear in red on the Earthquake Hazard maps Maps (6 – 9), representing possible areas of unconsolidated soils and amplified ground motion.

Most low-lying areas on Tutuila correspond to the unconsolidated soils and may experience amplified ground motion from an earthquake. Another factor that increases seismic risk during an earthquake is the possible liquefaction of soils typically found in landfill areas, such as those surrounding the northwestern portion of Pago Pago Harbor.

This detailed area, shown on Map 7, and other landfill areas may be subject to relatively stronger ground shaking during an earthquake.

Note the presence of several critical facilities, including the cannery, the local hospital, schools, and government buildings in areas prone to amplified ground shaking and/or liquefaction. Landslide potential is increased during earthquake activity and may increase vulnerability should these occur in populated areas or near roads. Identification of yet-to-be-determined local active fault zones may increase vulnerability to earthquake activity. These may be determined through a USGS seismic hazard analysis in the future.

Detailed maps of the eastern and western portions of the Tafuna Plain showing critical facilities located in areas of increased earthquake risk are shown in Map 8 and Map 9 respectively.

Population concentration in coastal areas, poor construction methods, and development in flood plains, drainage areas and wetlands are all factors that increase vulnerability to tropical cyclones.

3.9.4. Probability of Occurrence and Probable Magnitude of Events of Earthquake

American Samoa is classified by FEMA as Seismic Zone 3, which means the probability of the Territory experiencing earthquake ground shaking of approximately 0.2g peak horizontal acceleration is once in 500 years (or a 10% probability of experiencing at least 0.2g every 50 years), where 1.0 g is equal to the acceleration of gravity. This level of ground shaking translates to light-to-moderate building damage. A 0.2g horizontal acceleration is similar to the turbulence required to knock a person walking down the aisle of an airplane off his or her feet into an aisle seat. This Seismic Zone 3 designation considers all probable earthquake sources affecting American Samoa, local and distant, and translates their effects into different estimates of ground shaking.

The United States Geological Survey (USGS) calculates and publishes the probabilities of ground shaking hazard for each Territory by conducting an in-depth seismic hazards analysis. However, this definitive study has not been conducted for American Samoa. Personal communications by members of the Project Team with Dr. Arthur Frankel, USGS, and Denver Federal Center, Colorado in March 2003 indicated that Chuck Mueller is Project Officer for completion of this study for American Samoa in the future.

Seismic zones are also implemented as one of the design criteria in the *Uniform Building Code*. Seismic design calculations are input as part of the design criteria for construction of important structures to resist seismic forces.

3.9.5. Geographical Extent of Earthquake

Very little information exists about earthquakes generated by local faults near American Samoa or by local volcanic activity. All of American Samoa, including the Manua Islands, is subject to at least a perceived strong-to-very strong ground shaking of 0.2g.

Map 6 shows the earthquake hazard areas on American Samoa.

Maps 7 to 9 show detailed maps of the three high hazard areas with critical facilities and soil data highlighted.

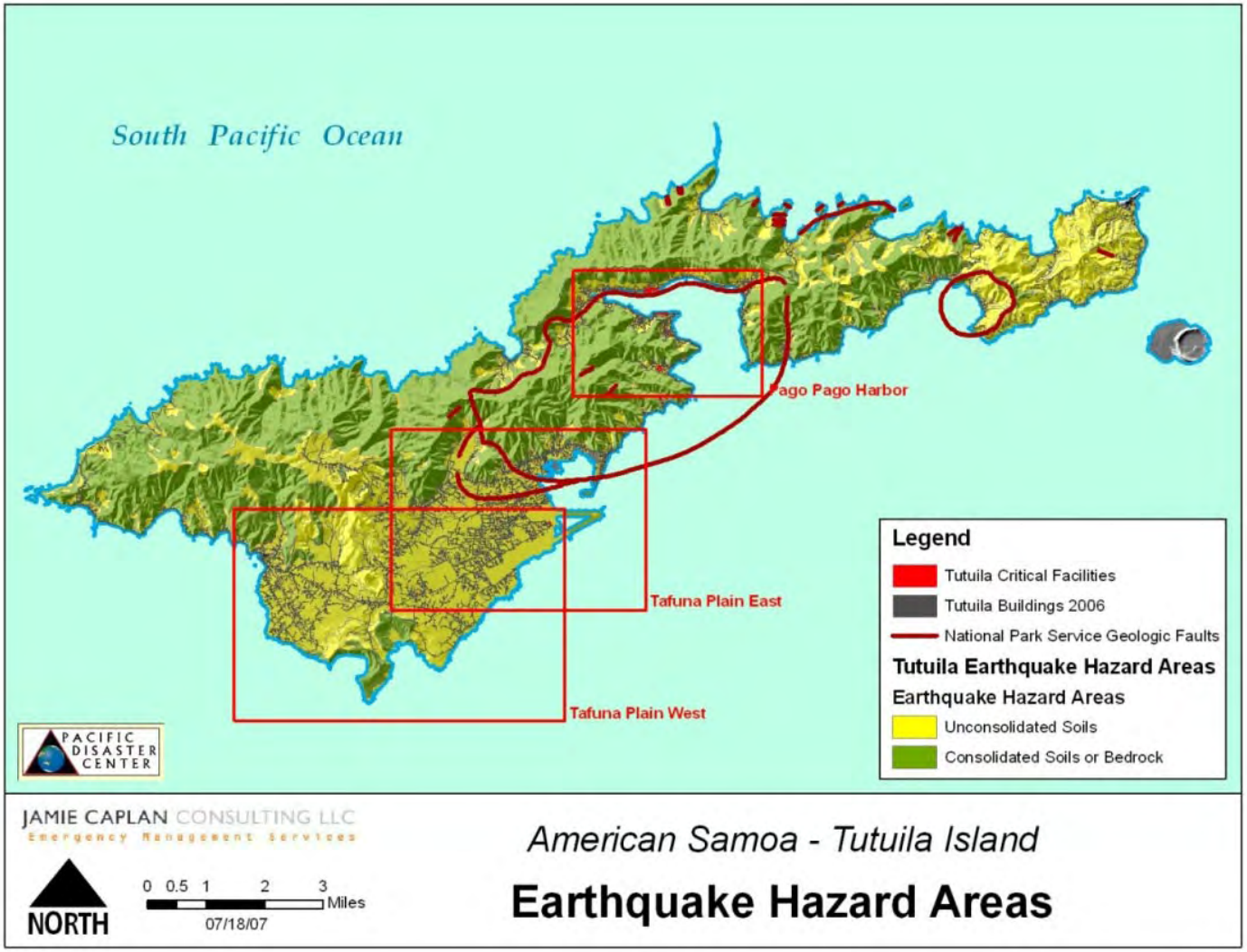
3.9.6. Fault explanations

Description: The Geologic Faults of the National Park of American Samoa, Territory of American Samoa data (NPSAFLT) consists of fault arcs. The data were completed as a component of the Geologic Resources Evaluation (GRE), a co-operative program between the Natural Resources Information Division (NRID) Inventory and Monitoring Program (I&M) and the Geologic Resources Division (GRD) of the National Park Service (NPS). The spatial data (coverage/theme) was produced from a georeferenced .TIF image (300dpi) of the source map from a paper copy. The coverage/theme (NPSAFLT) was

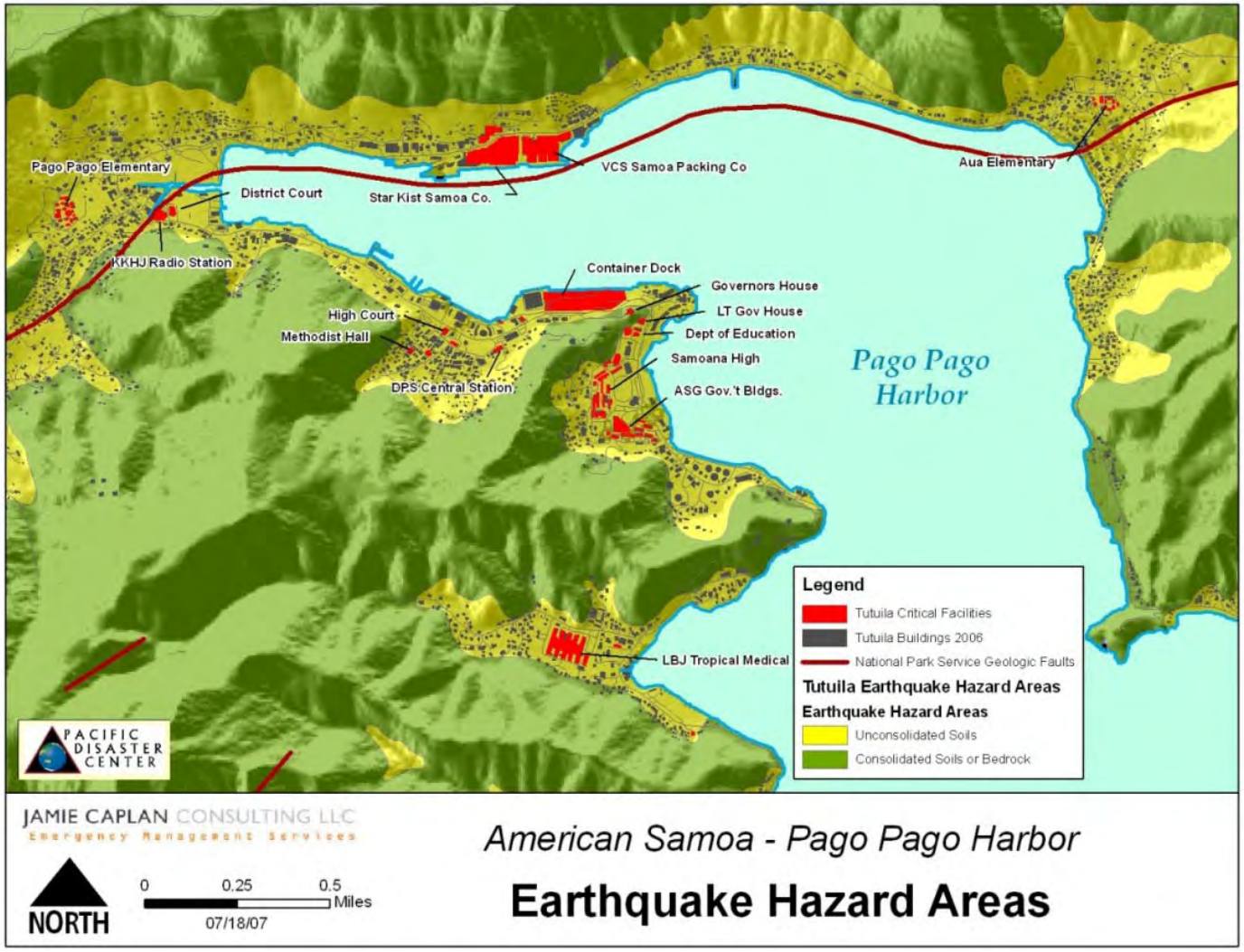
attributed as per the NPS GIS-Geology Data Model. An indexed ArcInfo .E00 (export) coverage file and an ArcView 3.X .SHP theme were then also created. The coverage/theme is within the area of interest of National Park of American Samoa. The coverage/theme is in NAD83, UTM Zone 2S.

Purpose: Data intended to assist NPS personnel in the protection and management of National Park of American Samoa.

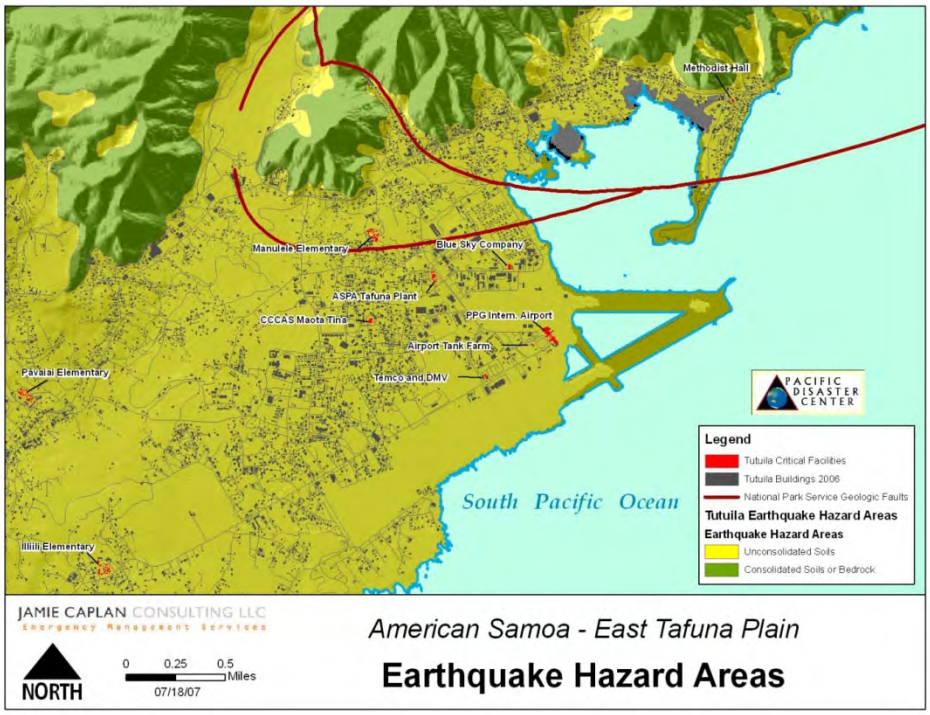
Supplemental_Information: The Geologic Faults of the National Park of American Samoa, Territory of American Samoa coverage/theme (NPSAFLT) is a component of the Geologic Map of the National Park of American Samoa, Territory of American Samoa. Other coverages/themes that comprise the Geologic Map of the National Park of American Samoa, Territory of American Samoa include: NPSAGLG (area geologic units and contacts), NPSAATD (geologic attitude observation points), NPSADKE (geologic dikes), NPSAVLN (volcanic lines), NPSAVNT (volcanic points) and NPSASEC (geologic cross section lines). Two accessory data tables, NPSAGLG1 (accessory geologic unit data) and NPSAMAP (source map information), are also considered map components.



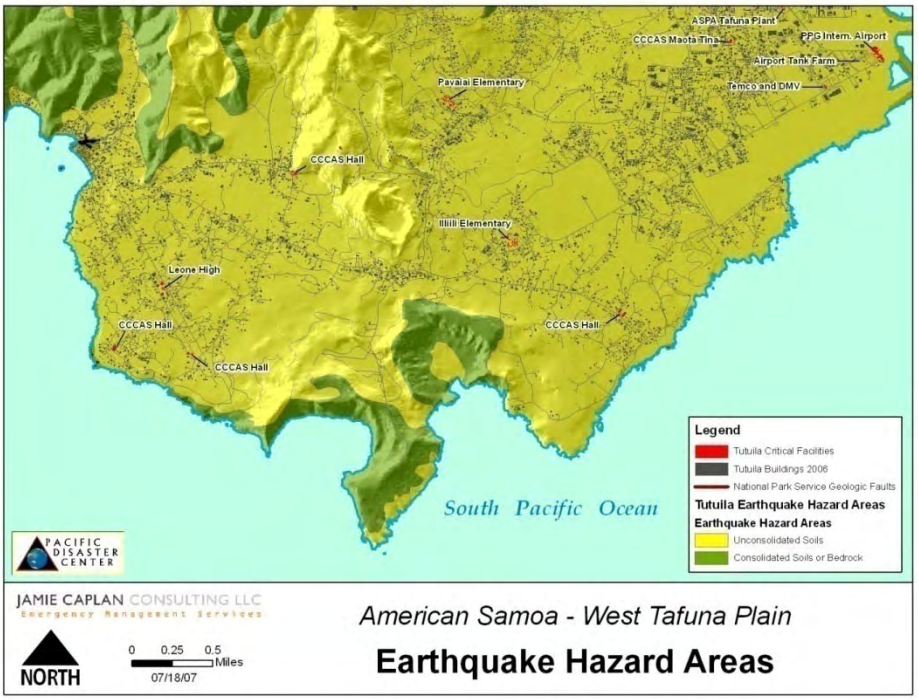
Map 6 Tutuila Island Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.)



Map 7 Pago Pago Harbor Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.)



Map 8 East Tafuna Plain Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.)



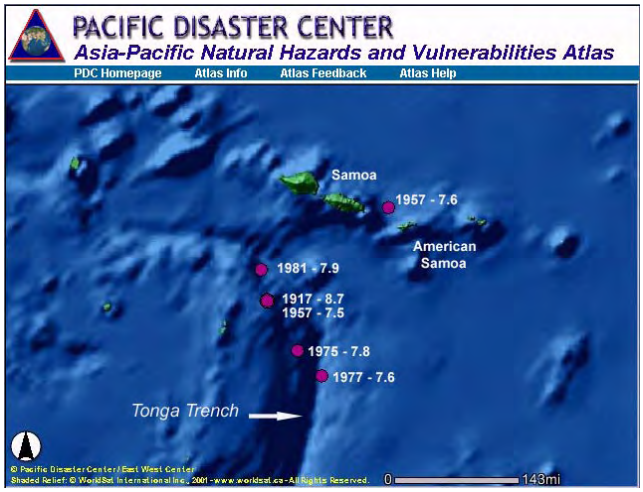
Map 9 West Tafuna Plain Earthquake Hazard Areas (Buildings on unconsolidated soils, shown in yellow, will shake stronger in earthquakes than buildings built on bedrock.)

3.9.7. History of Earthquake

Earthquakes occur rather frequently in the area around American Samoa. However, their impact to the islands is limited. A 1957 earthquake measuring magnitude 7.6 on the Richter scale, northwest of American Samoa may have an erroneous location and will require additional investigation. Earthquake history to the south and west of American Samoa is well documented for the Tonga-Kermadec trench. No deaths or injuries have been associated with historic earthquake activity, and no damage reports were available for inclusion in this report. While not considered insignificant, earthquakes affecting American Samoa have not achieved the same impact as other hazards mentioned in this report.

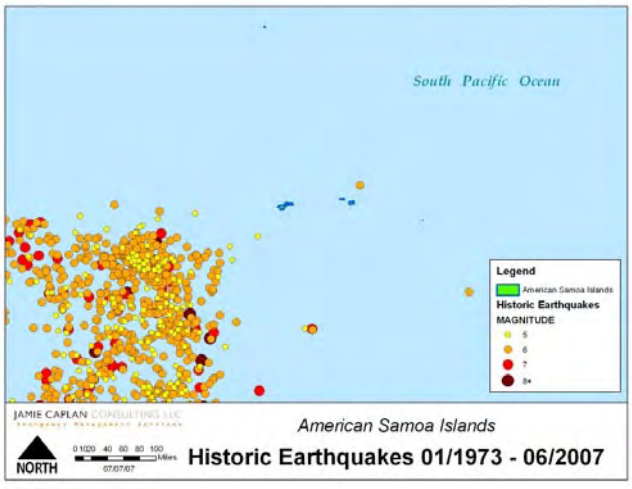
Map 10 below shows the Historical Earthquakes near American Samoa as represented by the Pacific Disaster Center, Asia-Pacific Natural Hazards and Vulnerabilities Atlas.

Map 11 was produced for the 2007 Updated and Revised Mitigation Plan with data from the Geologic Resources Evaluation (GRE), a co-operative program between the Natural Resources Information Division (NRID) Inventory and Monitoring Program (I&M) and the Geologic Resources Division (GRD) of the National Park Service (NPS).



Map 10 Historic Earthquakes 1[29]

Map 11 Historic Earthquakes 2[30]



[29] Asia-Pacific Natural Hazards and Vulnerability Atlas, 2001.
[30] Asia-Pacific Natural Hazards and Vulnerability Atlas, 2001.

3.10. Flood

3.10.1. Introduction to Flood

Flooding is a localized hazard that is generally the result of excessive precipitation. Floods generally fall into two categories: flash floods, the product of heavy localized precipitation in a short time period over a given location, usually associated with thunderstorm activity; and general floods, caused by precipitation over a longer time. Flooding is the most common environmental hazard, due to the widespread geographical distribution of valleys and coastal areas, and the population density in these areas.

3.10.2. Profile of Flood

3.10.2.1. Flash Flooding

Flash floods occur within a few minutes or hours of heavy amounts of rainfall and can destroy buildings, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides and landslides. Most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Although flash flooding often occurs in mountainous areas, it is also common in urban centers where much of the ground is covered by impervious surfaces. Roads and buildings generate more runoff than tropical forestland. Fixed drainage channels in urban areas may be unable to contain the runoff that is generated by relatively small but intense rainfall events.

3.10.2.2. Sheet Flooding

Sheet flooding is a condition where storm water runoff forms a sheet of water to a depth of six inches or more. Sheet flooding and ponding is often found in areas where there are no clearly defined channels and the path of flooding is unpredictable. Most floodplains are adjacent to streams or oceans; although, almost any area can flood under the right conditions where water may accumulate.

3.10.2.3. Coastal Flooding

Coastal flooding brought about by high surf, storm surge associated with tropical cyclone activity, or tsunamis can cause significant damage to beaches and low-lying coastal areas. Storm surge may overrun barrier islands and push seawater up coastal rivers and inlets, blocking the downstream flow of inland runoff. Escape routes, particularly from barrier islands, may be cut off quickly, stranding residents in flooded areas and hampering rescue efforts.

3.10.2.4. Urban Flooding

Urban flooding is usually caused by heavy rain over a short period of time. As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Since sidewalks and roads are non-absorbent, rivers of water flow down streets and into sewers. Urbanization increases runoff two to six times over what would occur on natural terrain. This high volume of water can turn parking lots into lakes, flooding basements and businesses, and cause lakes to form in roads where drainage is poor or overwhelmed.

Urban flooding occurs where there has been development within stream floodplains. This is partly a result of the use of waterways for transportation purposes in earlier times. Sites adjacent to rivers and coastal inlets provided convenient places to ship and receive commodities. The price of this accessibility has increased flooding in the ensuing urban areas. Urbanization intensifies the magnitude and frequency of floods by increasing impermeable surfaces, amplifying the speed of drainage collection, reducing the carrying capacity of the land and, occasionally, overwhelming sewer systems.

3.10.2.5. Riverine Flooding

Periodic flooding of lands adjacent to non-tidal rivers and streams is a natural and inevitable occurrence. When stream flow exceeds the capacity of the normal watercourse, some of the above-normal stream flows onto adjacent lands within the floodplain. Riverine flooding is a function of precipitation levels and water runoff volumes within the watershed of a stream or river. The recurrence interval of a flood is defined as the average time interval, in years, expected to take place between the occurrence of a flood of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

3.10.2.6. Floodplains and Flood Zones

Floodplains are divided into zones that experience different levels of flooding depending on elevation. A 100-year flood will inundate the 100-year zone of that floodplain. A 500-year flood will inundate the 500-year flood zone, which is higher in elevation than the 100-year floodplain. The chance of a 100-year flood occurring in any given year is 1%; and for a 500-year flood, the chances drop to 0.2% for any one-year period. The U.S. Army Corps of Engineers calls a 100-year flood an Intermediate Regional Flood, while a Standard Project flood describes a major flood that could be expected to occur from a combination of severe meteorological and hydrologic conditions. Most dam and flood-related structures have been designed to meet 100-year flood conditions.[31]

In May 1991, Flood Insurance Rate Maps (FIRMs) were published by FEMA for American Samoa in support of the National Flood Insurance Program designating zones according to potential risk and impact due to flooding. Although an all-inclusive description of FEMA flood zones is not included in this document, brief descriptions of the zones appearing on the FIRMs for the Territory are as follows:

3.10.2.7. Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations (BFEs) or depths are shown within this zone. Mandatory flood insurance purchase requirements apply.

3.10.2.8. Zone AE and A1-A30

Zones AE and A1-A30 are the flood insurance rate zones that correspond to the 100-year floodplains determined in the Flood Insurance Study by detailed methods. In most instances, BFEs derived from the

[31] North Carolina Division of Emergency Management. *Flooding.* Online. Available: http://www.dem.dcc.state.nc.us/mitigation/flood.htm [June 2003].

detailed hydraulic analyses are shown at selected intervals within this zone. Mandatory flood insurance purchase requirements apply.

3.10.2.9. Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone, and mandatory flood insurance purchase requirements apply.

3.10.2.10. Zones B, C, and X

Zones B, C, and X are the flood insurance rate zones that correspond to areas outside the 100-year floodplains, areas of 100-year sheet flow flooding where average depths are less than one foot, areas of 100-year stream flooding where the contributing drainage area is less than one square mile, or areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

3.10.3. Probability of Occurrence and Magnitude of Flooding Event

Research of historical rainfall, flood occurrences, tropical cyclone activity, reported damages due to flooding and analysis of ENSO events contributed to the determination of probable occurrence for flooding in American Samoa.

There are numerous accounts of flooding events during the 1960s, 1970s and 1980s, primarily brought about by isolated heavy showers (see Hazard Identification Summary Matrix). All of these were a result of localized atmospheric dynamics occurring at random, rather than organized tropical cyclones moving through the area. In many instances, significant precipitation, generally falling over a period of one to three days, totaled near 15 inches in many of these accounts, with at least one flood having over 20 inches of rainfall. With regard to these floods and the ENSO cycle, the most frequent floods during the past 50 years disassociated with tropical cyclone activity occurred during those years that are rated neutral, trending neither toward warm or cold cycles of ENSO.

During El Niño years, there is an increased chance for flooding when tropical storms or hurricanes come close to, or impact American Samoa. On the other hand, without the tropical cyclone factor, there are less frequent localized flooding events caused by thunderstorm flooding during El Niño years. During the La Niña phase of ENSO, there are fewer tropical cyclones, leading to a lower probability for flooding rainfall. In contrast, there is often more thunderstorm activity during La Niña periods, suggesting an increased flood potential from that source.

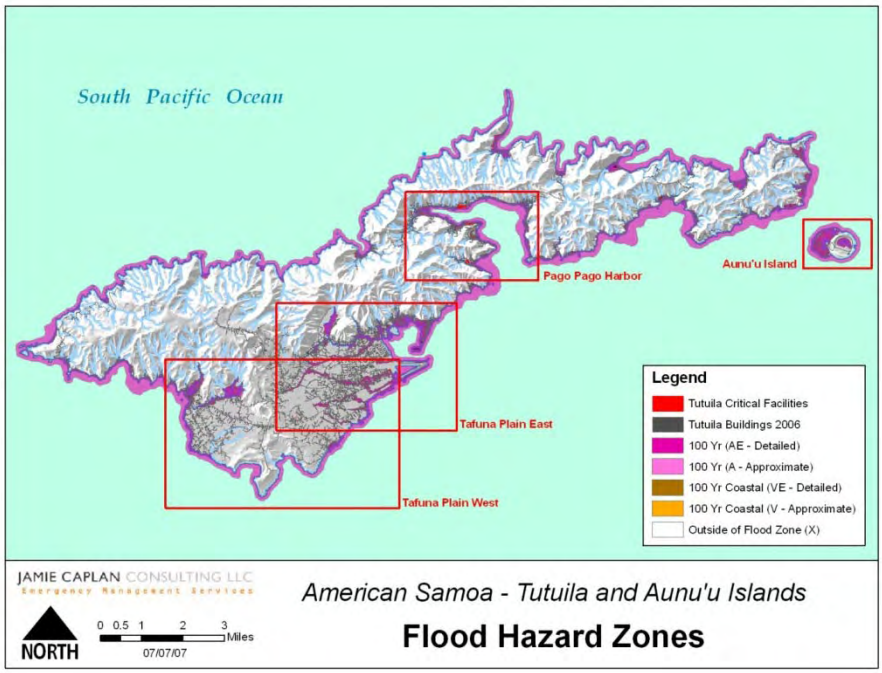
The probability of flooding rainfall can be high to very high with the arrival of any tropical cyclone, ranging from a tropical depression to the most dynamic of hurricanes with 100+ mph winds. Without this influence, there is an 11% probability per year for flooding due to heavy rainfall occurring in those areas designated as AE on FEMA's Flood Insurance Rate Maps for American Samoa.

The likelihood of inland and coastal flooding can be severe during tropical cyclones. Heavy rainfall associated with tropical storms and hurricanes can result in riverine flooding, shallow area flooding, and ponding in low-lying areas. Saturation of soil can also lead to landslides. High surf and storm surge

caused by high winds can cause significant erosion of beaches, sea cliffs, and coastal roads, and inundation of low-lying coastal areas.

Flooding is an increasingly serious problem in many areas of American Samoa, and a number of factors exacerbate this problem. Steep terrain in some areas results in high velocity stream flow. Shallow or ill-defined stream channels can rapidly overflow leading to overbank flooding, and urban development exaggerates these flooding extremes, since grading of the land can promote changes in drainage direction in streams. In some cases, stream channels have been redirected or moved to accommodate buildings, and this has caused sharp bends in the stream flow. Inadequately sized culverts are unable to accommodate stream flows during intense rainfall, causing a backup of floodwaters. Coastal roads are particularly vulnerable to flooding due to high surf, storm surge associated with tropical cyclones, or tsunamis. Lush vegetation and highly absorbent soil are two conditions that decrease vulnerability to flood hazards in American Samoa.

Map 12 shows the flood hazard zones in American Samoa.



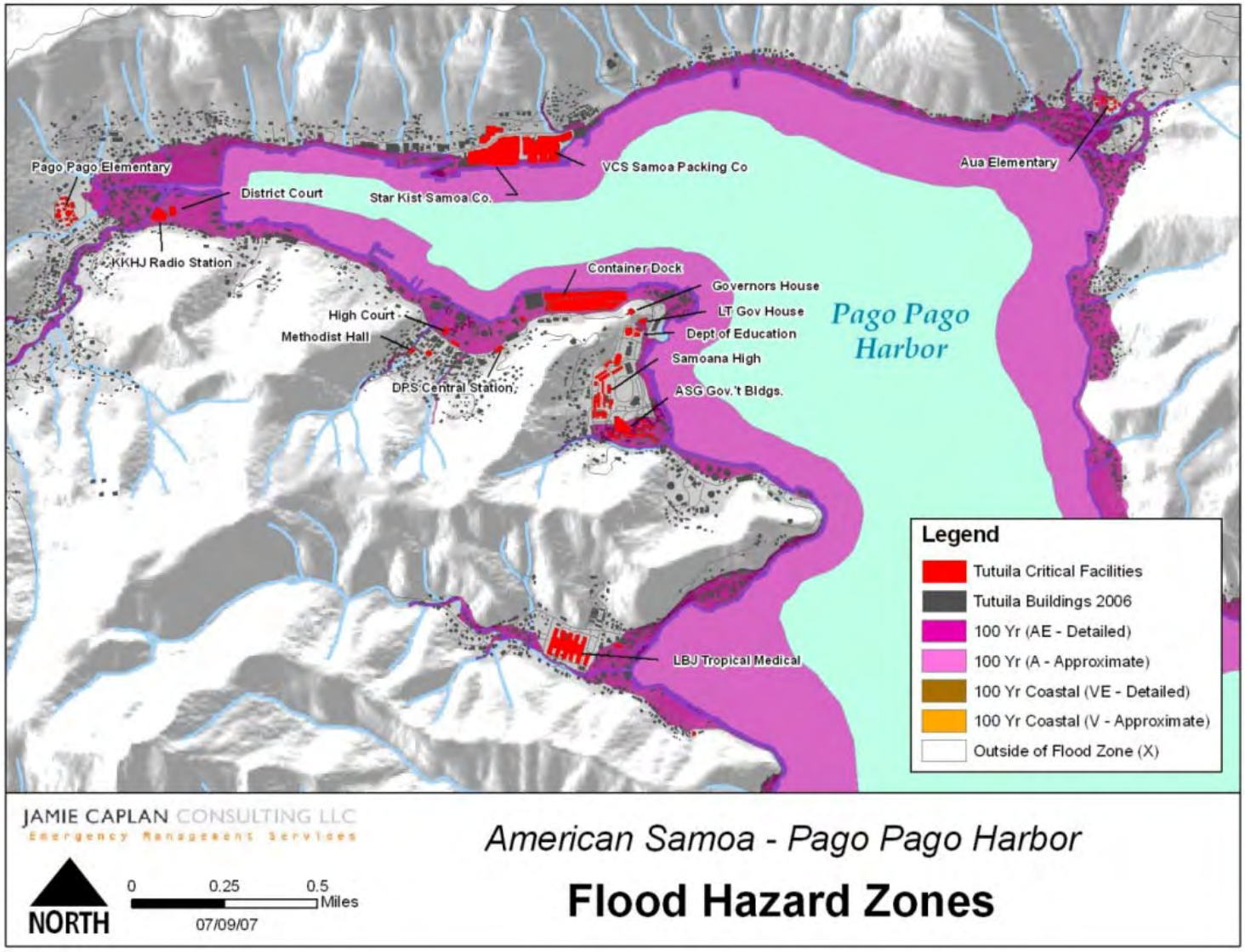
Map 12 Tutuila and Aunu'u Islands Flood Hazard Zones

(Index map for Maps 13 to 20)

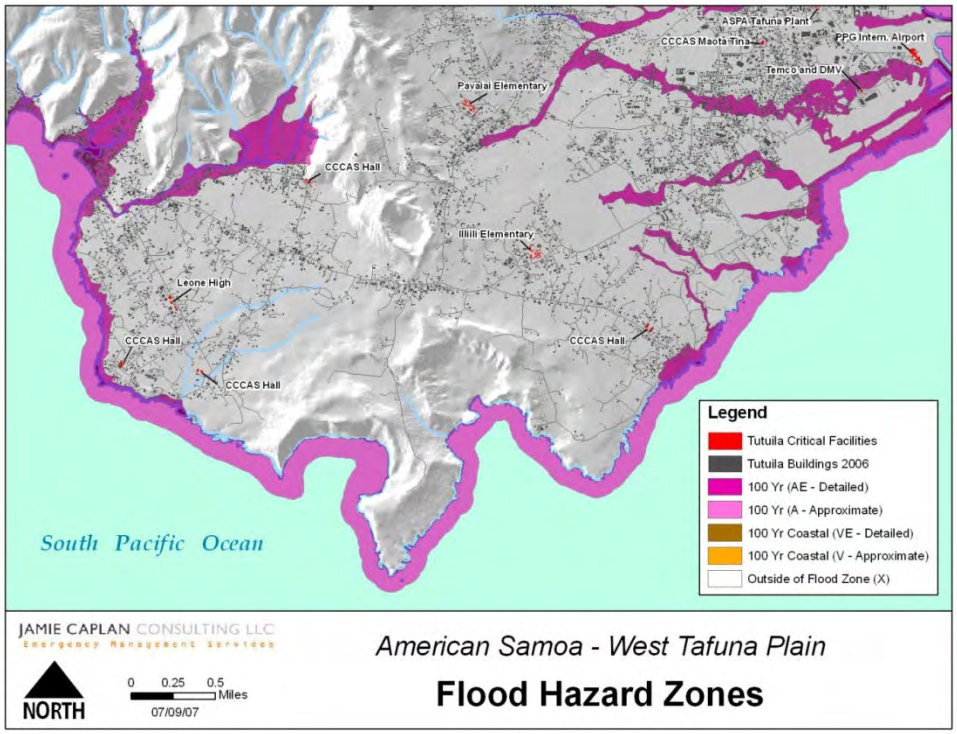
Maps 13 through 20 show the extent of potential flooding in American Samoa.

Each of the maps uses a similar legend and shows critical facilities in red. The 100-year flood zones are color coded.

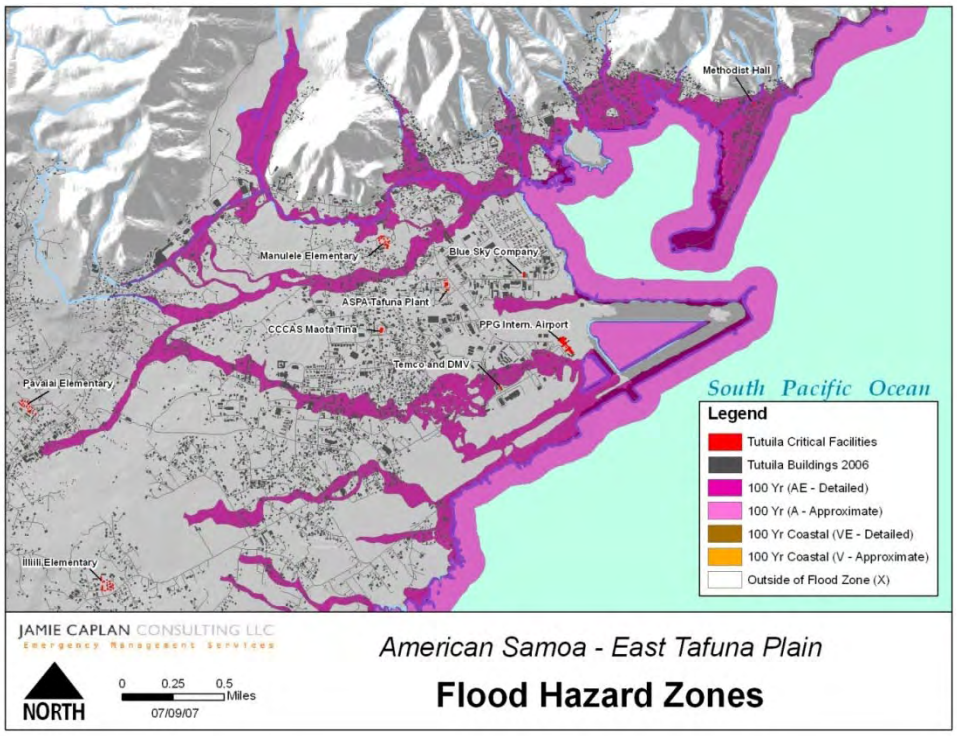
A narrow band along the entire north shore and much of Tutuila's south shore lie in the 100-year floodplain. In addition, significant portions of the Tafuna Plain are particularly vulnerable to riverine or urban flooding. The next three maps show detailed enlargements of areas in Tutuila particularly prone to floods with high population concentrations, as well as critical facilities. A number of critical facilities including airport buildings, utilities, and a school are near, but not in the 100-year flood zone. Several government buildings lie in the 100-year flood zone, and are vulnerable to riverine flooding.



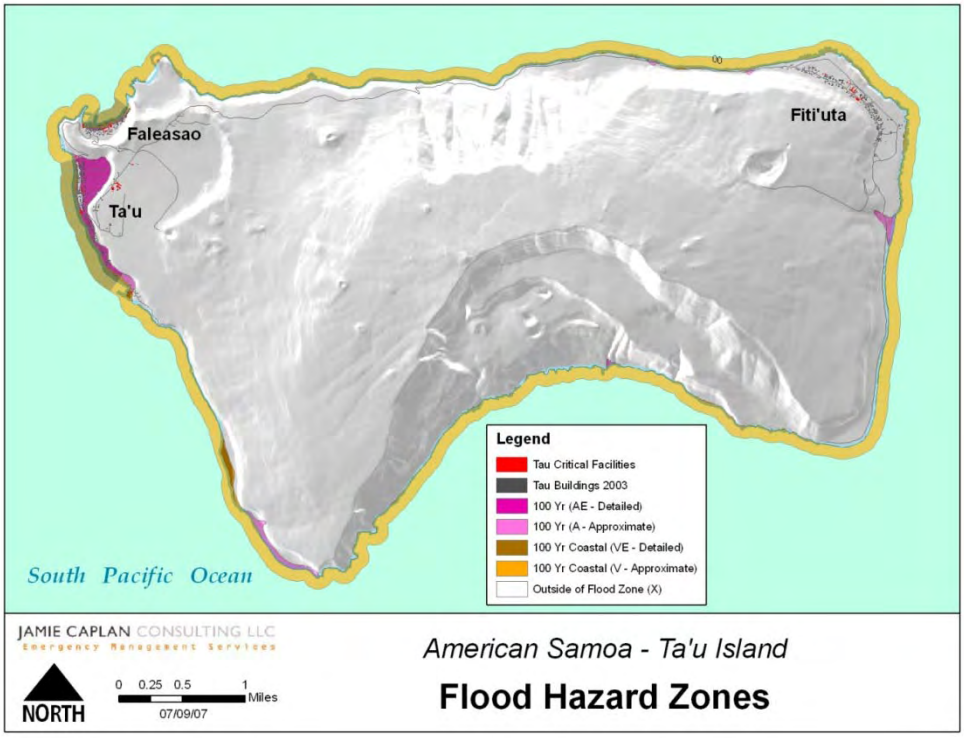
Map 13 Pago Pago Harbor Flood Hazard Zones



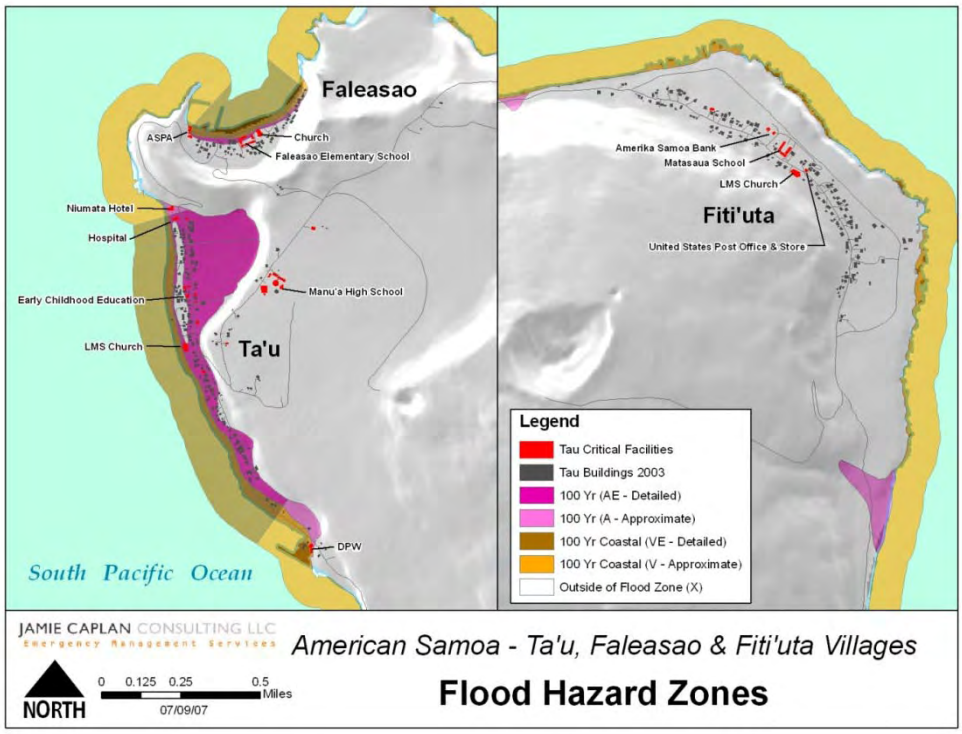
Map 14 West Tafuna Plain Flood Hazard Zones



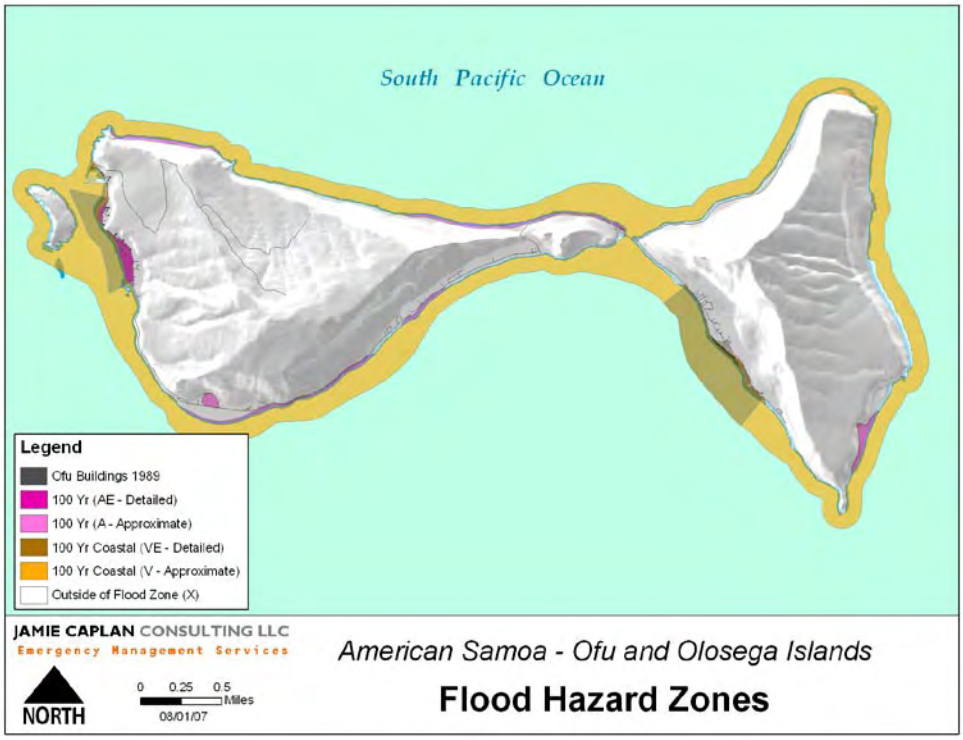
Map 15 East Tafuna Plain Flood Hazard Zones



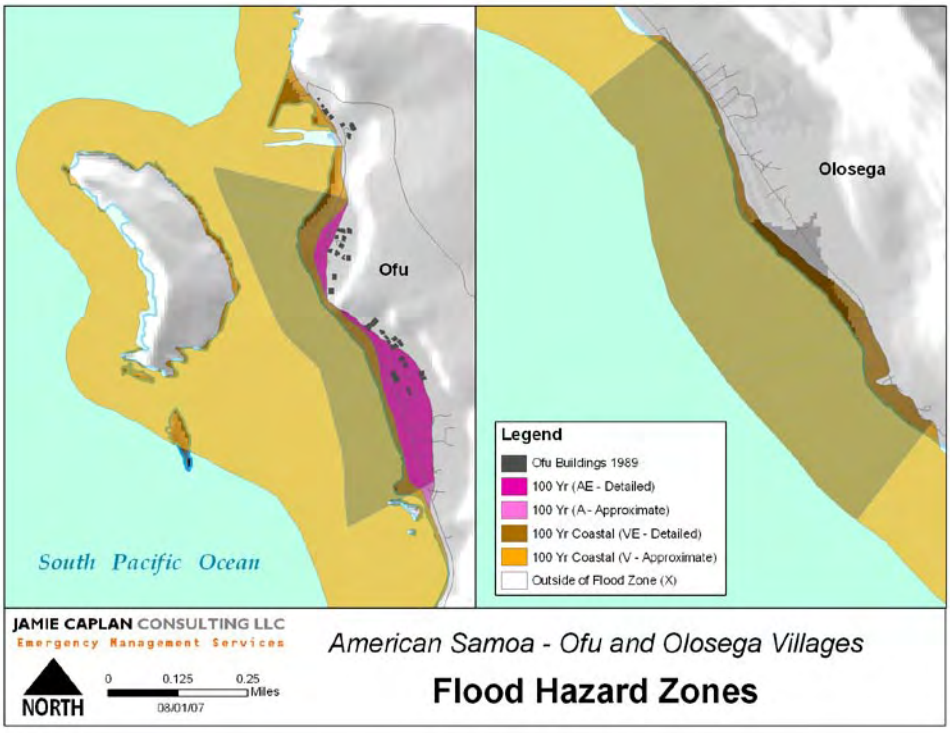
Map 16 Ta'u Island Flood Hazard Zones



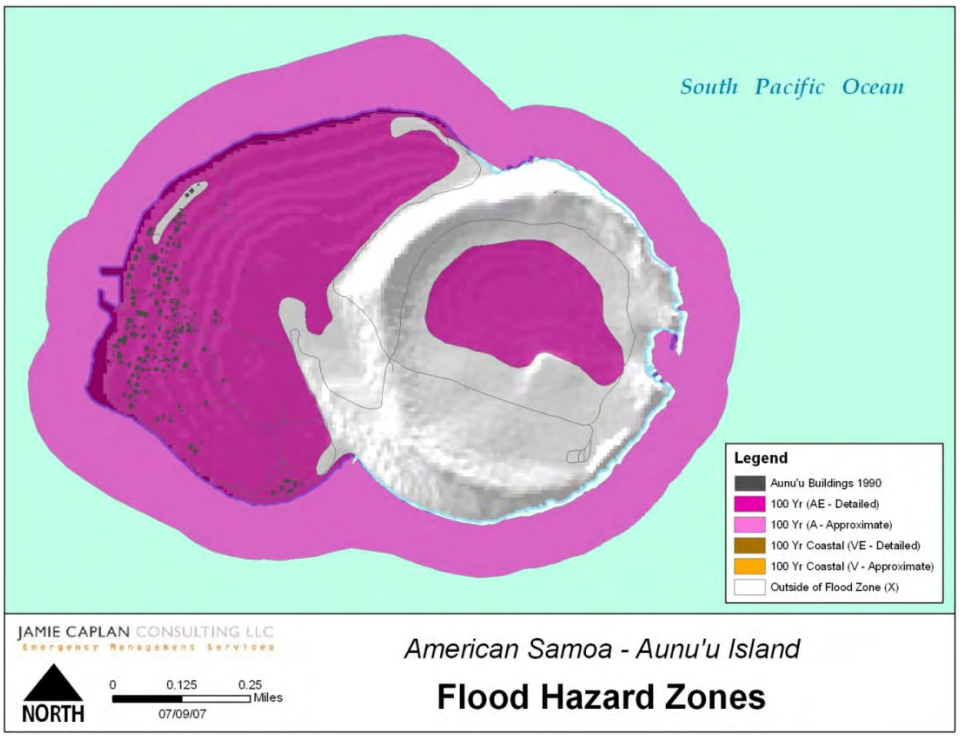
Map 17 Ta'u, Faleasao & Fiti'uta Villages Food Hazard Zones



Map 18 Ofu and Olosega Islands Flood Hazard Zones



Map 14 Ofu and Olosega Villages Flood Hazard Zones



Map 20 Aunu'u Island Flood Hazard Zones

3.10.4. History of Flood

The most notable weather elements that influence disastrous flooding in the islands of American Samoa include heavy thunderstorms, generally associated with low-pressure systems, both at the surface and aloft. These tropical downpours can occur as isolated incidents or in conjunction with tropical cyclones that come close to the islands. These downpours are of fairly short duration, but can release large volumes of water that at times cause flooding in low-lying areas, especially at the base of gulches, and in places where ponding is caused by faulty or inadequate drainage systems in low-lying urban areas.

Inland floods occur regularly in American Samoa, especially during the rainy season of December through March. They are primarily caused by excessive or prolonged rainfall combined with inadequate drainage capacity. As expected, urban flooding on Tutuila is most noticeable around population centers. This type of flooding has become more widespread in recent years due to population increases.

Tropical cyclones are sources of serious coastal flooding on American Samoa's low-lying shores due to battering high surf and storm surge, while tsunamis are a dangerous but less frequent threat to coastal areas. Table 12 shows a summary of significant flooding events in American Samoa.

Table 12: Summary of Significant Flooding Events

Event Name, Date	Geographical Extent	Impacts	Deaths/ Injuries	Estimated Losses ($)
Flood October 9, 1967	Throughout Tutuila	Flooding, landslides, electrical power failures. Damaged roads, culverts, and homes. 7.5 inches rain at Pago Pago Airport.	0/0	
Flood December 26, 1969		Roads blocked.	0/0	$25,000 to clear roads
Flood May 3, 1985	Pago Pago village, Tutuila	Extensive damage to Pago Pago village.	0/0	$60,000 public damages. $40,000 to businesses
Flood May, 2003	Pago Pago, Fagatogo, Nu'uuli, Fagaalu, and Utulei, Tutuila.	Heavy rainfall (10.68 inches at Pago-Pago on May 19) caused widespread (10+) debris flows, rock falls, and slumps. Deaths were a result of the landslide hazard, while property damage was mostly flood related. FEMA DR# 1473 Heavy Rainfall, Flooding, Landslides, and Mudslides	5 deaths due to landslide /No official injury report to date	$9.4 million

3.10.4.1. Flood (1967)

On October 9, 1967, a thunderstorm brought flooding rainfall to Tutuila, causing landslides, electrical power failures, damage to roads, culverts, and residences. The Pago Pago airport weather station recorded 7.5 inches of precipitation.

3.10.4.2. Flood (1969)

On December 26, 1969, an intense storm brought heavy rainfall that blocked roads with debris causing clean up costs of $25,000.

3.10.4.3. Flood (1985)

On May 3, 1985, Pago Pago village sustained extensive damage due to flooding. Thirteen residences, five businesses, and several public facilities were flooded, causing $60,000 in public damages, and $40,000 of damage to businesses. The local Red Cross chapter provided assistance to a number of families during this event.

3.10.4.4. Flood (2003)

FEMA Disaster #1473. Between May 19-21, 2003, heavy rainfall caused flooding, landslides, and mudslides on the Island of Tutuila near Pago Pago, Fagatogo, Nu'uuli, Fagaalu, and Utulei, prompting the

Territory to declare an emergency. Rainfall on May 19 at Pago-Pago totaled 10.68 inches. Widespread debris flows, rock falls, and slumps occurred due to the extremely heavy rains. Five people were killed in landslides, although much of the property damage was flood related. FEMA declared American Samoa a disaster area on June 6, 2003, and estimated damages of $9.4 million as of August 21, 2003.

The declaration covers damage to private and public property from heavy rains, flooding, and mud and landslides that occurred May 19-21. The American Samoa Government (ASG) and the Federal Emergency Management Agency announced that over $3,500,000 has been made available to the residents of American Samoa.

After the declaration, FEMA designated the island of Tutuila eligible for federal aid to stricken residents that can include grants to help pay for temporary housing, home repairs and other serious disaster-related expenses. Low-interest loans from the U.S. Small Business Administration will also be available to cover residential and business losses not fully compensated by insurance.

In addition, FEMA said federal funds will be provided for the territory and affected local governments on the island of Tutuila to pay 75 percent of the approved costs for debris removal, emergency services related to the disaster, and the restoration of damaged public facilities.

Under the declaration, cost-shared funding will be available to the territorial government for approved projects that reduce future disaster risks, FEMA said. President Bush indicated that additional areas may be designated for aid later if requested by the Territory and warranted by the results of further damage assessments.

Over 1,300 residents have registered for disaster assistance since President Bush declared the disaster. Almost 1,900 residents have visited the Disaster Recovery Center (DRC) located at the Lee Auditorium. The rain and mudslides claimed four lives and left several other people severely injured.

3.11. Hazardous Materials

According to Faamao Asalele Jr., Manager, Air and Land Division, American Samoa Environmental Protection Agency, “in terms of quantity and volume there is very small numbers of hazardous materials currently on Island or being imported into the Territory that are of great danger.” However, often times the most dangerous hazardous materials are being abandoned which creates a safety and health issue to nearby dwellings and to the environment. Abandoned hazardous materials or hazardous waste have the potential to impact public health, streams, coastal waters, can destroy our coral reefs, groundwater resources, and degrade of our quality of life if they are not applied, handled and stored properly in accordance with the label.

Abandoned hazardous materials/waste is often disposed of by the American Samoa Environmental Protection Agency (ASEPA) by using different types of neutralizing/diluting methods. On some occasions, US EPA has provided assistance as to the proper disposal of some of the few lethal hazardous materials/waste that ASEPA was able to identify.

ASEPA is currently working collaboratively with ASPA and Department of Port Administration on proper measures to remove the existing scrap metal site to a new permanent site and to restore the old site by conducting bio-remediation work. This is an on-going effort and until American Samoa can secure a new location for the new scrap metal facility, the old site remains hazardous in the event of a natural disaster. Two schools and a popular fast food restaurant (McDonalds) are located in close proximity to the scrap metal site.

Further, ASEPA is in the process of providing Department of Education compliance assistance on properly managing quantity and volume of purchased laboratory chemicals. In the past 3 to 4 years, ASEPA, with the assistance of US EPA continues to collect old chemicals from high school Laboratories Island wide for disposal. Unfortunately, not all chemicals can be disposed on Island and have to be stored properly until other disposal or shipping measures are arranged or established.

According to the Federal Register notice of July 1, 1994, the impact of a complete discharge of the largest tank of 54,293 barrels (2,280,306 gallons) would affect a radius of five (5) miles. This would impact the entire harbor, including all environmentally sensitive and all vulnerable areas. However, this is unlikely since all tanks are held within a diked area. In the event of a spill into the harbor, the actual impact would be highly dependent on currents, tides and the wind. The prevailing wind between 7 and 15 mph from the southeast will tend to push the oil to the western side of the harbor.[32]

3.12. Landslides

3.12.1. Introduction to Landslides

Landslides generally involve a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over-steepened slope is the primary reason for a landslide, there are other contributing factors:

- Erosion by rivers, road construction, or ocean waves that create over-steepened slopes
- Rock and soil slopes weakened through saturation by heavy rains
- Earthquakes that make weak slopes fail
- Earthquakes of magnitude 4.0 and greater have been known to trigger landslides
- Volcanic eruptions produce loose ash deposits
- Excess weight from accumulation of rock or ore, from waste piles, or from man-made structures may stress weak slopes to failure
- Slope material that becomes saturated with water may develop a debris or mudflow. The resulting slurry of rock and mud may pick up trees, houses, and cars, thus blocking bridges and tributaries causing flooding along its path.

3.12.2. Conditions that Impact Vulnerability to Landslides

Given the natural topography and history of landslides on Tutuila, a certain number of landslides will occur in the future. However, there are a number of conditions that increase or decrease the vulnerability of infrastructure, residential, and public buildings to damage from this hazard.

[32] Non-Transportation Related Facility Response Plan, January 2007 p.36.

Factors that increase vulnerability to the hazard:

- Clearing established vegetation from steep slopes.
- Cutting rock faces at near vertical angles.
- Excavation of large traditional housing pads on steep grades.
- Excavating for roadways without allowing for adequate drainage.
- Allowing water sources, such as water tanks or leaking water lines, to pool above slopes.

To help reduce vulnerability:

- Do not develop in the steepest of areas, such as those identified as high risk for landslides in the 1990 report and supporting maps. Many of these areas are currently unpopulated and undeveloped, so frequent slides cause little damage.
- Do not build below previous landslides or on their recent deposits.
- Leave locally occurring vegetation in place. Slides are relatively uncommon in areas that have not been cleared in some manner.
- Treat near vertical cut rock faces with screens, concrete guardrails, and so forth.
- Provide for the non-eroding drainage of house pads and roadways.

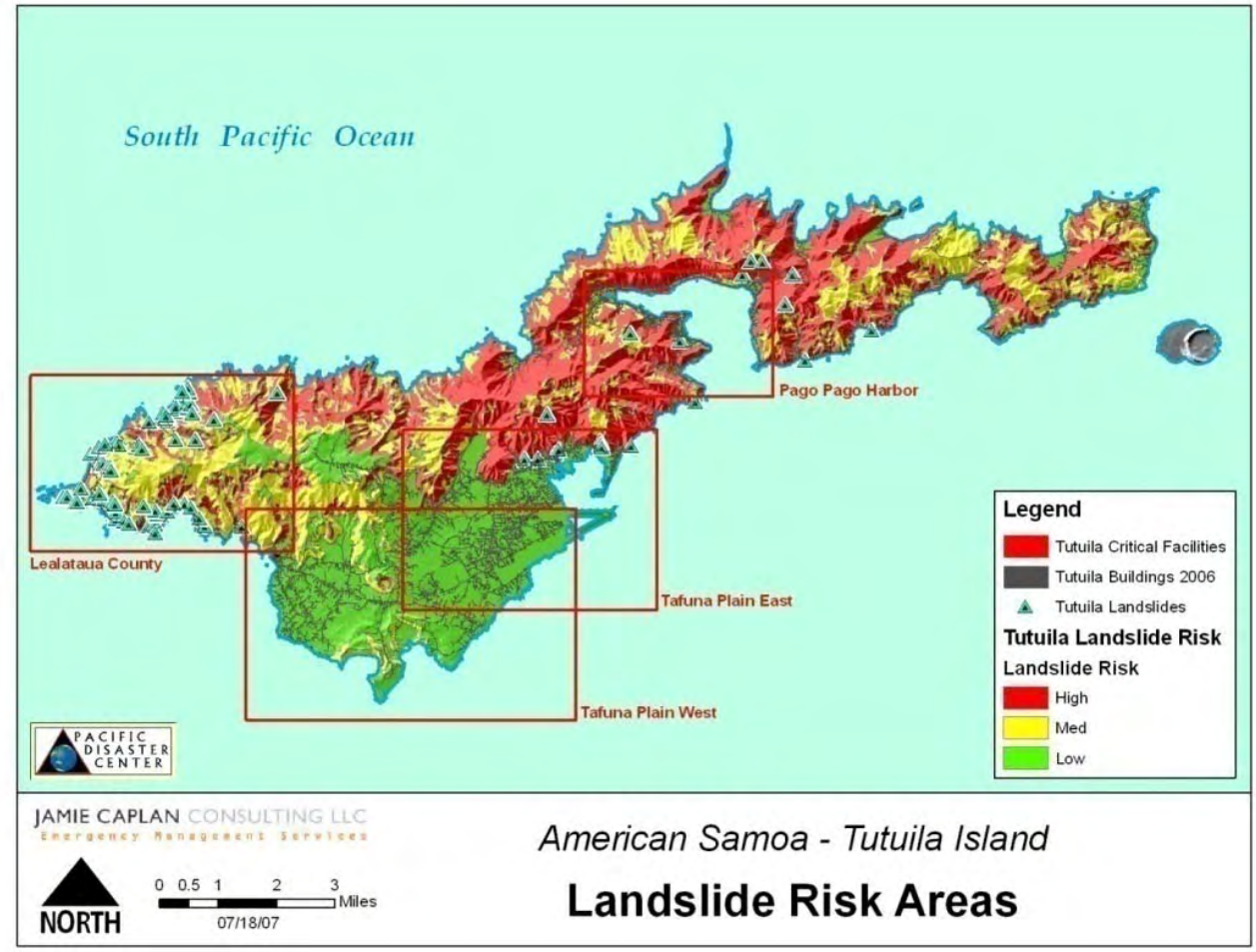
3.12.3. Probability of Occurrence and Magnitude of Landslide Events

Landslides in American Samoa are considered a medium magnitude hazard because:

- The slides are typically small (50 to 250 feet wide).
- They tend to affect the upslope edges of populated areas where the degree of slope begins to climb to a point of unsuitability for residential development.
- Their affects are not island-wide or particularly widespread at a single time.
- Most critical facilities are not in high-risk landslide areas.
- Deaths and property losses are still probable because slides usually occur without warning.
- Slides that threaten or temporarily block main roads are probable.

Because heavy rains tend to be the main trigger for Tutuila's landslides, the probability of the heaviest rain events were studied in order to determine how often the conditions contributed to landslides in a 24-year period between 1979 and 2003. Between heavy rains, flooding, and tropical cyclones, it is common for landslides to occur yearly; but they would be confined to the highest risk areas on the landslide risk map for Tutuila (Map 21). Based upon the frequency of historical events, the probability of occurrence for landslides is 20.8%.

Map 21 shows landslide risk for American Samoa and shows an index for the other landslide risk maps.



Map 21 Tutuila Island Landslide Risk Areas (Index map for Maps 22 - 25)

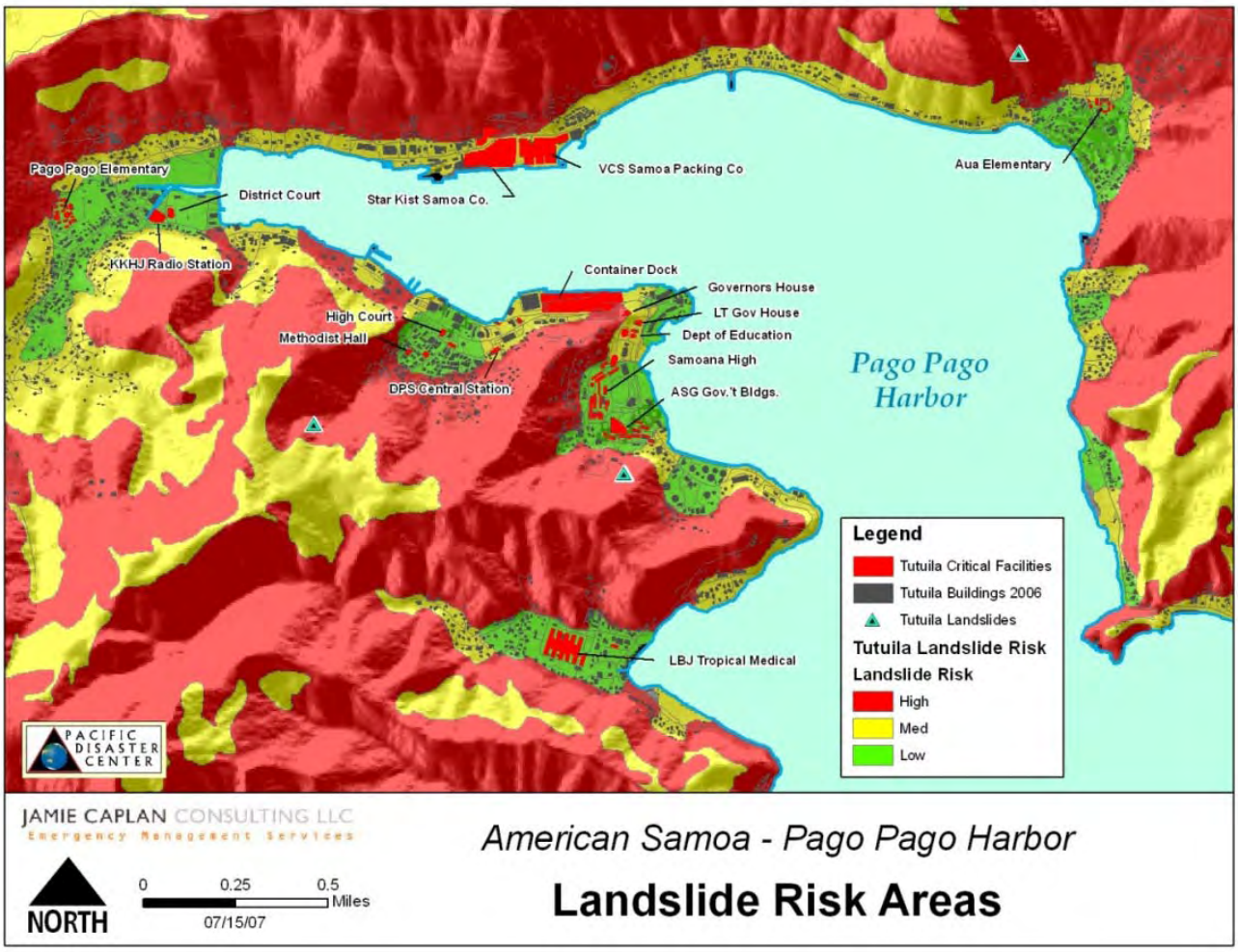
3.12.4. Geographical Extent of Landslides

The USDA/NRCS landslide risk map for the island of Tutuila distinguishes between three categories of risk. Low-risk areas are characterized by gentle slope (20% or less slope) and/or soils that are not slide prone and/or good vegetation cover. Structures in low-risk areas are not immediately down slope of, or built on, steep or moderate slopes. Medium-risk areas include structures that are immediately down slope of, or built on, steep slopes with less slide prone soils or are on/near moderate slopes (20% to 60% slope) with high slide-prone soils. High-risk areas are those that include structures immediately down slope of, or built on, steep slopes (60% to 80+% slope) with high slide-prone soils such as Aua or Fagasa. A lack of vegetation on these slopes also contributes to a "high" risk rating. Map 22 shows 42% of the island is classified as having a high landslide risk in red. Many of the steep slopes that rise toward the center of the island are considered high landslide risk, whereas the Tafuna Plain's gentler slope makes it a low landslide risk as noted in white. Medium-risk areas are depicted in yellow.

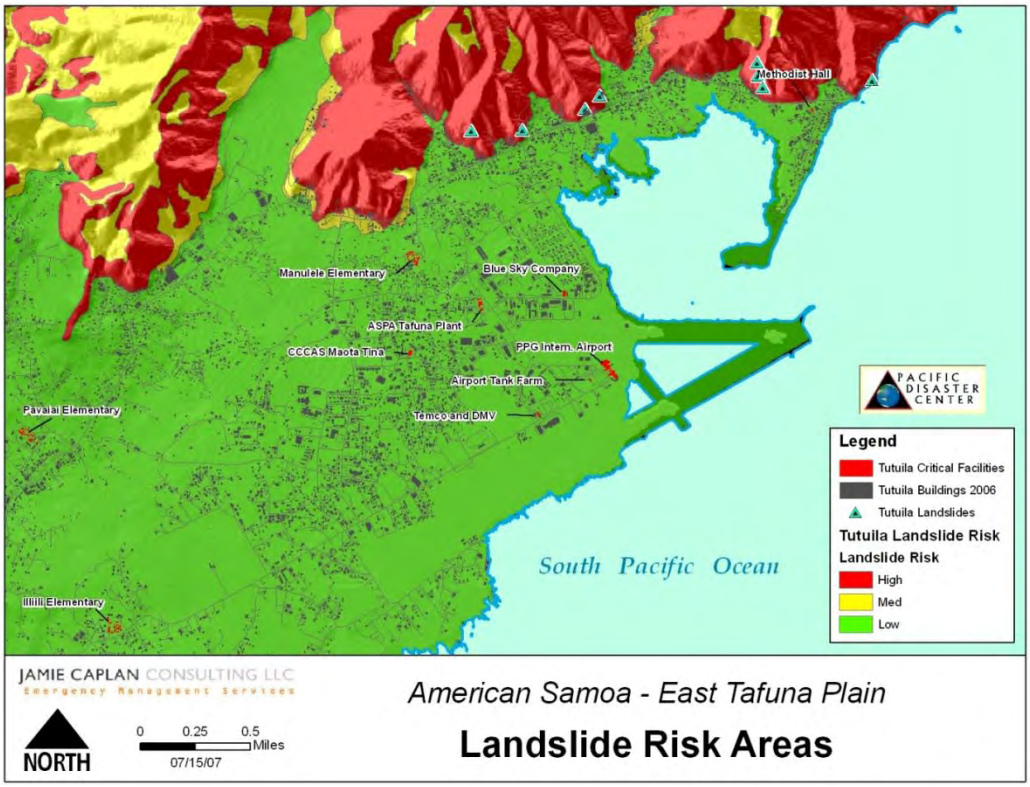
The detailed maps 22 to 25 show concentrations of population and critical facilities in areas of moderate to high landslide risk.

Map 20 depicts most of the cannery (in red) and a transportation building (Container Dock) in medium-risk areas surrounding Pago Pago Harbor.

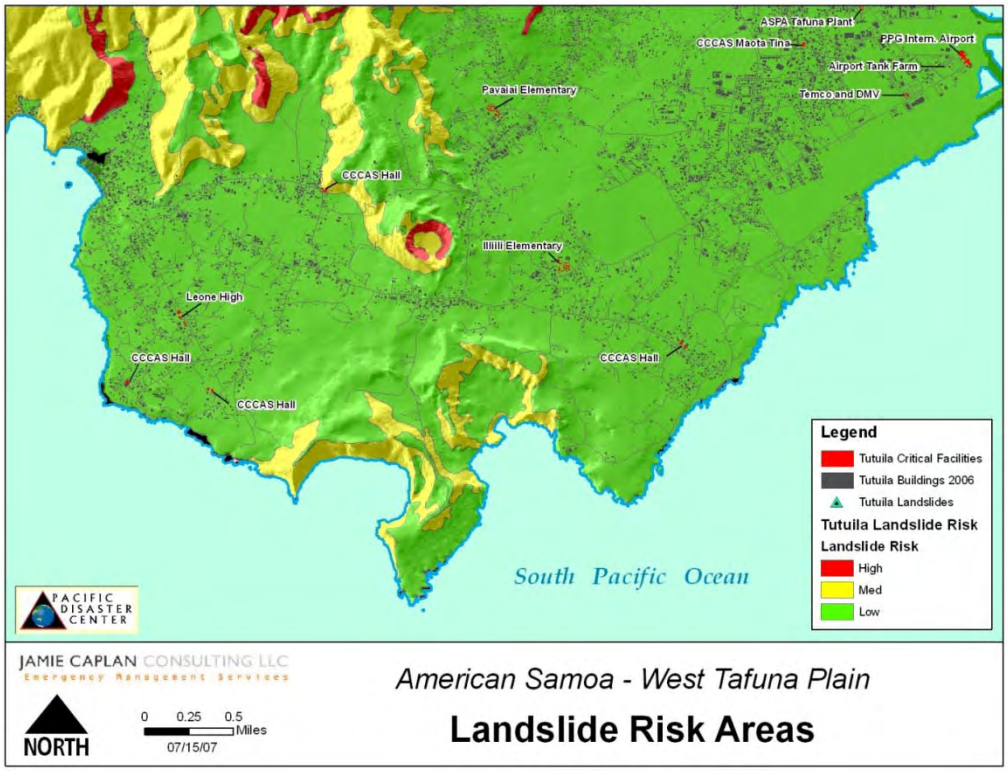
Map 23 shows several schools in very close proximity to high-risk landslide areas.



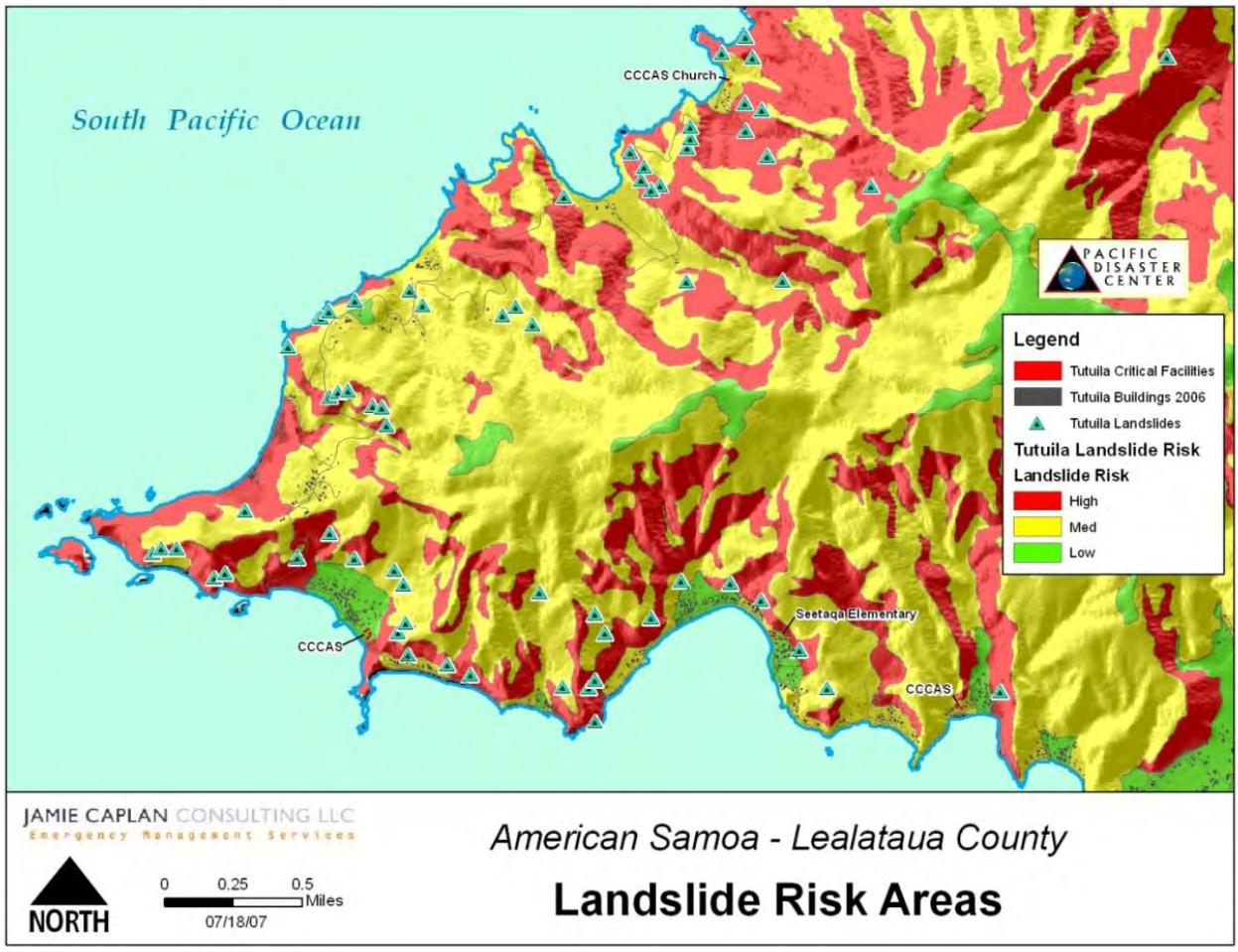
Map 15 Pago Pago Harbor Landslide Risk Areas



Map 16 East Tafuna Plain Landslide Risk Areas



Map 24 West Tafuna Plain Landslide Risk Areas



Map 25 Landslide Risk Areas Lealataua County

3.12.5. History of Landslides

On the island of Tutuila, landslides tend to be either naturally occurring steep slope failures or steep slope failures associated with slope cuts made for traditional road or building construction. Historically, most landslides occurred during very heavy rains. In February 1990, some 10 slides were seen following the wind and very heavy rains of Hurricane Ofa. The USDA/NRCS *Landslide Hazard Mitigation Study* published in October 1990 noted that: "Strong correlations were found between landslides and certain soils, geology, slopes, and vegetation. Slides were concentrated in areas of Fagasa and Aua soils, ash and talus geology, slopes greater than 60%, and where the natural vegetation had been disturbed. Concentrations of water from springs, runoff, or man's activities were often contributing factors to many slides." Table 13 shows a summary of significant landslide events.

Table 13: Summary of Significant Landslides Events

Event Name, Date	Number of Occurrences	Cause	Geographical Extent	Impacts	Deaths/ Injuries
Landslide October 28, 1979	60+	Rain storms	Western portion of Tutuila. Se'etaga debris flow	Four people killed in Se'etaga debris flow. Significant structural damage.	4/0
Landslide 1985	1	Rain storms	Nua, western Tutuila	School building destroyed.	0/0
Landslide February 2-4, 1990	10+	During Hurricane Ofa	Central ridge top, Tutuila	Most occurred along the central ridge top of Tutuila on extremely steep and largely inaccessible slopes. Most likely caused by heavy rain, and contributed to by the toppling of large trees carrying soil as they fell down slope.	0/0
Landslide Almost yearly	8	Rainfall	Aua-Afono Road, Tutuila	Aua-Afono Road blocked.	0/0
Landslide 2000	1	Rainfall	Nuu'uli-Pago Pago Road	Nuu'uli-Pago Pago Road rock fall.	1/0
Landslide May 19-21, 2003	10+	Heavy rainfall	Pago Pago, Fagatogo, Nu'uuli, Fagaalu, & Utulei, Tutuila.	Heavy rainfall caused widespread debris flows, rock falls, and slumps. Deaths were a result of the landslides, while most property damage was flood related.	5/0

3.12.5.1. Landslide (1979)

During the storms of 1979, 4 people were killed by the debris flow/landslide in Se'etaga, Tutuila.

3.12.5.2. Landslide (1985)

In 1985, a school building was destroyed in Nua, Tutuila.

3.12.5.3. Landslide (1990)

In September 1990, high winds and very heavy rain from Hurricane Ofa contributed to 10 landslides, although these slides were in mostly uninhabited areas.

3.12.5.4. Landslide (2000)

In 2000, a motorist was killed by a rock fall on the coastal road between Nuu'uli and Pago Pago. The sheer rock faces along this section of road make it a high-risk area, although some mitigation efforts had been put in place since the 1990 study. The road between Aua and Afono had at least eight separate slides associated with the construction of the road there.

3.12.5.5. Landslide (2003)

Between May 19-21, 2003, heavy rainfall caused flooding, landslides, and mudslides on the Island of Tutuila near Pago Pago, Fagatogo, Nu'uuli, Fagaalu, and Utulei, prompting the Territory to declare an emergency. Rainfall on May 19 at Pago-Pago totaled 10.68 inches. Widespread debris flows, rock falls, and slumps occurred due to the extremely heavy rains. Five people were killed in landslides, although much of the property damage was flood related.

3.13. Tropical Cyclones

3.13.1. Introduction to Tropical Cyclones

Over the past 20 years, coastal and low-lying areas in small island nations have been devastated by hurricane related hazards, costing the world economy billions of dollars (U.S.), and resulting in a significant loss of life. The most predominant and destructive hazards associated with hurricanes include high winds, heavy rain, and storm surge.

Cyclones typically approach the islands from a west, northwest, or northerly direction. This characteristic approach affords some protection to the opposite sides of the islands with respect to incoming seawater as waves. Storm surge would typically accompany a hurricane center's landfall, which could most frequently be expected to impact the west through northern exposures of the Territory. This typically spares Pago Pago Harbor the worst of the storm surge flooding and battering effects.

3.13.2. Profile of Tropical Cyclones

3.13.2.1. High Winds

Hurricane winds can reach speeds up to 155mph in the eye-wall of the hurricane, with gusts exceeding 224mph. The destructive power of these winds increases by the square of its speed; thus, a tripling of wind speed increases destructive power by a factor of nine. Consequently, these winds can devastate agricultural crops, uproot large trees, and flatten entire forests. Man-made structures are also vulnerable, with buildings shaking or even collapsing. In addition, the drastic barometric pressure differences in a hurricane can cause windowless structures to explode, uplift rooftops and even entire buildings. However, the major wind related cause of death, destruction, and injury is flying debris.

3.13.2.2. Heavy Rain

The rain that accompanies hurricanes is extremely variable and difficult to predict. Intense rainfall can cause different types of destruction. Seepage of water into buildings can cause structural damage and if the rain is steady and persistent, the structures may simply collapse from the weight of the absorbed water. Inland flooding means that building structures and critical transportation facilities, such as roads and bridges in valleys and low-lying areas, are at risk. In addition, heavy rain often triggers landslides, typical in areas with medium to steep slopes that have become over-saturated.

3.13.2.3. Storm Surge

Storm surge is a great dome of water often 50 miles wide that comes sweeping across the coastline near the area where the eye of the hurricane makes landfall, and can inundate low-lying areas up to several

miles inland. Aided by the hammering effect of breaking waves, the surge acts like a giant bulldozer sweeping everything in its path. The stronger the hurricane, the higher the storm surge. If heavy rain accompanies the storm surge and landfall occurs at a peak high tide, the consequences can be catastrophic. The excess water from the heavy rains inland can cause an increase in sea level heights and riverine flooding, thus blocking the seaward flow of rivers and effectively leaving nowhere for the water to go. In sum, storm surge is unquestionably the most dangerous part of a hurricane, accounting for 90% of all hurricane related fatalities.

For the purposes of this assessment, flooding due to heavy rains associated with tropical cyclones is discussed under the "flood hazard." This section primarily covers the impacts of high wind and storm surge commonly accompanying all categories of hurricanes.

Areas at risk to storm surge are identical to tsunami risk areas and mapped according to FEMA's velocity wave hazard, or VE zones.

3.13.2.4. Conditions that Impact Vulnerability to Tropical Cyclones

Development and population surge in hazard prone areas increases the vulnerability to tropical cyclones.

3.13.2.5. Probability of Occurrence and Magnitude of Tropical Cyclone Events

All the major tropical cyclones affecting American Samoa during the past 50+ years have been classified between Categories 1 and 5 on the Saffir-Simpson Hurricane Scale. Hurricane Olaf was a category 5; however, it appears that due to it relatively close proximity to the equator (840 miles south of the 0 degree latitude line), the most intense tropical cyclones in the vicinity of American Samoa are rare.

The ENSO cycle appears to have bearing on the probability of occurrence. The following list illustrates the phase of the ENSO cycle active during storms between 1966 and 1998:

- Unnamed hurricane 1966 – Weak El Niño
- Tropical Storm 1973 – Moderate El Niño
- Tropical Storm Esau 1981 – Neutral
- Hurricane Tusi 1987 – Weak El Niño
- Tropical Storm Gina 1989 – La Niña/Neutral
- Hurricane Ofa 1990 – Weak El Niño
- Hurricane Val 1991 – Moderate/Strong El Niño
- Tropical Storm Tui 1998 – Strong/Very strong El Niño

This comparison shows that with the exception of tropical storms Esau and Gina, the El Niño phase prevailed during these occurrences. Typically during an El Niño, the warmest water in the Pacific would occur in the eastern and central parts of the basin, as the trade wind flow breaks down across the northern hemisphere. The greater number of hurricanes or tropical storms occurred during the weaker El Niño years, when the water in the SW Pacific remains quite warm, rather than being cooler when westerly winds along the equator push the warmest water into the eastern Pacific during a full-fledged El Niño outbreak. Thus, it seems reasonable to suppose that the most damaging hurricanes would occur during El Niño years, especially when the phase was in a weak to moderate Territory of intensity.

A major hurricane in American Samoa would be classified between Category 1 and Category 5. Wind speeds for these classifications of storms would vary between 74 mph and 155 mph. The array of associated hazards with strong to very strong hurricanes affecting American Samoa include winds of damaging force, heavy rainfall of flooding proportions, and high surf that can cause extensive structural damage, as well as coastal flooding along exposed shorelines.

Category 1 hurricanes tend to do little damage to buildings, although there may be effects on shrubbery and trees since winds can range between 74-95 mph. Damage could also occur to poorly constructed signs, along with some coastal road flooding and minor pier damage. Storm surge caused by a Category 1 hurricane can reach 4-5 feet.

Category 2 hurricanes have winds between 96-110 mph with storm surge potential of six to eight feet above normal. Roofing material, doors, and windows could be shattered, causing significant damage to buildings. Considerable damage to shrubbery and trees can be expected, with some trees down, as well as considerable damage to poorly constructed signs and piers. Coastal and low-lying escape routes could flood two to four hours before arrival of the hurricane center, and small craft in unprotected anchorages could break moorings.

Category 3 hurricanes typically have sustained winds of 111 mph with gusts near 130 mph. Storm surge can reach 9 to 12 feet above normal, with some structural damage to small residences along the immediate coasts, and utility buildings with a minor amount of curtain wall failures. There's often damage to shrubbery and trees with foliage blown off and large trees blown down. Mobile homes and poorly constructed signs are likely to be destroyed. Low-lying escape routes are typically cut by rising water three to five hours before the arrival of the hurricane center. Flooding near the coasts can destroy smaller structures, and larger structures are damaged by battering from floating debris. Terrain up to eight miles inland that is continuously lower than five feet above mean sea level may be flooded, and evacuation of low-lying residences within several blocks of the shoreline may be required.

Category 4 hurricanes typically have winds 131-155 mph (114-135 kt or 210-249 km/hr). Storm surge is generally 13-18 ft above normal. There are extensive curtainwall failures and some complete roof structure failures on small residences. Shrubs, trees, and all signs are blown down. There is complete destruction of mobile homes. Extensive damage may occur to doors and windows. Low-lying escape routes may be cut by rising water 3-5 hours before arrival of the center of the hurricane. Major damage to lower floors of structures near the shore is probable. [33]

Category 5 hurricanes typically have winds greater than 155 mph (135 kt or 249 km/hr). Storm surge with this level of hurricane is generally greater than 18 ft above normal. There is often complete roof failure on many residences and industrial buildings and some complete building failures with small utility buildings blown over or away. All shrubs, trees, and signs would be blown down during a Category 5 hurricane, and there would be complete destruction of mobile homes. [34]

[33] http://www.nhc.noaa.gov/aboutsshs.shtml
[34] http://www.nhc.noaa.gov/aboutsshs.shtml

In addition, American Samoa could see waterspout activity (tornadoes over water), which can be dangerous to small craft, and bring very strong and gusty winds ashore when the funnel makes landfall. High surf generated by the approach of a strong to very strong hurricane can cause large breaking waves to arrive several days before the hurricane's center impacts the area. These high surf episodes can start in the 5 to 10-foot range, but can quickly increase in size to 15-20+ feet as the storm gets closer. High surf damage can increase during higher than normal tides, although a barrier reef or a sea wall can mitigate the associated damage to some degree.

3.13.2.6. Geographical Extent of Tropical Cyclones

Historical information regarding past tropical cyclone hazards is limited, and specific locations of concentrated or extreme damage due to high winds are unavailable and therefore not mappable. It is possible, however, to indicate areas that are likely to be affected by storm surge. These areas are designated as VE zones on FEMA's Flood Insurance Rate Maps, coincident with areas vulnerable to wave action resulting from tsunamis.

Tropical cyclones are considered island-wide events, to which all islands of American Samoa are vulnerable. Category 2 and 3 hurricane winds, waves and rainfall would certainly be felt island-wide, with Category 1 hurricanes felt to a lesser degree. Depending upon storm severity the direction of approach, and the effects of high winds, high surf and storm surge would vary. Terrain features play a role in increasing or decreasing wind speeds, but given that the highest mountains on Tutuila are nearly 2,000 feet, little protection from the wind is afforded from one side of the island to the other. Some amplification, however, could be expected in places, as winds could be accelerated over ridges and through valleys. The island of Ta'u is about 1,000 feet higher than Tutuila, which gives the leeward side somewhat more protection. However, there are wind and rain amplification factors that arise with the associated terrain features.

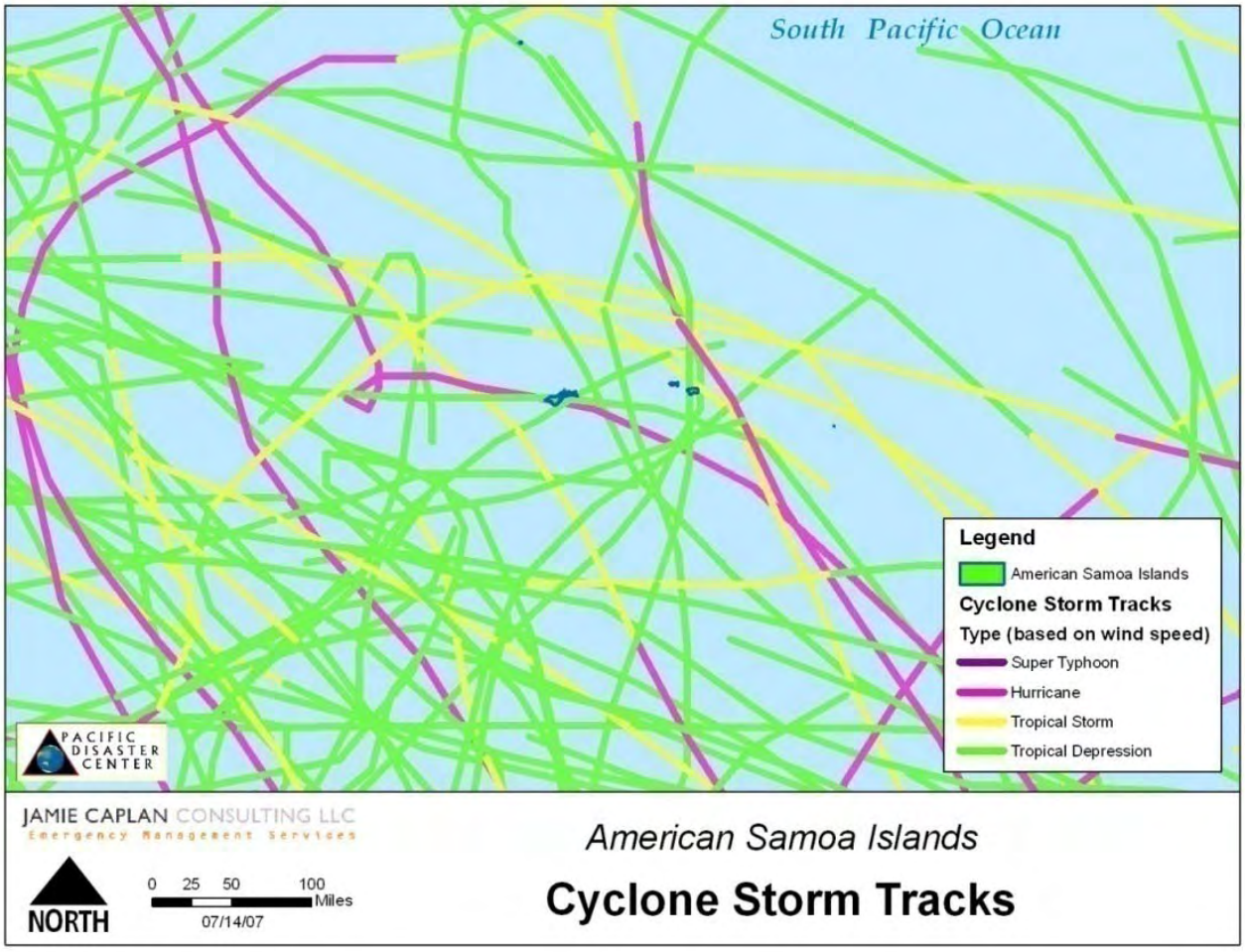
3.13.2.7. History of Tropical Cyclones

American Samoa lies outside of the most active tropical cyclone belt in the southwest Pacific Ocean. Although many years can pass between major hurricanes, when they do impact American Samoa, or nearby islands, the effects are devastating.

Map 3-26 depicts all storm tracks between 1966 and 2005 that have occurred within 3 degrees of American Samoa's coastlines.

Hurricane tracks are illustrated in purple, tropical storms are yellow, and tropical depressions are green. Named storms are those that impacted the Territory to one extent or another.

During the last 50+ years, seven major hurricanes have impacted American Samoa. They have been fairly uniform in frequency and more or less evenly distributed during this period. Details regarding storm severity, affected geographical areas, damages, and estimated losses for seven significant tropical cyclones are listed in Table 14.



Map 17 American Samoa Islands Historical Cyclone Storm Tracks

Table 14 Summary of Significant Cyclone Events

Event Name, Date	Geographical Extent	Severity (Category)	Impacts	Deaths/ Injuries	Estimated Losses ($)
Un-named hurricane January 29-30, 1966	Throughout Tutuila	Category 2 100+ mph gusts	Substantial structural damage.	90/0	$4.3 million
Hurricane Tusi January 16-20, 1987	Manu'a Islands	Category 3, Max sustained winds 110 mph, gusts to 120 mph	Tusi destroyed: 100% of structures in the villages of Faleasao, Fitiuta, and Sili; 90% of the structures in Ta'u and Ofu; 50% of those on Olosega. It left 98% of the 2,000 people in the islands homeless. Plantations were totally devastated, and the islands were denuded of forests and coconut palms. Stripped vegetation took five years to recover. There was severe storm surge on the north shores.	0/0	$5 - 10 million
Hurricane Ofa February 2-4, 1990	Islands of Tutuila, Aunu'u, Ofu, Olosega, Ta'u, and Swains	Category 2, Max sustained winds 90 mph, gusts to 100 mph, 20+ inches of rain, high surf, storm surge, 10+ landslides	Ofa caused coastal damage due to storm surge and high surf plus high tides heaviest along north shores of Ta'u and Olosega and some coastal villages on north shore of Tutuila. NW facing villages sustained the greatest damage. Fagasau roads were wiped out, and the road was destroyed at Poloa. Poloa and Amanave evacuated. Sailele lost 750 feet of road, cutting off the village. Extensive wind damage to airport buildings. Office of Procurement warehouse incurred structural damage. Dept. of Agriculture building lost. Four schools badly damaged in Poloa, Aoa, Masafau, Faleasau (at Ta'u). Tafuna high school gym collapsed. Special Ed. building in Utulei a total loss. 95% of water supply lost due to loss of power at water-well pumping stations. 10+ large landslides on Tutuila.	10/0	$10 million (PPG); Public losses $28,761,983 (FEMA); Damage to roads $4,400,000 (FEMA); $200,000 (ReIns:Swiss)
Hurricane Val December 6-10, 1991	Tutuila and Manu'a Islands	Category 3, Max sustained winds of 100 mph, gusts to 123 mph, high surf, storm	Severe damage to structures (40% of housing), and utility lines. High surf and wave action washed away several sections of coastal roads on Tutuila, and the Manu'a Islands. Damage caused by high winds closed down harbor operations for a week. Containers strewn about the port, crane broken, 5-7 luxury yachts were destroyed, along with 11 long-line fishing vessels causing major impacts on the fishing industry. Cannery and airport	15/0	$13 million (PPG); Public losses $80,473,533 (FEMA); $50-80 million overall damage to seaport, $11 million to seaport infrastructure (AS Dir.

Event Name, Date	Geographical Extent	Severity (Category)	Impacts	Deaths/ Injuries	Estimated Losses ($)
		surge, 20+ inches of rain	heavily impacted by storm surge affecting the southern shore of Tutuila.		Port Authority); $167,700 (ReIns:Swiss)
Tropical Cyclone Heta - FEMA DR #:1506 1/13/04	High Winds, High Surf and Heavy Rainfall	Category 5	10% of inhabitants are now homeless, destroyed valuable crops	0/20	$50-$150 million
Tropical Cyclone Olaf - FEMA DR #: 1582 2/18/05	Tropical Cyclone Olaf, including High Winds, High Surf, and Heavy Rainfall	Category 5	Wiped out almost all homes on Manu'a Islands	0/0	$723,000
Tropical Cyclone Percy 2/23/05	Pago Pago	Category 5 (Category 3 while near American Samoa)	Minimal damage	0/0	

3.13.2.8. Un-named hurricane (1966)

An un-named hurricane struck Tutuila on January 29-30, 1966 killing 90 people and causing an estimated $4.3 million in damage. Winds of over 100 miles per hour and rainfall amounts of 6 to 14 inches caused flooding and substantial structural damages.

3.13.2.9. Tropical Cyclone Tusi (1987)

Tropical cyclone Tusi, a Category 3 hurricane, passed to the northeast of the Manu'a Islands between January 16 and 20 1987, causing an estimated $5 to $10 million in damage and destroying virtually 100% of the structures in the villages of Faleasao and Fiti'uta on the island of Ta'u, and Sili village on the island of Olosega.[35] In Ta'u and Ofu, 90% of the structures were destroyed, as were 50% of those in Olosega. High winds stripped most of the vegetation from the island of Ofu, which took five years to grow back. Storm surge heavily impacted the north shores of the islands. Tusi is considered by many local residents to be the worst storm to affect American Samoa in recorded history.

3.13.2.10. Tropical Cyclone Ofa (1990)

In February 1990, American Samoa suffered the most severe storm in more than 160 years. Winds gusted up to 100 mph. severe forest damage occurred with only 1% of the primary forest surviving.

[35] American Samoa Government. *American Samoa.* Online. Available: http://www.asg-gov.com/islandinfo.htm [May 2003].

Hurricane Ofa hit the Samoan Islands on Friday, February 2, finally passing to the south on Sunday, February 4, 1990. It left a path of destruction that obliterated whole villages in Western Samoa and destroyed or damaged almost every building in American Samoa. Although the center never got closer than 180 miles to the islands, American Samoa was directly in its path until the hurricane veered south. Even so, the winds were stronger and the storm bigger in diameter by the time it passed by, so the Territory received the brunt of the storm.

One eyewitness account reported, "Winds were clocked at the airport at 107 miles per hour… Power was lost on Saturday the 3rd, along with all communications…Trees went down everywhere, along with power poles, and sheet metal roofing flew off like playing cards to litter yards and roads. Some villages in low-lying areas were totaled from the wind and waves. In unprotected harbors, small boats and ships alike were driven up on the reefs."[36]

3.13.2.11. Tropical Cyclone Val (1991)

After passing through Western Samoa, tropical cyclone Val, a Category 3 hurricane, tracked across the southwestern portion of Tutuila on December 9, 1991 with maximum sustained winds of 100 mph and gusts to 123 mph. After 12 hours of battering winds, heavy rain, and destructive high surf, Val then continued a southeastern track, passing about 30 miles to the south of, and impacting the Manu'a Islands the next day. Fifteen people died in the storm.

High winds caused severe damage to housing, electric power distribution systems, and water and sewage systems. High surf washed away several sections of the coastal road between Faga'alu and Nu'uuli on Tutuila Island, as well as roads on the Manu'a Islands. However, traffic was apparently interrupted more due to downed utility poles than problems associated with the roadbed. More than 20 inches of rain fell during the storm, and high winds defoliated over 90% of primary forest. One report estimated damage at $13 million.[37]

FEMA's Hazard Mitigation Strategies document for Hurricane Val reported severe damage to the electric power system, primarily to the distribution feeder and transmission lines. Switching gears were also damaged. Damage to the power system left water and sewer systems non-functional and downed power lines rendered intra-island communication non-existent. However, communication off the island and cellular use was largely unaffected.[38]

Hurricane Val affected 40% of the housing in American Samoa. The Office of Development Planning reported that low-income households were the most severely impacted group due to the type of home construction. However, homes constructed by FEMA following hurricanes Tusi and Ofa, and those constructed under the office of Emergency Preparedness received very little damage.[29]

[36] Robert L. Webb. *Hurricane Ofa – American Samoa.* Online. 2000. Available: http//www.motivation-tools.com/hunky-dory/feb27-90.htm [May 2003].
[37] PPG Consultants, American Samoa Flood Mitigation Plan, PPG Consultants. January 10, 2003.
[38] Federal Emergency Management Agency, Hazard Mitigation Strategies, Hurricane Val. DR-927-AS. FEMA, December 22, 1991.

The Director of the Port Authority on Tutuila described hurricane Val as the most destructive hurricane to affect the islands. High winds caused $50-80 million of damage to the overall port, including vessels, with $11 million in damage to seaport infrastructure that closed down operations for a week. Containers stacked four high were strewn about the port, a crane was broken, five to seven luxury yachts were destroyed, as were 11 long-line fishing vessels, which had a major impact on the fishing industry.[39]

Both the cannery and the airport were heavily impacted by storm surge on the southern shore of the island. Neither of these facilities has backup power, making both particularly vulnerable.

3.13.2.12. Tropical Cyclone Heta

January 13, 2004 FEMA declared American Samoa a disaster area due to Tropical Cyclone Heta (FEMA DR #1506). The damage Heta caused on Tonga, Niue, and American Samoa was estimated at $150 million dollars (2004 USD), with most of the damage occurring in American Samoa; the cyclone was also responsible for two deaths (not in American Samoa). Heta precipitated a massive relief and clean-up operation that lasted throughout 2004.

It reached a maximum intensity of 160 mph and exerted an estimated pressure of 915 millibars before dissipating on January 11, 2004. The high winds destroyed over 600 homes and damaged 4,000 others. Offshore, the storm brought waves up to 44 feet high along the north and western part of the island. The combination of rough surf and storm surge damaged or destroyed many boats near Swains Island. Although no deaths were reported, the storm injured 20 people.

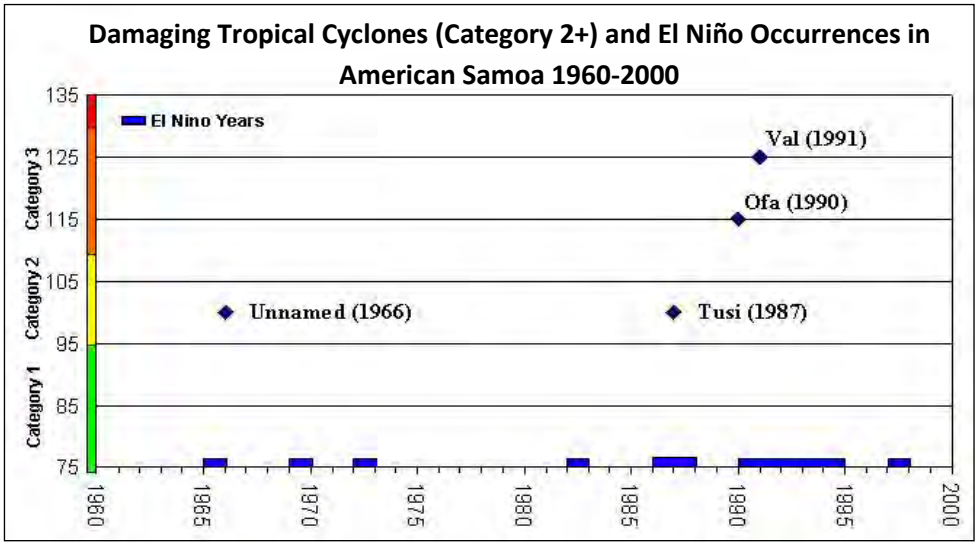


Figure 10 Tropical Cyclone Concurrence with El Niño

The damage from the cyclone caused an evacuation of 140 residents to relief shelters, thirteen of which were opened after the storm. In addition, the Small Business Administration (SBA) offered $40,000-$200,000 (2004 USD) in repair loans for residents and $1.5 million (2004 USD) in repair loans for businesses. The federal government offered $22 million (2004 USD) in relief aid through FEMA. The United Church of Christ also provided $5,000 in relief aid.

[39] Seugogo Ben Schirmer, Director of the Port Authority. Pago Pago Harbor. Personal Interview. Pago Pago, American Samoa. April, May 2003.

More than 9,100 American Samoa residents and business owners have registered with FEMA to apply for aid. FEMA has issued approximately $11.4 million in temporary disaster housing grants to people whose homes were severely damaged and to those repairing their primary residences to make them safe, sanitary and functional. The agency has provided more than $13.6 million for other serious needs directly related to Heta. The bulk of funding will go towards the cost of restoring and repairing utilities (specifically, electrical power and telephone lines) as well as replacing and repairing public buildings.

As Figure 10 illustrates, over a 25-year period, four highly destructive (Category 2-3) hurricanes occurred in 1966, 1987, 1990, and 1991. Heta occurred during a phase that was neither El Niño nor La Niño which is known as El Niño Neutral. In addition, tropical storms affected American Samoa in 1973, 1981, 1989 and 1998. For the purposes of determining the probability of occurrence, eight tropical cyclones (of tropical storm force and higher) affecting American Samoa during a 32-year period were considered. The probability of occurrence is therefore 25% in any given year.

3.13.2.13. Tropical Cyclone Olaf

February 18, 2005 FEMA declared American Samoa a disaster area due to Tropical Cyclone Olaf. Olaf had wind gusts up to 190 mph, making it a Category 5 storm, the most intense. The weather service said the storm generated destructive waves of 30 to 40 feet on the shores of all islands. The cyclone passed 50 miles to the north of Samoa, officials said. Prior to its change of track, the storm was heading directly toward the small nation, prompting it to declare a Territory of emergency. The islands suffered some damage from winds, heavy rain and pounding seas and 15 people were treated for minor injuries. There were no reports of deaths from the islands, home to some 2,000 people, but many houses were seriously damaged, officials said. Olaf damaged several water stations in the Manu'a Islands causing a water shortage. The cyclone caused telephone service interruption to the Manua Islands of Ta'u, Ofu and Olosega.

Direct Federal Assistance was authorized to American Samoa under DR #1582. This allowed for Public Assistance for the repair or replacement of disaster-damaged facilities and debris removal and emergency protective measures

Under the declaration, federal funds will be provided for the territory and affected local governments and certain private nonprofit organizations to pay 75 percent of the eligible costs for debris removal and emergency services related to the storm that began on February 15. The funding also covers the cost of requested emergency work undertaken by the federal government.

3.14. Tsunami

Since 1990, there have been 82 tsunamis worldwide, 10 of which were destructive, claiming more than 4,000 lives. One of the most destructive of these occurred on July 17, 1998 in Papua New Guinea (PNG) when a 7-magnitude (M_w) earthquake struck the north central coast of PNG. Shortly after the earthquake, a 23- to 49-foot (7- to 15-meter) tsunami destroyed the villages of Sissano, Warupu, Arop and Malol, killing at least 2,100 people and displacing more than 5,000.

3.14.1. Introduction to Tsunami

Tsunami (soo-NAH-mee) is a Japanese word, which translates in English as "harbor wave," and is now used internationally to describe a series of waves of extremely long wavelength and long period traveling across the ocean. The public sometimes refers to tsunamis as “tidal waves,” which is a misnomer. Although a tsunami's impact on a coastline is dependent upon the tidal level at the time of impact, tsunamis are unrelated to the tides. Tides result from the gravitational influences of the moon, sun, and planets on the earth’s oceans. The scientific community once referred to tsunamis as "seismic sea waves," which is also misleading. "Seismic" implies an earthquake-related generation mechanism, and a non-seismic event, such as a landslide, meteorite impact, or sub-marine volcanic eruption can also generate a tsunami.

3.14.2. Profile of Tsunami

Any disturbance that displaces a large volume of water from its equilibrium position can generate a tsunami. In the case of earthquake-generated tsunamis, the earthquake causes the sea floor to abruptly uplift or subside, disturbing the equilibrium of the overlaying water column and resulting in a tsunami.

Submarine landslides, which often accompany large earthquakes, can also generate tsunamis due to the sudden down slope movement and redistribution of sediment and rocks across the sea floor. Similarly, a violent submarine volcanic eruption can create an impulsive force uplifting the water column from its equilibrium and generating a tsunami. In 1883, Indonesia's Mt. Krakatoa erupted violently, generating a tsunami that killed more than 30,000 people. Conversely, super marine (above water) landslides and space born impacts can disturb the water column by the transfer of momentum from falling debris to the water into which the debris falls. In 1958, a huge landslide generated a 1,722-foot (525 meter) tsunami in Lituya Bay, Alaska. In general, tsunamis generated by these non-seismic mechanisms dissipate quickly and rarely affect coastlines far from the source area.

Tsunamis are shallow-water waves, but are different from the wind-generated waves many have seen from the beach. Wind-generated waves usually have a period (the time between two successive waves) of 5 to 20 seconds and a wavelength (the distance between two successive waves) of about 330 to 660 feet (100 to 200 meters). Tsunamis in deep water can have a wavelength greater than 300 miles (482 kilometers) and a period of about an hour. This is very different from the normal California-type tube wave, which generally has a wavelength of about 330 feet (100 meters) and a period of about 10 seconds.

Since tsunamis are shallow-water waves, the ratio between water depth and wavelength is very small. The deeper the water, the faster and shorter the wave travels because shallow-water waves move at a speed equal to the square root of the product of the acceleration of gravity and the water depth. For example, when the ocean is 20,000 feet (6100 meters) deep, a tsunami travels at the speed of a jet airplane, 550 mph (885 km per hour).

Tsunami waves have a very long reach, and may transport destructive energy from the initial source location to coastlines thousands of miles or kilometers away. As a tsunami approaches the shore, its speed decreases and its height increases. It may appear as a rapidly rising or falling tide, or a series of

breaking waves. Coastal features, such as reefs, bays, and harbor entrances, as well as the slope of the beach, help modify the tsunami as it approaches the shore.

3.14.3. Conditions that Impact Vulnerability to Tsunami

Although basalt cliffs, high seawalls, and deep coastal waters protect the majority of the coastline of Tutuila, embayment's of the island are at highest risk of tsunami damage due to shallow bathymetry and the amplifying effect of the wave energy as it heads toward the shore.

Mitigation measures can be implemented to lessen the chance of loss of life by installing tsunami detection buoys off shore, installing seismic sensors to detect for potential locally generated tsunamis, and implementing a warning and evacuation plan for low lying areas including the areas of historical run-up.

3.14.4. Probability of Occurrence and Magnitude of Tsunami Event

The analysis methods that determine the probability of occurrence are related to historical information and, in some cases, numerical models. In this study, historical data was the main analysis method used. The information for American Samoa suggests a probability of a potentially destructive tsunami occurring 2 to 3 times every 50 years. The probability of occurrence for a Pacific-wide tsunami event is approximately once every 5 to 10 years.

The probable magnitude of an event resulting in significant damage is high for tsunamis with a run-up of 2.6 feet (0.8 meter) or greater in American Samoa, particularly in terms of economic loss and property damage since the majority of commercial and residential buildings reside along the low-lying coastal regions and are protected only in a few cases by sea walls. The areas at highest risk of damage are the bays of Tutuila, particularly Pago Pago Harbor, due to the amplification of the wave energy as it approaches the shore.

3.14.5. Geographical Extent of Tsunami

The entire coastline of American Samoa would be affected in the event of a tsunami. Wave heights along the shoreline would be directly related to the energy of the wave and direction in which it was generated. The majority of the coastline of Tutuila is relatively protected by basalt cliffs and high seawalls; however the pocket coves and bays of the island would be at higher risk of damage due to shallow bathymetry and the amplifying affect of the wave energy as it nears the shore.

Pago Pago Harbor could sustain the worst damage due to amplification of the tsunami by the narrowing of the channel. Additional threats would include the severe erosion of the coastline due to resonance of waves inside the narrow northwestern tip of the harbor as the sea surface returns to equilibrium. A significant number of critical facilities lie within the velocity wave hazard area, including the fire station, communications, government buildings, and transportation buildings.

3.14.6. History of Tsunami

Between 1917 and 1996, 41 tsunamis have been recorded in American Samoa with a run-up of 0.3 foot (0.1 meters) or greater for Pago Pago Harbor. Of the 41, only 12% (5) of the earthquake- generated events resulted in significant run-up of 1.5 feet (0.5 meters) or greater. A minimum run-up of 1.5 feet

(0.5meter) is required to cause significant damage. Table 15 gives information regarding some of the most significant tsunamis to impact American Samoa. Damage reports for the events were scarce and inconclusive in most cases.

Table 15: Summary of Significant Tsunami Events

Event Name, Date	Geographical Extent	Severity	Impacts
Local tsunami (Tonga Trench) June 17, 1917	Pago Pago Harbor, Tutuila	Run up 4 feet (1.2 meters)	Many houses destroyed, church damaged.
Aleutian tsunami April 1, 1946	Pago Pago Harbor	Run up 2.6 feet (0.8 meter)	Pacific-wide impacts. Several huts washed away.
Kamchatka, Russia tsunami November 4, 1952	Pago Pago Harbor	Run up 2.7 feet (0.9 meter)	Pacific-wide tsunami. No documented damage.
Aleutian tsunami March 9, 1957	Pago Pago Harbor, Tutuila	Run up 4 feet (1.2 meters)	Road flooded.
Chilean tsunami May 22, 1960	Pago Pago Harbor, Tutuila	Run up 4.5 feet (1.4 meters) at harbor entrance, 10.7 feet (3.3 meters) at the inner end of harbor (PPG), Run up 16 feet (4.9 meters) Tutuila, 8 feet (2.4 meters) Pago Pago (NGDC website)	No documented damage.
Local tsunami (Loyalty Islands) May 16, 1995	Pago Pago Harbor	Run up 1.6 feet (0.5 meter)	No documented damage.

3.14.6.1. Tongan Trench Tsunami (1917)

In June 1917, an 8.0 magnitude earthquake, the largest recorded in the area, at a depth of 15.5 miles (25 kilometers) within the Tonga Trench, generated a localized tsunami with a recorded run-up height of 3.6 feet (1.2 meters) above mean sea level (MSL) in Pago Pago Harbor. Damage included the total loss of several houses and a church on the island of Tutuila.

3.14.6.2. Aleutian Tsunami (1946)

In April 1946, a 7.8 magnitude earthquake in Alaska's Aleutian Islands generated a Pacific-wide tsunami resulting in catastrophic damage and loss of life throughout the Pacific. The recorded run-up height for Pago Pago Harbor was 2.4 feet (0.8 meter) above MSL and damage included total loss of several houses.

3.14.6.3. Russian Tsunami (1952)

In November 1952, an 8.2 magnitude earthquake in Kamchatka, Russia, generated a Pacific-wide tsunami with recorded run-up height for Pago Pago of 2.7 feet (0.9 meter) above MSL. There was no historical data found documenting local damage.

3.14.6.4. Aleutian Tsunami (1957)

In March 1957, an 8.3 magnitude earthquake in Alaska's Aleutian Islands generated a Pacific-wide tsunami resulting in significant damage and loss of life throughout the Pacific. The recorded run-up height for Pago Pago Harbor was 3.6 feet (1.2 meters) above MSL. Damage included a flooded road on Tutuila.

3.14.6.5. Chilean Tsunami (1960)

In May 1960, an 8.2 magnitude earthquake in Chile generated a Pacific-wide tsunami, causing major damage and loss of life throughout the Pacific. For the island of Tutuila, the recorded run-up height was 14.7 feet (4.9 meters), and in Pago Pago Harbor it was 7.2 feet (2.4 meters) above MSL. There was no specific historical data found documenting local damage.

3.14.6.6. Loyalty Islands Tsunami (1995)

In May 1995, a 7.7 magnitude earthquake in the Loyalty Islands generated a South Pacific tsunami with recorded run-up in Pago Pago Harbor 1.5 feet (0.5 meter) above MSL. There was no historical data found documenting local damage.

3.14.6.7. M6.7 quake hits near Samoa, causes small tsunami[40]

September 28, 2006 Kyodo News

An earthquake with a magnitude of 6.7 occurred under the ocean floor near the Samoa islands on Thursday and triggered small tsunami, according to the U.S. Geological Survey and the Hawaii-based Pacific Tsunami Warning Center, but there were no reports of damage.

The quake struck under the seabed in the South Pacific, about 195 kilometers east-southeast of Hihifo in Tonga and 290 km south-southwest of Pago Pago in American Samoa, the U.S. Geological Survey said.

The Hawaii Tsunami Warning Center said an 8-centimeter rise in sea levels was observed in Pago Pago.

''Sea level readings indicate a tsunami was generated. It may have been destructive along coasts near the earthquake epicenter,'' the center said in a bulletin posted on its website.

For those areas, it said, ''when no major waves are observed for two hours after the estimated time of arrival or damaging waves have not occurred for at least two hours then local authorities can assume the threat is passed.''

[40] Asian Economic News, Oct 2, 2006

3.14.6.8. Tsunami Watch[41]

At 7:39 a.m. April 1, 2006 an 8.0 magnitude earthquake struck the Solomon Islands, epicentered about 25 miles southwest of the town of Gizo and about 217 miles from the capital Honiara. A second 6.7 magnitude earthquake epicentered to the north of Gizo occurred a few minutes later. Within 5 minutes a tsunami wave approximately 10-15 feet came ashore and washed as far as a half a mile inland in some places before receeding. At least 20 people are reported dead or missing the day after the tsunami. A tsunami watch was issued for nearby Pacific islands, including; New Zealand, the Philippines, American Samoa, Guam and Fiji. Hawai'i was put under a tsunami advisory which was lifted by the evening.

3.14.7. Shoreline Erosion Status

The diverse Samoan reefs provide food, infrastructure, and shoreline protection. Crown-of-thorns starfish (COTS) outbreaks, hurricanes, and mass coral bleaching episodes have caused declines in hard coral cover, but coral reefs now show good recovery. Hard corals are in good condition after the COTS outbreak in 1978; however, coral cover declined by 78% between 1917 and 2001 in the industrialised Pago Pago harbour. Climate change impacts such as warm-water coral bleaching and coral diseases pose the major threats to the structure and function of the reefs, along with over-fishing. The high population growth rate (2.1% per year) is adding pressure with threats of extensive coastal development, increased fishing, loss of wetlands, soil erosion and coastal sedimentation, inadequate solid and hazardous waste disposal, and pollution.[42]

3.14.7.1. Shoreline Inventory Maps

Shoreline erosion has been a big problem in American Samoa at least since World War II. There is limited flat land, and most of that is in the form of narrow coastal plains at the base of steep mountains. As a result, almost all villages are built along the coast, close to, or impinging upon, the shoreline. The connecting roads parallel the shoreline, often at the seaward edge of the backshore berm.

Maps 27 to 30 show shoreline erosion.

An enlarged view of Pago Pago Harbor (Map 25) and surrounding area shows that a significant number of critical facilities lie within the velocity wave hazard area, including the fire station, communications, government buildings, and transportation buildings.

[41] www.tsunami.org
[42] http://www.aims.gov.au/pages/research/coral-bleaching/scr2004/pdf/scr2004v2-14.pdf

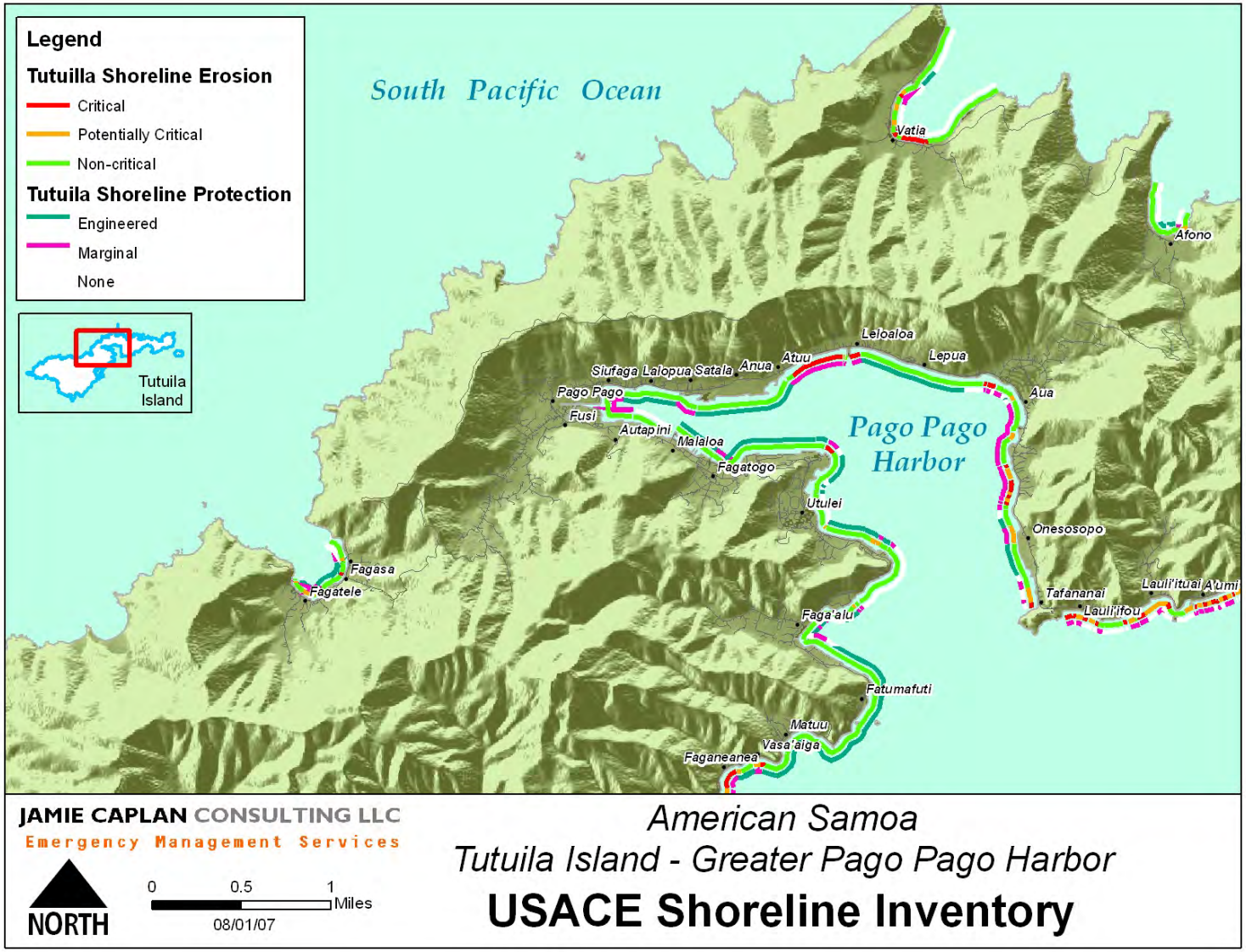
Shoreline Erosion Status

- Critical: Highly susceptible to erosion
- Potentially Critical: Moderately susceptible to erosion
- Non-critical: Low susceptibility to erosion

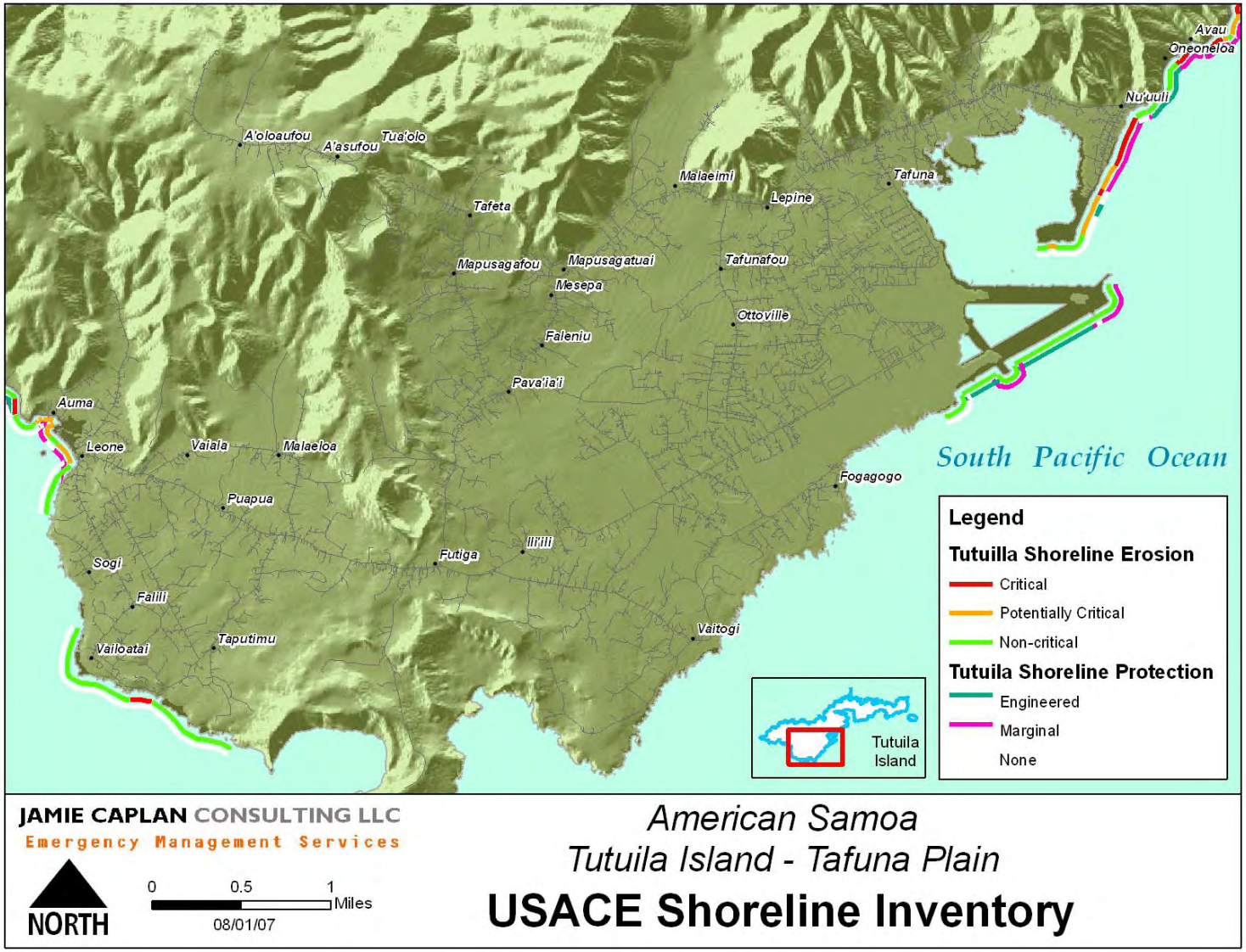
Shoreline Protection Type

- Engineered: Professionally installed seawall or other manmade protection
- Marginal: Slight modification but not professionally constructed
- None: No protection

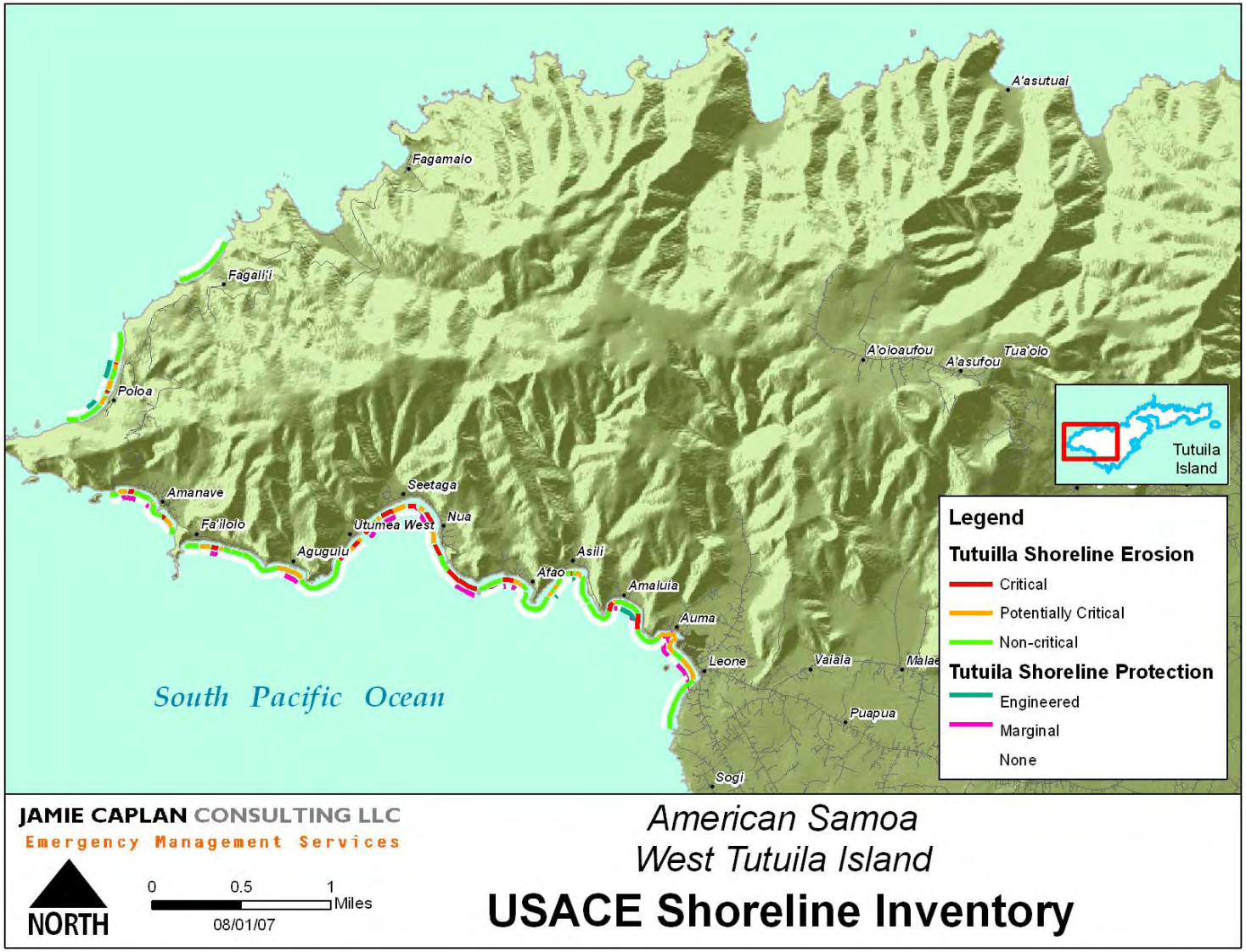
The shorelines with the greatest need of protection would be the Critical (red) and Potentially Critical (orange) with no protection (white).



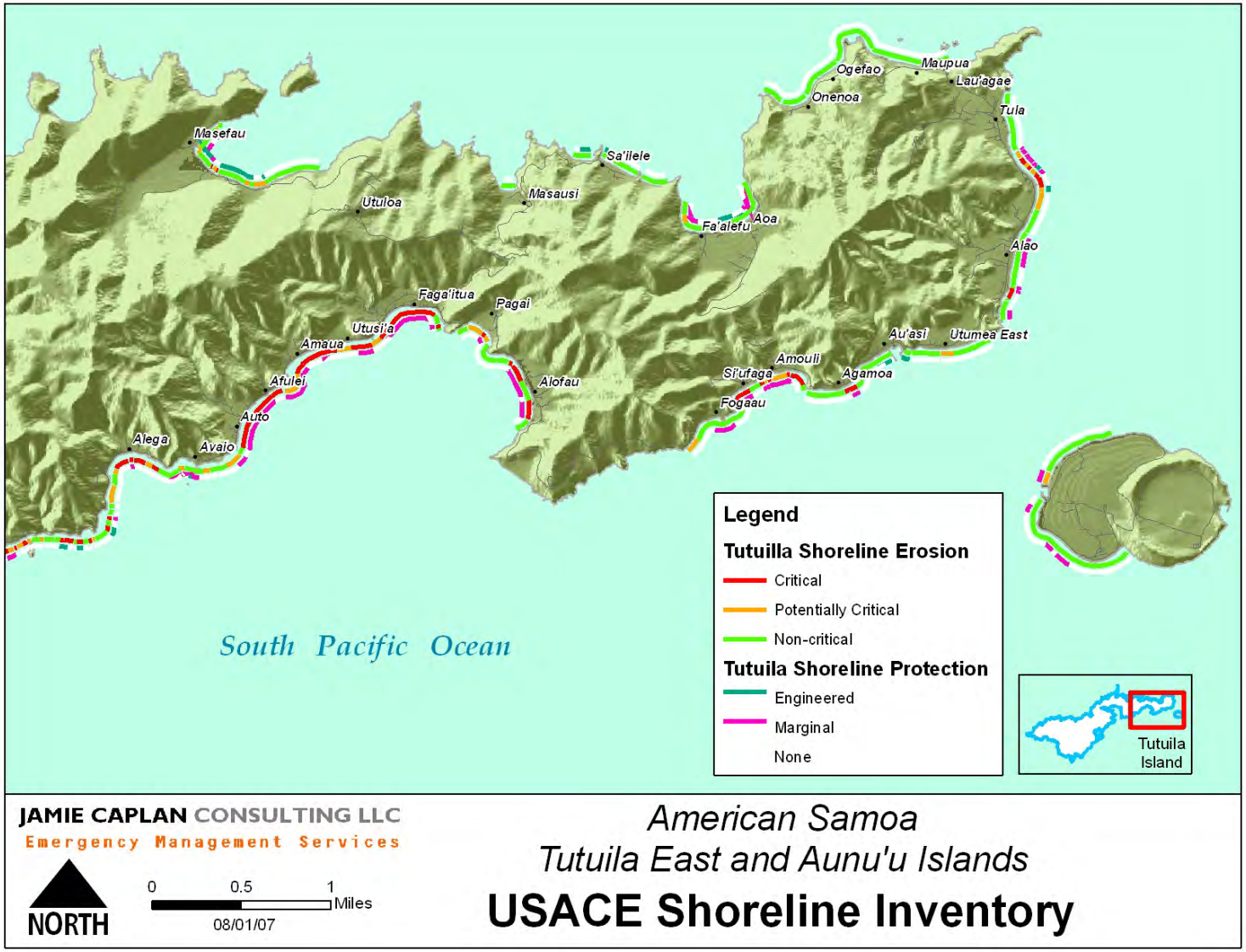
Map 27 Tutuila Island - Greater Pago Pago Harbor, USACE Shoreline Inventory



Map 18 Tutuila Island - Tafuna Plain, USACE Shoreline Inventory



Map 19 Velocity Wave Hazard Areas for Tutuila



Map 30 Tutuila East and Aunu'u Isalnds, USACE Shoreline Inventory

3.15. Wildfire

3.15.1. Introduction to Wildfire

A wildfire is an unplanned fire that requires measures of control. This uncontrolled burning can occur in vegetation, structures and other improvements. Dry conditions at various times of the year increase the potential for wildfires. Common causes include lightning, human carelessness, arson, volcano eruption, and pyroclastic cloud from active volcano. Heat waves, droughts, and cyclical climate changes such as El Niño can also have a dramatic effect on the risk of wildfires. The evaporation of water in plants is balanced by water absorbed from the soil. Below this threshold, the plants dry out and under stress release the flammable gas ethylene. A consequence of a long hot and dry period is therefore that the air contains flammable essences and plants are drier and highly flammable.

3.15.2. Profile of Wildfire

American Samoa has a slim chance of wildfire according to Peter Craig, American Samoa National Park Biologist. For that reason, American Samoa has a limited response plan. However, several rangers on staff are expert wild fire fighters and form part of a team of seventeen American Samoans who go up to the States every fire season to help. They have been written up several times as an excellent crew and are in demand. Wildfire has not occurred with any significance on American Samoa. If a wildfire did occur, it would probably be limited to the national park areas.

3.16. Assessing Vulnerability and Estimating Potential Losses by Jurisdiction

Vulnerability was assessed for each county through the visualization of known risk areas using available data, maps, and other information sources for Tutuila and the Manua Islands. The number of structures that could potentially be affected by individual hazards in each county could be determined. In some cases, as with landslides, floods, and tropical cyclones, extensive mapping and existing mitigation reports assisted this process. In others, sparse information made mapping of island-wide effects of drought and high wind impossible. Additionally, critical facilities were identified and mapped. Hazard mapping, mitigation reports, and historical accounts were used in conjunction with FEMA guidelines to establish loss estimation criteria for American Samoa outlined in Table 16.

Table 16 Loss Estimation Criteria

Hazard Type	Low Criteria	Moderate Criteria	High Criteria
Climate Change	None or minor climate change.	Moderate climate change: Higher than average temperatures, increased drought frequency.	Extreme climate change: extreme temperature fluctuation, drought for extended number of seasons, increased cyclone frequency.
Drought	More than average rain.	Below average rain.	Extremely below average rain for multiple successive years.
Earthquake	Bedrock	Soil types other than bedrock.	Landfill areas.
Flood	FEMA Zone A: 100-year floodplain, approximate.	FEMA Zone AE: 100-year floodplain. Known base	FEMA Zone VE: coastal area subject to velocity hazard

Hazard Type	Low Criteria	Moderate Criteria	High Criteria
		flood elevations.	(wave action).
Hazardous Materials	Hazardous materials stored safely away from critical facilities.	Hazardous materials stored near critical facilities.	Hazardous materials stored in critical facilities.
Landslide	Structures that are not immediately down slope of or built upon steep or moderate slopes. Low risk areas are characterized by gentle slope (20% or less) and/or soils that are not slide prone and/or good vegetation cover.	Structures that are immediately down slope of or built upon steep slopes with less slide prone soils or on/near moderate slopes (20- 60% slope) with high slide prone soils.	Structures that are immediately down slope of, or built on steep slopes (60-80 %+) with high slide prone soils such as Aua or Fagasa. Lack of vegetation on these slopes contributes to a "high" risk rating.
Tropical Cyclones and Storm Surge	Structures inland and clear of flood zones.	Structures near the coast. Structures in the 100-year flood plain (Zone AE).	Critical facilities near the coast, and located in the velocity hazard Zone VE.
Tsunami	Structures inland.	Structures near the coast.	Critical facilities near the coast and located in FEMA Flood Zone VE.
Wildfire	Structures with sprinklers and clear of dense vegetation.	Structures near dense vegetation during drought.	Critical facilities near active volcanoes.

Data for the Manua Islands has been collected as part of this project, but has not been incorporated into this assessment other than in the case of mapping FEMA flood zones. However, historical hazard accounts have certainly identified the need for a comprehensive risk assessment and justify the need to implement hazard mitigation strategies. At a future date, additional mapping of risk areas and critical facility locations on the Manua Islands will be accomplished.

An analysis of the spatial and tabular data for Tutuila was conducted to determine the percent of structures in each county falling within moderate- to high-risk areas. The results of this analysis, outlined in Table 17 Earthquake Vulnerability Analysis by County, through Table 20, summarize the vulnerability of each county on Tutuila to individual hazards. Emphasis was placed upon identifying risk to critical facilities. In general Maoputasi and Tualauta Counties represent counties with concentrated critical facilities and buildings at risk. The tope mitigation priotirty project, Tualauta Flood Mitigation Project target reducing the chronic flooding problem in this county.

Table 17 Tutuila Island Earthquake Hazard Vulnerability

County	Buildings In Zone	% of Total	CF-In-Zone	Vulnerability	Estimated Loss
Ituau	1023	6.2%	51	High	$1,087,900
Maoputasi	1990	12.2%	240	High	$96,905,844
West Vaifanua	171	1.0%	1	Moderate	$360,000
East Vaifanua	489	3.0%	23	High	$2117500
Tualatai	904	5.5%	33	High	$1,312,000
Lealataua	1863	11.4%	86	High	$4,292,000
Tualauta	7413	45.3%	579	High	$136,168,840
Sua	821	5.0%	43	High	$5,122,000
Leasina	478	2.9%	21	High	$2,013,000
Saole	367	2.2%	19	High	$2,183,000
Total	**15519**	**94.8%**	**1096**		**$251,562,084**

Table 18: Tutuila Island Riverine Flood Hazard Vulnerability

County	Buildings in Zone	% of Total	CF-In-Zone	Vulnerability	Estimated Losses
Ituau	596	4%	29	High	$1,087,900
Maoputasi	759	5%	135	High	$72,782,651
West Vaifanua	141	1%	1	Moderate	$ 360,000
East Vaifanua	298	2%	19	High	$2,117,500
Tualatai	4	0.02%	0	Low	0
Lealataua	616	4%	23	High	$1,572,000
Tualauta	921	6%	113	High	$ 41,640,760
Sua	492	3%	33	High	$ 5,122,000
Leasina	86	1%	1	Moderate	NA
Saole	355	2%	10	High	$878,000
Total	**4268**	**26%**	**364**		**$ 125,560,811**

Table 19: Tutuila Island Landslide Hazard Vulnerability

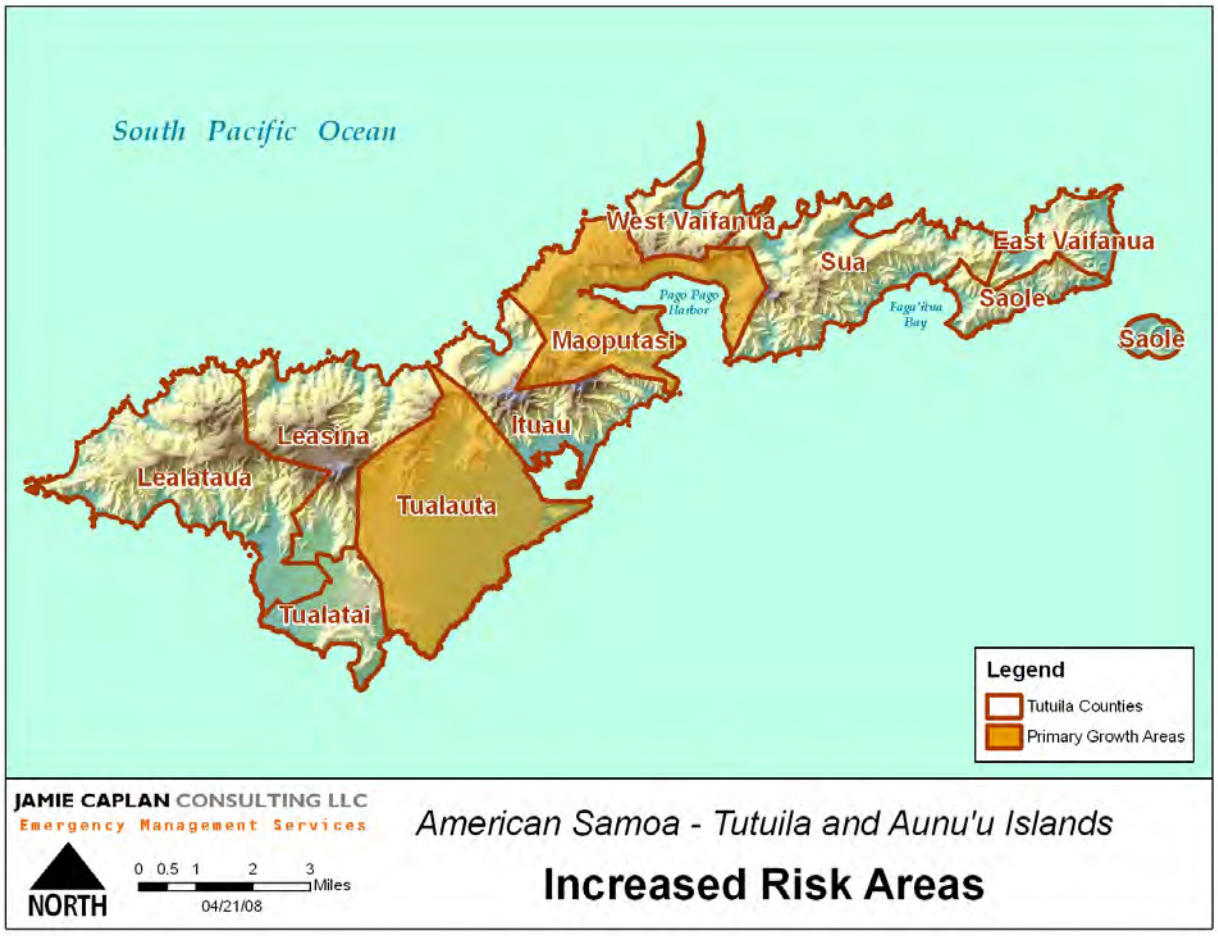
County	Buildings in Zone	% of Total	CF-In-Zone	Vulnerability	Estimated Losses
Ituau	389	2%	13	High	$ 784,000
Maoputasi	1647	10%	143	High	$72,732,474
West Vaifanua	29	0.2%	0	Low	0
East Vaifanua	165	1%	8	High	NA
Tualatai	2	0.01%	0	Low	0
Lealataua	483	3%	19	High	$ 1,852,000
Tualauta	244	1%	11	High	NA
Sua	454	3%	14	High	$ 2,781,000
Leasina	35	0.2%	4	High	$ 861,000
Saole	139	1%	5	High	$ 1,305,000
Total	**3587**	**22%**	**217**		**$80,315,474**

Table 20: Estimated Losses to Critical Facilities for Identified Hazards per County

County	Earthquake	Flood	Landslide	Tsunami & Storm Surge
Ituau	$ 1,087,900	$ 1,087,900	$ 784,000	$ -
Maoputasi	$ 96,905,844	$ 72,782,651	$ 72,732,474	$ -
West Vaifanua	$ 360,000	$ 360,000	$ -	$ -
East Vaifanua	$ 2,117,500	$ 2,117,500	NA	$ -
Tualatai	$ 1,312,000	$ -	$ -	$ -
Lealataua	$ 4,292,000	$ 1,572,000	$ 1,852,000	$ -
Tualauta	$ 136,168,840	$ 41,640,760	NA	$ -
Sua	$ 5,122,000	$ 5,122,000	$ 2,781,000	$ -
Leasina	$ 2,013,000	NA	$ 861,000	$ -
Saole	$ 2,183,000	$ 878,000	$ 1,305,000	$ -
Total	**$ 251,562,084**	**$ 125,560,811**	**$ 80,315,474**	**$ -**

3.17. Changes in Development for Jurisdictions in Hazard Prone Areas

Map 20 *Increased Risk Areas* shows the parts of the two counties with 60% of the total housing units for American Samoa. According to Public Works permit counts for 2000 - 2006; this is also where most of the development and population increases have occurred since 2004. These areas are susceptible to cyclones, earthquake, flooding, and landslide hazards. The Hazard Mitigation Council consensus number one mitigation priority is the Tualauta Flood Control Project, which would mitigate chronic flooding to many homes, businesses and infrastructure in Tualauta County. Table 21 *Building Counts and New Structures* shows the raw data used to create the map named above. The data came from the Department of Commerce Statistical Division which can be found at www.asdoc.info.



Map 20 Increased Risk Areas

Table 21 Building Counts and New Structures

Counties	*2000 Total Units*	*Percent of Total*	*2001 New Structures*	*2002 New Structures*	*2003 New Structures*	*2004 New Structures*	*2005 New Structures*	*2006 New Structures*	*County Totals*
Ituau	740	7.4%	11	9	10	18	13	12	**813**
Ma'oputasi	2031	20.2%	30	25	28	48	37	32	**2231**
Sa'ole	298	3.0%	4	4	4	7	5	5	**327**
Sua	611	6.1%	9	8	8	14	11	10	**671**
Vaifanua	431	4.3%	6	5	6	10	8	7	**474**
Faleasao	37	0.4%	1	0	1	1	1	1	**41**
Fitiuta	64	0.6%	1	1	1	2	1	1	**70**
Ofu	75	0.7%	1	1	1	2	1	1	**82**
Olosega	67	0.7%	1	1	1	2	1	1	**74**
Ta'u	80	0.8%	1	1	1	2	1	1	**88**
Swains Island	8	0.1%	0	0	0	0	0	0	**9**
Lealataua	972	9.7%	14	12	13	23	18	15	**1068**
Leasina	312	3.1%	5	4	4	7	6	5	**343**
Tualatai	451	4.5%	7	6	6	11	8	7	**496**
Tualauta	3875	38.5%	57	49	54	92	71	61	**4257**
New Unit Total			**148**	**126**	**139**	**238**	**183**	**158**	
Total Units	**10052**		**10200**	**10326**	**10465**	**10703**	**10886**	**11044**	

3.18. Summary

Summarizing the natural hazard profiles, tropical cyclones and associated storm surge, landslides, floods, and droughts have had the highest historical occurrence in American Samoa. Damaging tsunamis have occurred less frequently and with less impact, while earthquakes have caused no documented significant damage or impact to the Territory.

Tropical cyclones, storm surge, landslides, and floods have all caused injuries and loss of life. Eight tropical cyclones (four tropical storms plus four hurricanes) have occurred in the past 37 years causing an estimated cumulative loss of over $100 million as a result of flooding, high surf, storm surge, coastal erosion, and high wind damage to infrastructure and buildings. Landslides have been associated with tropical cyclones also. Five significant landslides have occurred in the past 24 years. In addition to flooding associated with past tropical cyclones, four significant floods have occurred in the past 36 years.

Drought is a frequent hazard, with a high probability of occurrence. Three significant droughts have occurred in the past 24 years causing impacts that include water rationing; depletion of ground water, wells, and catchment systems; food shortages; cannery closures; school closures; and economic recession.

Six tsunamis, all affecting Pago Pago Harbor, have been documented since 1917 in American Samoa. The most significant was the 1960 Chilean earthquake tsunami that caused recorded wave run-up heights between 4.5 feet and 16 feet in the Pago Pago Harbor and around Tutuila. Very little documented damage exists for these tsunami events. No recorded earthquakes have caused significant damage to the Territory.

The purpose of the natural hazard profiles has been to present a framework regarding the relative risk to the Territory's population and infrastructure for each hazard as well as to specifically examine the relative risk to critical facilities, as identified by the HMC.

The vulnerability assessment identifies critical facilities at greatest risk by first determining areas of highest risk from an "all-hazard" composite map. Concentrated risk from multiple hazards is shown in three maps for Tutuila where all high-hazard areas and/or medium-hazard areas intersect. At least ten critical facilities have been identified as being vulnerable to multiple hazards, or at greatest risk. The critical facilities entirely within the greatest risk boundaries include the Inter-Island Ferry Terminal, the Department of Public Safety Fire Division, and the Container Dock in the village of Fagatogo, and the Lieutenant Governor's house in the village of Utulei. Critical facilities with either part of a building, or one to several buildings within greatest risk areas include parts of the VCS Samoa Packing Company in Atu'u village; parts of the Star-Kist Samoa Company in Satala village; one American Samoa Government building in Fagatogo; the Department of Education in the village of Utulei; part of one Faga'itua High School building in Sua County; and several of the Aua Elementary School buildings in Aua.

4. Chapter 4 - Capability Assessment

The purpose of conducting the capability assessment is to identify the strengths and weaknesses of the Territory in terms of mitigating risks. This analysis will point to shortfalls and weaknesses as well positive measures already in place which should continue to be supported.

The capability assessment serves as the foundation for designing an effective hazard mitigation strategy. It not only helps establish the goals and objectives for the American Samoa mitigation plan but it ensures that those goals and objectives are realistically achievable under given local conditions.

The capability assessment includes a comprehensive examination of the following capabilities as summarized in Table 22 below: (program documentation has been reviewed but not included for each program). Table 22 was developed from descriptions of a complete capability assessment given in Developing the Mitigation Plan, FEMA 386-3.

Table 22 Capability Assessment Components

Current Programs and Policies	• Political Capability • Land Use Management Systems and Regulations • Floodplain Management Regulations • Mitigation Projects • Authority and Representation: Who makes the decisions, and how are they influenced by the people that they govern? Is mitigation an important issue to the community?
Technical Capability	• What kind of technical resources does the Territory have to help with mitigation techniques?
Fiscal Capability	• What kind of funding does the Territory have or have access to that will allow them to mitigate for disasters?
Historical Assessment of Past Development Efforts	• Historical events and past developments are taken into account when determining where current work needs to be done.
Analysis and Evaluation of Capability Data	Proposed activities should be classified as those which: • Can be carried out easily, without a change in the law • Require only a change in the regulations • Can be implemented with only a change in practice or • Require new authorization
Capability Assessment Conclusions	• American Samoa has the administrative infrastructure and technical ability to undertake mitigation projects. • American Samoa has the ability to receive funding. • American Samoa will benefit from continued consulting expertise in the areas of planning and emergency management.

4.1.Current Programs and Policies

4.1.1. Government Organizations[43]

Departments of government are grouped based on funding sources, chain of command, relationship to government and other criteria. Below is a complete listing of the groupings.

4.1.1.1. Departments

- Administrative Services
- Department of Agriculture
- Department of Commerce (DOC)
- Department of Education (DOE)
- Department of Health
- Human Resources
- Human and Social Services (DHSS)
- Legal Affairs
- Local Government (Samoan Affairs)
- Department of Marine and Wildlife Resources
- Department of Parks and Recreation
- Department of Planning and Budget
- Port Administration
- Procurement
- Protection and Advocacy
- Public Defender
- Department of Public Information
- Department of Public Safety (DPS)
- Public Works
- Treasury
- Youth and Women's Affairs

Picture 4 Hazard Mitigation Council and Technical Staff Meeting June 7, 2007

[43] http://americansamoa.gov/departments/

Agencies

- Administrative Law Judge
- Arts Council
- Criminal Justice
- Election Office
- American Samoa Environmental Protection Agency (ASEPA)
- American Samoa Historic Territory Office (ASHPO)
- Office of Territorial and International Criminal and Drug Enforcement (SPICIN)
- The Feleti Barstow Public Library
- Territorial Administration On Aging (TAOA)
- Territorial Audit Office

4.1.1.3. Offices

- American Samoa Office – Hawaii
- Governor's Washington Representative
- Property Management
- 10th Pacific Festival of the Arts
- Territorial Emergency Management Coordinating Office (TEMCO)
- Territorial Energy Office
- Territorial Office of Homeland Security
- Territorial Office of Financial Reform
- Veterans and Military Affairs Office
- Office of Vital Statistics

4.1.1.4. Authorities

- American Samoa Community College (ASCC)
- American Samoa Power Authority (ASPA)
- American Samoa Telecommunications Authority (ASTCA)
- Development Bank of American Samoa (DBAS)
- Medical Services Authority

4.1.2. Key American Samoa Mitigation Departments and Agencies

The following departments and agencies have developed and completed most of the mitigation projects for American Samoa.

4.1.2.1. Department of Public Works (DPW)

The primary mission of the Department of Public Works (DPW) is to provide high quality construction engineering, design, construction management, construction, maintenance, renovation, and repair services for ASG infrastructure, equipment and facilities throughout the Territory. Within this framework, the DPW endeavors to employ environmentally sound, culturally sensitive, socially responsible and cost effective practices in all service areas, programs and projects. In carrying out this mission, the DPW maintains a high level of accountability through fiscal management and planning with emphasis on the development of American Samoa's construction industry and improving construction capacity in the Territory. Employing the latest technology, management concepts, and training techniques, the Department offers reliable and effective civil engineering, architectural, construction, inspection and maintenance services that effectively extend the useful life of public assets and improves overall safety conditions for the general public.[44]

Picture 5 ASPA Project Definition Meeting June 5, 2007

4.1.2.2. American Samoa Power Authority (ASPA)

The ASPA provides quality, safe, economical and sustainable utility service in partnership with their customers, the community of American Samoa and the Pacific Region.[45]

4.1.2.3. American Samoa Telecommunications Authority (ASTA)

The American Samoa Telecommunications Authority (ASTCA) is American Samoa's telecommunication leader to the world, providing advanced Territory-of-the-art digital telephone, cellular, internet and long distance service to and from American Samoa's most remote and challenging areas.[46]

4.1.2.4. Development Bank of American Samoa[47]

The Development Bank of American Samoa (DBAS) was established in 1969 under Public Law 11-40. The operation of the DBAS is based on the following mission statement and goals, developed as integral components of the strategic plan.

The mission of the Development Bank of American Samoa (DBAS) is "to serve the economic and development needs of the community of American Samoa through affordable financial services."

[44] http://www.asg-gov.net/PUBLIC%20WORKS.htm
[45] http://www.aspower.com/
[46] http://www.samoatelco.com/
[47] http://www.dbas.org/

Other tasks promoted by the Development Bank of American Samoa include:

- Continue to promote residential development in American Samoa by providing affordable mortgage loans for new home construction and home repair activities.
- Further the development of the private sector and the economy of American Samoa by providing commercial loans to start-up and existing businesses.
- Facilitate disbursement of loans and grants offered by US Federal Agencies directly to the qualified residents of American Samoa.

4.1.2.5. Office of Procurement

The office of Procurement is responsible for procuring and purchasing resources for the American Samoa Government.

4.1.3. Territorial Emergency Management Coordinating Office (TEMCO) and Department of Homeland Security (DHS)

The Territorial Emergency Management Coordination (TEMCO) operates under the general supervision of the Director of the American Samoa Department of Homeland Security (ASDHS). The Disaster Assistance Coordinator (TEMCO Manager) reports to the Director of ASDHS. TEMCO is created by law under the American Samoa Code Annotated (ASCA) Section 26.0106 as a coordinating agency to coordinate assistance, resource management, emergency response and recovery efforts, and shall prepare and maintain a territorial assistance plan and keep it current. The law further states that the territorial disaster assistance plan shall be reviewed annually and standards and regulations are adopted as necessary or appropriate in coping with disasters.

In the wake of Office of Insular Affairs audit and consequent funding freeze, the governor issued Executive Order No. 003-2007 establishing the American Samoa Department of Homeland Security within the Executive Branch, reorganizing several government agencies/offices as follows: Territorial Office of Homeland Security(TOHS), the Office of Vital Statistics(OVS), TEMCO, Office of Territorial and International Criminal Intelligence and Drug Enforcement (OTICIDE), South Pacific Islands Criminal Intelligence Network (SPICIN), and the United States Interpol Pacific Sub-Bureau (INTERPOL) under the leadership of Acting Director Mike Sala. The reorganization marks the first time since its inception that any TEMCO personnel have been locally funded. This is a milestone and as of October 2007, TEMCO is staffed with three permanent career service employees and an organization structure and staffing (DHS Memorandum No. 37-2007) showing five new hires needed.

In terms of land use planning, Department of Commerce (DOC) employs a full time land use planner. In the past, TEMCO relied on DOC for much of the data used for planning and preparedness strategies. Until project funding is released, the reliance will continue. However, a renewed emphasis on emergency resource location and documentation will result in the development of data sets that are specific to TEMCO's response work. A GIS specialist will be hired to coordinate this development. In addition, new satellite images, updated critical facilities layers and emergency shelter information will be added. An annual update of a territory wide emergency planning and response map is proposed using the local college's GIS interns to input new or revised land use data,

The interim focus on training while funding is limited by the freeze is to provide basic NIMS training to all first responders and to document their levels of general and specific emergency response capabilities. A pattern of territorial needs will thus be generated to direct the use of training funds as they are released.

4.1.4. Government Department Roles in Mitigation

Table 23 gives a list of the different government organizations and their role in mitigating risks. Also, the table provides contact information for each organization as well as the effect on loss reduction.

Table 23 Government Department Roles in Mitigation

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Point of Contact Name, Address, Phone, Email	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
Territorial Emergency Management Coordinating Office (TEMCO)	1. Pre-Disaster Mitigation Grant program—mitigation planning	Alefa Afalava (684) 699-6482 (684) 699-7828 Ale4-546@yahoo.com	Yes	Yes	No	Support for mitigation planning and projects.
	2. American Samoa Hazard Mitigation Plan	Alefa Afalava (684) 699-6482 (684) 699-7828 Ale4-546@yahoo.com	Yes	Yes	No	This document, which meets FEMA requirements.
	3.Hazard Mitigation Grant Program	Tusipasi Suiaunoa (684) 733-1361 (684) 699-7828 suiaunoatusipasi@yahoo.com	Yes	Yes	No	Support for mitigation.
Department of Commerce (DOC)	1. Project Notification & Review System	Lelei Peau, EOB, 2nd Floor (684) 633-5155 lelei.peau@noaa.gov	Yes	Yes	No	Integrated land use management and regulation program to reduce risk.
	2. National Flood Insurance Program	Genevieve Brighouse EOB, 2nd Floor (684) 633-5155 gene.brighouse@noaa.gov	Yes	Yes	No	Integrated with above but enhancements being made.
	3. Coastal Management Program	Genevieve Brighouse EOB, 2nd Floor (684) 633-5155 gene.brighouse@noaa.gov	Yes	Yes	No	Special Management Area rules developed under this program and Coastal Hazard Assessment and Mitigation Program.
	4. American Samoa Flood Hazard Mitigation Plan	Genevieve Brighouse EOB, 2nd Floor (684) 633-5155 gene.brighouse@noaa.gov	Yes	Yes	No	Adopted to meet NFIP requirements. Recommendations adopted as part of this Mitigation Plan.
	5. Village Coastal Hazard Assessment and Mitigation Program (CHAMP)	Genevieve Brighouse EOB, 2nd Floor (684) 633-5155 gene.brighouse@noaa.gov	Yes	Yes	No	With assistance from DOC/ASCMP, villages set up their own ordinances and measures to

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Point of Contact Name, Address, Phone, Email	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
						reduce local risks to hazards.
Department of Public Works (DPW)	1. Building Code administration and enforcement	Punaofo Tilei American Samoa Government, Executive Office Building, Utulei Territory of American Samoa, Pago Pago, AS 96799 (684) 633-4141	Yes	Yes	No	Primary building standards permit system for American Samoa.
	2. Deputy Director	Faleosina Voight, (684) 733-2699, faleosina@yahoo.com				
American Samoa Power Authority (ASPA)	1. CEO	Mike Keyser (684) 644-2772 mikchaelk@aspower.com	Yes	Yes	No	ASPA is the electric, water, wastewater, and solid waste management utility. Responsible for mitigating risk to systems.
	2. COO	Reno Vivao, reno@aspower.com				
	3. GIS Technician	Andrew Ena, (684) 733-1803				
	4. Electric Division	John Utu (684) 644-2772				
	5. Water Division	Ne'emia Mareko (684) 699-1333				
	6. Wastewater Division	Fa'I Mareko (684) 633-1462				
	5. Solid Waste	Petelo Lafaele (684) 699-4619				
Department of Port Administration	1. Director	Matagi R. McMoore, Director (684) 633-4251 American Samoa Government, Territory of American Samoa, Pago Pago, AS 96799	Yes	Yes	No	Responsible for mitigating risks in all ports of entry: Pago Pago Harbor, port, marina and airport facilities.
	2. Port Master Plan 1999-2019	Chris Soti, Port Engineer (684) 633-4251	Yes	Yes	No	Regulates development around the port

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Point of Contact Name, Address, Phone, Email	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
		American Samoa Government, Territory of American Samoa, Pago Pago, AS 96799				area; supports facilities needed to clean and maintain the port area; recommendations improve navigation and prevent ship groundings in storms.
Department of Health (LBJ)	1. Engineer	Sa Mavaega (684) 633-4590	Yes	Yes	No	Responsible for mitigating risk for LBJ Hospital and other health facilities.
	2. Public Health	Aso Maga (684) 633-4606				
Environmental Protection Agency	1. Executive Director	Dr. Toafa Vaiaga'e (684) 633-2304	Yes	Yes	No	Responsible for insuring protection of environmental resources.
	2. Division Chief	Faamao Asalele, Jr. (684) 733-6149 fasalele@gmail.com	Yes	Yes	No	
	3. American Samoa Watershed Protection Plan (1998)	Edna Puchan (684) 633-2304	Yes	Yes	No	Identifies protection methods to reduce floods and erosion.
	4. American Samoa Non-point Source Pollution Control Program	Peter Peshut (684) 633-2304 Genevieve Brighouse EOB, 2nd Floor (684) 633-5155 gene.brighouse@noaa.gov	Yes	Yes	No	Joint responsibilities w/ASEPA and ASCMP.
Coral Reef Advisory Group	1. The American Samoa Coral Reef Advisory Group	Governor's Point of Contact: Lelei Peau, EOB, 2nd Floor (684) 633-5155 lelei.peau@noaa.gov	Yes	Yes	No	Appointed by, and reports directly to, the Governor to protect coral reef ecosystems.
	2. US All Islands Coral Reef Initiative Plan (1999)	Governor's Point of Contact: Lelei Peau	Yes	Yes	No	Identifies strategy and protection measures for

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Point of Contact Name, Address, Phone, Email	Effect on Loss Reduction			Comments
			Support	Facilitate	Hinder	
						coral reefs.
	3. US Flag Islands Vessel Grounding Workshops Summary and Next Steps	Governor's Point of Contact: Lelei Peau	Yes	Yes	No	Identifies actions to prevent vessel grounding for coral reef protection.
Development Bank of American Samoa	Grant Writer, Financial Consultant	Jilla Prioozmandi, (684) 633-4031				
American Samoa Telecommunications Authority		Dave Alaga (684) 733-9078 James Taylor (684) 733-9014				

4.1.5. Laws and Regulations

American Samoa has many laws and regulations intended to directly or indirectly reduce the risk of disaster losses. Most of these address building codes and standards, land use management and regulation, and flood hazard mitigation.

4.1.5.1. Land Use Management and Regulations

The legal framework for regulating development in areas subject to natural hazards is Public Law 21-35, the *American Samoa Coastal Management Act* (ASCMP). This law ensures that development is restricted in areas subject to natural hazards. The *American Samoa Coastal Management Program Administrative Code* gives the Department of Commerce, the agency that now contains the Coastal Management Program, responsibility to restrict development in areas subject to flooding, storm surge, tsunamis, landslides, and coastal erosion in order to minimize losses from these disasters.

The *American Samoa Coastal Management Act* (26.0202) mandates the establishment of a system of environmental review known as the Project Notification and Review System (PNRS). The Act includes development standards, procedures for the designation, planning and management of Special Management Areas, procedures for environmental assessments, and procedures for determination of federal consistency. The land use management system provides a mechanism for regulating unsafe building practices. It also mitigates the risk of natural hazards by monitoring the location of construction and avoiding development in hazardous areas.

Rules establishing and regulating development in Special Management Areas are explicitly aimed at reducing the impact of the natural hazards described in Chapter 3. The rules define and delineate Special Management Areas as:

> *"…areas which, if development were permitted, might be subject to significant hazard due to storms, landslides, floods, erosion, settlement (subsidence), or salt water intrusion;…"*[48]

The ASCMP Administrative Rules establish an explicit coastal hazards policy to restrict development in hazardous areas. The policy on coastal hazards and shoreline development mandates (1) protection of life and property, (2) denial of projects, uses, or activities in coastal hazardous areas, (3) compliance with the American Samoa Flood Plain Management Regulations. The shoreline development provisions of the regulations restrict development in a 200-foot shoreline setback. The regulations also provide legal backing for Village Mitigation Ordinances established through agreements between the American Samoa Coastal Management Program, eight villages on Tutuila, and one village in the Manu'a Islands.

A soil erosion policy in the Administrative rules explicitly targets restriction of development in areas subject to landslides. It permits projects, uses, or activities in areas with slopes of grades from 0-20%. It allows conditional use permits for development in areas with grades of 20-40% and mandates the denial of permits for projects, uses, or activities on slopes of greater than 40%.

[48] American Samoa Coastal Management Act

Droughts are serious threats to the well being of the people of American Samoa. Mitigation of the drought risk is addressed indirectly through general planning functions of the Department of Commerce conducted in conjunction with the *Coastal Zone Management Act* and the Project Notification and Review System. However, drought impacts are mitigated directly through the management of ground water resources by the American Samoa Power Authority; efforts to minimize agricultural losses by the Land Grant College extension program and the Department of Agriculture; and fire suppression efforts. Drought impacts are also mitigated through seasonal to inter-annual climate forecasts issued by the Pacific ENSO Application Center and the U.S. National Weather Service.

Land Use Management Improvements Already Initiated

The Department of Commerce sponsored a strategic planning workshop for the members of the PNRS in May 2003. The purpose of the meeting was to improve coordination among agencies and strengthen the system to ensure public compliance with the system. The mission of the PNRS was defined as follows:

PNRS facilitates and coordinates the work of its *Member Agencies* in meeting their obligation to:

- Protect property and resources
- Protect health and human life
- Maintain/improve the quality *of life* in the unique *cultural* and *natural* setting

To succeed at this, all Member Agencies share the responsibility for *public awareness*, *customer service*, and, *compliance and enforcement*.

Three PNRS board subcommittees were established: public awareness, compliance and enforcement, and customer service. These subcommittees developed actions that have been initiated. At the end of 2003, another workshop was conducted to review the status of these working groups. By improving the PNRS system, American Samoa has taken steps to improve the overall land use system. With a strategic planning process established, these subcommittees have continued to revise and improve the system since 2003.

Recommended Improvements in Land Use Management and Regulation

From the 2003 Hazard Mitigation Plan, the Disaster Mitigation Council Subcommittee on Land Use Regulations and Standards recommended a list of actions that would improve overall land use within the Territory. These recommendations are still valid, several recommendations are being addressed, and these recommendations are being carried forward as part of the Mitigation Plan Update. By encouraging proper land use activities and by considering the impacts of hazards in future land use projects, future development should not increase risks to hazards. The subcommittee presented the following list of recommended improvements in the land use management and planning systems at the April 2003 meeting. In April 2003 and again in August 2003, the HMC endorsed the following actions to improve the land use system:

1. Establish an enhanced Planning Division within Department of Commerce to establish current and strategic planning processes for the Territory.

2. Consolidate Land Use/Zoning/Business Applications and Permits within DOC to facilitate comprehensive planning in concert with completed general plans, rules and statute changes.
3. Overhaul the Zoning Regulations and Statutes and merge into the Territorial Planning Commission, restructuring the Planning Commission and existing boards. There is a need to revise land use and zone classifications to determine current and strategic planning areas.
4. Implement the American Samoa General Plan and the development of County Plans (i.e. Tualauta & Pago areas completed to date) for the Territory to be administered to manage growth, outline policies, land use, and zoning maps.
5. Develop land use and zoning maps for the entire Territory. A current basic inventory of all structures would be a start and useful to determine the range of uses in the Territory.
6. Establish Planned Unit Development building regulations in conjunction with zoning specifications for Tualauta County and the Territory.
7. Formulate a residential and a multi-family housing plan for Tualauta County (i.e. highest growth area in the Territory) that will restrain the development of squatter settlements and contribute to the creation of desirable communities.
8. Commission an assessment for the sighting of public facilities and the development of a Regional Government Center.

The American Samoa Government will fund the improvements listed above. Additional funding will be available through grant support from the NOAA Office of Ocean and Coastal Resource Management to the American Samoa Coastal Management Program and other federal sources. An additional improvement would be to formally institute a comprehensive hazard assessment as part of the PNRS review process.

4.1.5.2. Project Notification and Review System (PNRS)

PNRS is the primary land use management and regulation mechanism. It is coupled with other land use planning and permitting functions within the American Samoa Government. The PNRS is, however, the primary mechanism for mitigating the risk of natural hazards by controlling the location of new structures and avoiding development in the hazardous areas shown in Chapter 3. It is also integrated with the administration of the building code and flood plain management regulations.

A Land Use Permit Application is required for all new building development in American Samoa. The Purpose of the Land Use Permit (O le mafuaaga ole faaaogaina o Pemita o le faaaogaina o Laueleele) is to preserve and protect the environment of American Samoa through technical planning of all activities on the land "from the mountains to the sea" (ASAC 26.0207). The PNRS is a streamlined land-use permit system administered by the Department of Commerce that integrates the permitting requirements of each of the territorial agencies with environmental management concern (ASAC 26.0206).

Land Use Permits are classified into Major and Minor projects depending on the impacts they would impose on the environment. Minor projects are reviewed within a five (5) day period whereas major projects requiring more technical information usually take approximately forty-five (45) days to review.

Examples of Minor Projects:

- Construction of a single-family home with utilities

- Samoan cultural facilities
- Extension to non-commercial structures
- Projects requiring a utility hook-up
- Rebuilding a residential structure on an existing footprint

For Minor projects, the site is visited within 2 to 3 days of receiving the land use permit application. The applicant must meet with a Department of Commerce (DOC) representative to explain the project and ensure the accuracy of the project description and site plan. Decisions are rendered in about five (5) days.

Examples of Major Projects:

- Commercial projects involving new construction and business activities.
- Projects in or around U.S. waters (streams, wetlands, & shoreline areas).
- Development on steep slopes involving land excavation or dredging, leveling, and filling.
- Major projects that receive U.S. federal funds (e.g., new school buildings or roads).
- Projects that involve the use or storage of hazardous materials or chemicals.
- Any activity that is found to significantly impact the quality of the human environment.

The PNRS Board meets twice a month (first and third Wednesday of each month) and reviews major projects. The PNRS Board conducts site visits to these projects every Tuesday. Major projects usually require the review and approval of technical plans prior to full permit approval. The applicant provides these technical plans, which are reviewed by the agency given jurisdiction (e.g., DPW would review parking and drainage plans). The PNRS Board only reviews Land Use Permits classified as Major projects.

The PNRS Board is composed of representatives from agencies with land use and environmental management responsibilities in the Territory (Table 24). Each agency plays a role in the PNRS review process and votes on projects based on their agency jurisdiction. In general, major development projects must be carefully planned and reviewed for environmental compliance prior to final approval. Technical information provided to the Board by the applicant must be complete.

Table 24 Project Notification and Review Board Membership & Responsibilities

Agency	PNRS Function or Responsibility
American Samoa Coastal Management Program within Department of Commerce (ASCMP/DOC)	Administrative Coordinating Agency for the PNRS process. The goal of the ASCMP is to preserve, protect, develop, and enhance coastal resources. Also lead agency for flood plain management.
The Department of Public Works (DPW)	Infrastructure requirements: traffic flow, parking, drainage, and building design. Reviews plans for major construction activities that involve major earthworks. Responsible for building code administration.
American Samoa Environmental Protection Agency (ASEPA)	Impacts on land, air, and water quality. Projects involving hazardous materials, chemicals, and pesticides must be approved by ASEPA.

Agency	PNRS Function or Responsibility
American Samoa Historical Territory Office (ASHPO)	Documentation and review of ancient cultural and historic sites throughout American Samoa. Projects receiving federal funds must conduct a Section 106 review of historic findings at the site.
Department of Marine and Wildlife Resources (DMWR)	Protection of plant and animal habitats, especially endangered species. DMWR also reviews projects that may impact reef and fishery resources.
American Samoa Power Authority (ASPA)	Major utility provider. Reviews projects based on water distribution and resources, such as groundwater and wastewater treatment.
Department of Health (DOH)	Public health, including new facilities, such as restaurants or food distribution centers, and pollution from sources that will impact the public.
Department of Parks and Recreation	Park and government owned land, recreation opportunities, and shoreline access.

The PNRS requires the collaboration of the agencies listed in the above table. In order for the agencies to effectively evaluate and issue permits, they must first obtain all of the appropriate information from the applicants. Should the applicant fail to include information, the entire process may be delayed for months. Therefore, the PNRS has developed a substantive packet of instructions for applicants that outline the process.

PNRS has proven to be a very effective way to restrict development in hazardous areas, although, as discussed below, improvements are needed in the system.

4.1.6. Existing Mitigation Programs

The building code and its enforcement, the Project Notification and Review System, and the American Samoa Flood Plain Management Regulations are the primary ways in which the American Samoa Government prevents losses from future development. As described below, the three regulatory regimes function as an integrated system to mitigate damage to future development from floods, tropical cyclones including storm surge, landslides, tsunamis, earthquakes, and drought.

4.1.6.1. *Building Code Administration and Enforcement*

The 1997 *Uniform Building Code* is used by engineering and design professionals in the Territory and by the Department of Public Works in administering building and safety code regulation.

An application for a land use permit from the Department of Commerce is required before a building permit application can be provided and issued by the Department of Commerce. Plans are submitted with the building permit and land use permit applications. The Architecture and Engineering Division of the Department of Public Works reviews the building permit application for compliance with the 1997 *Uniform Building Code*. Ten or more separate inspections may be required, including special inspections by an engineer, during the course of construction.

Public Works officials believe that the existing building safety program has done much to reduce the risk of losses to government buildings, commercial structures, community buildings, and homes. However,

improvements can be made and those endorsed by the Mitigation Council are included in a later section of this chapter.

4.1.6.2. Flood Hazard Mitigation

The flood risk in American Samoa is very serious and occurs with frequency due to heavy rainfall, including the heavy rain associated with tropical cyclones. This can result in flooding of rivers, streams, and low-lying areas. Coastal flooding also occurs in relation to tropical cyclones due to high surf and storm surge. Storm surge from the last three hurricanes caused considerable damage in coastal areas. Tsunamis cause coastal flooding as well. Chapter 3 shows a fairly low frequency of tsunamis, and most tsunami damage has been concentrated in Pago Pago Harbor.

In 1991, the Governor promulgated the Territory of American Samoa Floodplain Management Regulations through Executive Order 02-1991 to meet requirements for participating in the National Flood Insurance Program (NFIP). The Executive Order adopted the 1991 Flood Insurance Rate Maps (FIRMs) and declared that no structure could be constructed, located, extended, converted, or altered without full compliance with the terms of the regulations contained in the Executive Order and other applicable regulations. It also states that violators of these regulations may be subject to sanctions, both civil and criminal, according to Title 24, Chapter 05, and Title 26, Chapters 02 and 10 of the American Samoa Code Annotated. The Executive Order appointed the Office of Economic Development and Planning, now the Department of Commerce, to administer and implement the Floodplain Management Regulations.

4.1.6.3. Flood Plain Management

As indicated above, the land use permit obtained through the PNRS is the mechanism for insuring compliance with the Floodplain Management Regulations. The Executive Orders that established the Floodplain Management Regulations require that a determination should be made based on whether a structure is in a Special Flood Hazard Area during the preliminary review of the Land Use Permit/Building Permit Application. The Floodplain Administrator determines the Base Flood Elevation for a proposed location and the Survey Branch of the Department of Public Works provides the applicant with a determination of the actual elevation of the construction site. When the applicant has received the Base Flood Elevation Determination and the determination of the actual elevation of the proposed construction site, a final plan may be prepared and submitted to the Floodplain Administrator for review prior to issuance of the Land Use Permit through the PNRS.

It is also the responsibility of the Floodplain Administrator to notify the community and applicable federal agencies prior to any alteration or relocation of a watercourse, to submit evidence of such notification to FEMA, and to require that the flood carrying capacity of the altered or relocated portion of said watercourse be maintained.

Under the flood plain management regulations, variances may be issued for new construction and substantial improvements being erected on a lot of one-half acre or less in size which is contiguous to, and surrounded by, lots with existing structures constructed below the base flood level. As the lot size increases beyond one-half acre, the technical justification required for issuing the variance must increase.

Variances may be issued for the reconstruction, rehabilitation, or restoration of "historic structures" upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure, and that the variance is the minimum necessary to preserve the historic character and design of the structure. Variances may be granted for new construction, substantial improvement, and other proposed new developments necessary for the conduct of a "functionally dependent use" with certain restrictions. The structure or other development must be protected by methods that minimize flood damages during the base flood and create no additional threats to public safety. Variances are not granted within any designated floodway or floodway setback area if any increase in flood levels during the base flood discharge would result.

Major improvements in the flood plain management program were proposed in the *American Samoa Flood Hazard Mitigation Plan* and the HMC has endorsed these as part of this Plan.

4.2.Coordination with other Territorial Plans

4.2.1. Territorial General Plan, Department of Commerce 2003

The Territorial General Plan is an indicative policy agenda for the economic and social development of the Territory of American Samoa. The purpose of the plan is to promote a better quality of life for the Territory's residents, protect the natural environment and preserve the Territory's resources for the sustainable development of the islands.

Part I of the Territorial General Plan introduces the reader to the Territory's islands and existing conditions. Chapters One and Two provide colorful pictures of the Territory's islands and infrastructure to augment the narrative and data, while Chapters Three and Four identify the principal issues and areas of concern for the future.

The issues put forward in Part I have been identified by a planning process that included the participation of government agency representatives, private sector business people and interested individuals. The planning process also drew upon previous studies and recent social and economic development initiatives that involved public input.

Part II of the Territorial General Plan sets out the policies and strategies for the sustainable development of the Territory's islands that the American Samoa Government will implement during the next several years. Part II follows upon Part I and presents the issues in greater detail on the basis of acute common issues, economic development imperatives, environmental concerns and social development needs.

The Territorial General Plan serves several important aims:

- To create a vision for the future;
- To focus upon the primary issues and concerns faced by the Territory;
- To create a permanent system of cooperation, coordination, planning and management among government and non-governmental organizations;

- To identify a rational and strategic path for development that makes the best use of available funding and resources;
- To create the capacity to implement effective programs with efficiency; and
- To make known the policies and plans of the government administration and demonstrate to Federal oversight agencies and funding sources that the government has implemented a means to direct its progress and gauge its performance.

Scope of Plan

The scope of the plan is inclusive of a broad range of issues that are classified under the following areas of concern:

1. Commerce and economic development;
2. Environmental protection and resource management;
3. Social development and the delivery of social services; and
4. Capital improvements and infrastructure.

These four areas of concern form the framework of the Territorial General Plan. They are reviewed and summarized in Part I. In Part II, they each encompass a chapter devoted to issues, policies and strategies. The Territorial General Plan is an indicative policy plan. It precedes master plans and comprehensive development plans. That is, it provides the initial direction and points the way toward the future development of the Territory, and it enables the formulation of master and comprehensive plans. These latter plans will provide maps, infrastructure and schedules.

Where master and comprehensive plans exist, e.g. the Port Master Plan of 1999, the Territorial General Plan endorses these plans and builds in policy to support their agenda and functions. In essence, the Territorial General Plan provides the overall policy agenda and serves as the umbrella under which future government development and functional or action plans will be formulated.

4.2.2. ASG Tank Farm Terminal Operations Mitigation Plan[49]

The current operator, BP Southwest Pacific Ltd. has stored oil & operated the tank farm terminal for six years. This facility started to store oil in 1941 and has been upgraded several times. Currently, the oldest tanks were installed in the 1980's.

The facility SIC code is 5171. The facility is primarily engaged in the wholesale distribution of petroleum products from bulk liquid storage terminals.

The main office and primary storage are located in the village of Utulei, on the west side of Pago Pago Harbor. It is owned by the American Samoa Government and operated by BP South West Pacific Limited. The fuel dock is located south of the Commercial Container pier, adjacent to the Rainmaker Hotel, on the west rim of Pago Pago Harbor. The Airport Tank Farm Satellite is located on the west end of the Pago Pago International Airport parking lot.

[49] American Samoa Government Tank Farm Terminal Operations Mitigation Plan

The petroleum storage area at the Utulei Tank Farm contains 10 aboveground storage tanks with a total storage capacity of 29,512 barrels. The Airport Tank Farm contains 6 horizontal bullet tanks with a total storage capacity of 3,048 barrels. All of the tanks are contained within dike (secondary containment) areas. The fuel dock is connected to the storage area by three petroleum pipelines. The following operations have the potential for a release of petroleum hydrocarbons:

Truck Loading Operations

The two truck loading areas are bermed at the Terminal. The containment berm around each loading rack is capable of holding the maximum capacity of any single compartment of a tank truck.

Both truck-loading areas are connected to a drainage collection system, which is controlled by an underground storage tank. The tank capacity at Tank Truck Loading Rack No.1 is 10,000 gallons. The capacity of the tank at Tank Truck Loading Rack No.2 is 5,000 gallons.

Truck drivers overseeing vehicle-loading operations are trained to disconnect all transfer hoses or top loading arms before the vehicle departs. Prior to departure, the lowermost drains and outlets of tank trucks are examined for leakage and tightened or adjusted as necessary to prevent leakage during transit.

Marine Transfer Operations

The Terminal Operator at the dock is responsible for checking for proper hose hookup and product transfer procedures. Additionally, they check for leaks, observe pressures, check valves, and are in constant communication with the Terminal Operator at the tank farm and the person-in-charge on the vessel. In case of an emergency, the Pier Operator will notify both the Vessel and the Terminal Operators. All pumps will then be shut down and all valves closed.

Day-to-Day Operations at Both Terminals

Company personnel man storage tank and Terminal operations during normal working hours. The facility is always manned whenever product is being transferred. Prior to starting a product transfer, a determination is made as to the volume the receiving tank will hold. A stop gauge is established and a Terminal Operator is required to standby at the tank as the product level approaches the stop gauge.

During periodic maintenance of the aboveground storage tanks, the tanks are visually inspected for signs of deterioration. Tank foundations are also inspected.

Comparison records are kept where appropriate. In addition, operational personnel inspect the exterior of tanks while they are sampling, gauging, or transferring product. The tanks are gauged daily to assist with determinations of potential product loss. Loss/gain reconciliation reports are made daily. Signs of deterioration, leakage, or oil accumulation are noted and action taken as appropriate.

Pipelines that are not in service for an extended time are capped, blind flanged and marked "out of service." The pipelines are supported by sleepers to prevent corrosion.

Operating personnel regularly inspect all aboveground pipelines and valves for leaks. These checks are always made during product transfer operations. Any alterations or modifications to piping within the

Terminal are pressure tested for leaks before the system is returned to service. All aboveground piping is located away from vehicular traffic.

4.2.3. Pago Pago Bay Shoreside Development Plan

According to the Department of Parks and Recreation Pago Pago Bay Shoreside Development Plan, the shoreline revetment between Niuloa Point and Faga'alu Park was completed by the end of 2003. This project is a required portion of the reconstruction of the main highway leading toward the center of Pago Pago harbor. The road has been improved and the revetment installed between Faga'alu village and Breaker's Point. There is no other road construction contemplated for the main highway.

Faga'alu Park requires the installation of revetment along its shoreline to prevent further erosion. The placement of the revetment is shown as project (F) in Figure 12, Proposed Improvements to Faga'alu Park. The possibility of funding the installation of revetment, which would cost several hundred thousand dollars, is slim for the foreseeable future, but may be possible toward the end of this decade.

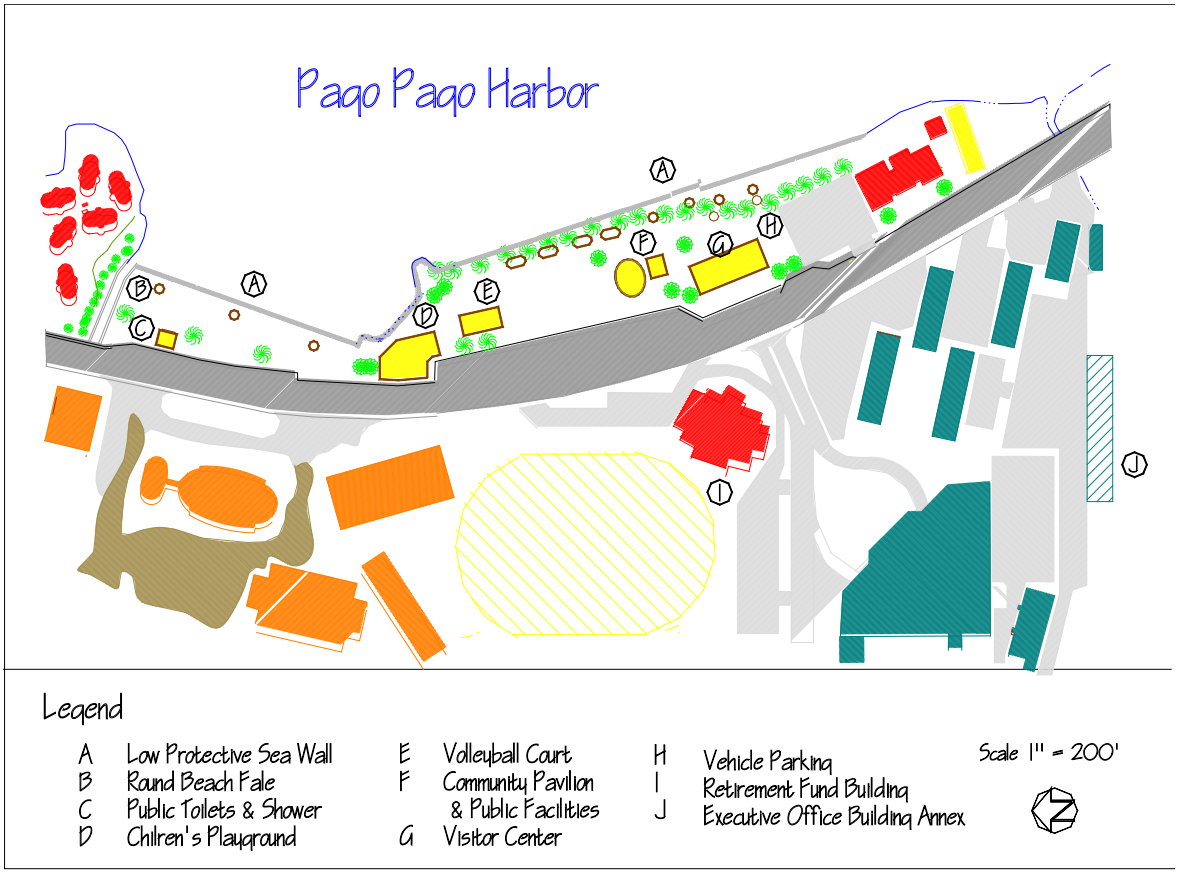


Figure 11 Proposed Improvements to Faga'alu Park[50]

4.2.4. National Park of American Samoa Wildland Fire Management Plan[51]

The wildland fire management policies of the National Park Service (NPS) support National Park of American Samoa's resource management goals. The overriding goals are to:

[50] Pago Pago Bay Shoreside Development Plan. Proposed improvements to Faga'alu Park.
[51] National Park of American Samoa Wildland Fire Management Plan, 2006.

- Provide for firefighter and public safety and protection of natural and cultural resources, and protection of human developments from unwanted wildland fire.
- Perpetuate and conserve the cultural and natural resources of National Park of American Samoa.

The Wildland Fire Management Plan program focuses on guiding the decision-making process where safety, social, political, and resource values are evaluated, and appropriate management response strategies are identified for wildland fires. The park has chosen a fire suppression only policy.

The Plan is organized to combine the latest scientific knowledge, including regional and local studies, with policy direction from the National Park Service, the Department of the Interior, the Federal Wildland and Prescribed Fire Management Policy and Program Review (USDI/USDA1995), and other Federal Government level wildland fire policies to accomplish resource and fire management goals and objectives. The intent of the plan is to provide direction for rare wildland fire events.

This Plan is in compliance with the requirements found in the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA). These requirements ensure a prudent assessment and balance between a federal action and any potential effects of that action, leading to consensus between fire managers, agency resource specialists, and the public. Any constraints or limitations imposed on the fire management program are also included.

4.2.5. Other Environmental Initiatives, Programs, and Projects for Risk Reduction

American Samoa has made strides in several areas of environmental management that contribute to the overall health of the island environment and reduce vulnerability to hazards addressed in this Plan. The American Samoa Government has planned and implemented formal programs which improve watershed management, reduce pollution and debris, and protect reef ecosystems. Coral reefs provide protection to the islands from storms. Without their protection, damage resulting from storm surge and waves would be far greater. Healthy watersheds can reduce impacts from flooding and erosion. There are efforts underway to improve watershed management with the explicit goal of reducing flooding.

The following four sections describe ongoing mitigation actions to improve the ecosystem, including a reduction of vessel groundings from storms in coral reef ecosystems, participation in the U.S. All Islands Coral Reef Initiative[52] to protect coral reefs, the watershed protection and non-point pollution plans, and the Coastal Hazard Assessment and Management Program.

Vessel Grounding

During Hurricane Val, nine long-line fishing vessels in Pago Pago Harbor ran aground. Most of these vessels were abandoned. The vessels and their slow oil leaks contributed to harbor pollution and were a potential threat to navigation. They also damaged precious coral reef ecosystems and threatened ciguatera poisoning. After a decade of concentrated effort, American Samoa received assistance from the National Oceanic and Atmospheric Administration (NOAA) and the United Territories Coast Guard (USCG) to remove these vessels and their contaminants.

[52] U.S. All Islands Coral Reef Initiative

American Samoa supports activities to protect its coral reef health and to prevent such costly damage from vessel groundings in the future. The U.S. Flag Pacific Islands Vessel Grounding Workshops, held January and February 2002 in Honolulu and Guam for the U.S.-affiliated islands led to specific actions from the U.S. Coral Reef Task Force through NOAA, based on vessel grounding and removal experience in American Samoa.

The experience in Pago Pago Harbor initiated a sequence of events that ultimately led to a draft resolution on grounded vessels by the U.S. Coral Reef Task Force (U.S. CRTF) at their August 2000 meeting in American Samoa. In response to that resolution, NOAA initiated actions to address the issue, including the use of legal mechanisms to remove grounded and abandoned vessels from coral reef ecosystems. For this hazard mitigation strategy, it is important to note that American Samoa has experienced extensive reef damage from storms and from vessel groundings and that the actions taken by the U.S. Coral Reef Task Force will help to minimize the impacts on coral reef ecosystems.

U.S. All Islands Coral Reef Initiative

American Samoa has participated in the U.S. All Islands Coral Reef Initiative since it was first initiated in 1994 to develop strategies for protecting coral reef ecosystems. Efforts in coordination with groups in Hawaii, Guam, Northern Mariana Islands, Puerto Rico, and the U.S. Virgin Islands came to be known as the "U.S. All Islands Coral Reef Initiative." The Governor of American Samoa established the Coral Reef Advisory Group (CRAG) in 1999 to develop an American Samoa action strategy for the protection of coral reefs and coordination of coral reef protection activities involving federal and Territorial agencies and the private sector. All of the island jurisdictions participating in the U.S. Coral Reef Initiative recognized that coral reef ecosystems provide essential resources, contributing to commercial and subsistence economies, food security, recreation, and storm protection.

Hurricanes and storms have caused damage to the reefs directly by overturning coral heads and scouring reef areas with debris and indirectly by blanketing several reefs with sediments and solid waste from the land. As part of future landslide and debris management plans, it will be important to consider ways to remove marine debris from storms as recommended by FEMA debris management plans that address dealing with the lack of disposal sites and need for emergency landfill sites following a storm.

Watershed Protection

American Samoa has several initiatives that focus on watershed management and protection that will help reduce flooding:

- *The Watershed Protection Plan* of 1998 makes 311 recommendations, with the American Samoa Environmental Protection Agency mandated to "facilitate coordinated resource management efforts" within each of the territory's 41 watersheds. Top priority watersheds not meeting EPA environmental standards are Nuuuli, Tafuna, Leone, Pago Pago, and Fagaalu.

- *The Non-Point Source Pollution Control Plan* was developed in 1995 by the American Samoa Coastal Management Program, in association with the American Samoa Environmental Protection Agency, to meet the requirements contained in Section 6217 of the *Coastal Zone Amendments Reauthorization Act of 1990*. Non-Point Source [NPS] pollution refers to pollution

of waters that comes from a broad area rather than a specific location. It generally results from rainwater running off the land and is amplified by hydrologic modification projects, such as stream hardening and channeling. The NPS Control Plan provides management and design guidelines to agencies and private businesses.

- The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) has conducted a number of activities to improve watershed management and assist in the application of appropriate agricultural methods. NRCS previously conducted a landslide risk assessment for American Samoa. They provide farmers with information and identify sources of relief for drought, storms, and other hazards. NRCS is currently working on watershed issues around Pago Pago Harbor by identifying methods to reduce flooding and prevent future devastating landslides.

Village Coastal Hazard Assessment and Mitigation Program

Most of the actual land use decisions that affect people happen in the traditional villages that still value the Samoan way of life. To help the leaders and people in villages better plan their communities in order to prevent impacts from disasters, the Department of Commerce Coastal Management Program developed the Coastal Hazard Assessment and Management Program (CHAMP) at the village level. The program was voluntary and implemented in 11 villages throughout American Samoa. Village risk assessments were conducted, and mitigation plans and regulations were developed for each village. This was done in conjunction with the Territorial regulatory system and enabled people to take action at the community level to reduce the impacts of disasters with the backing of the Territorial government.

4.3.Technical Capability

4.3.1. Emergency Alert System

The NWS has worked with TEMCO and DHS on all alert protocol and agency activation coordination. The NWS receives tsunami alerts from Pacific Tsunami Warning Center, Honolulu. There is an early alert system in place for the islands, including Manua, via NOAA Weather Radio (NWR). The NWS Office activates the NWR alarm for watches and warnings including tsunamis, hurricanes, flash flooding, etc as well has a provision for Civil Emergency Messages such as Hazardous Spills. The NWS Office is operational 24/7. Alerts are also broadcast over the Emergency Alert System which becomes activated via KKHJ radio station as the Local Primary Broadcast system. The NWR System has been funded by a DHS grant of $250,000. Four hundred NOAA radios have been purchased and distributed. The EAS system does weekly testing of the system as required by the FCC. The NWS is committed to maintaining the NWR system. The NWR program also includes observations, forecasts, and climate and outreach information such as hurricane preparedness activities. Radios are available for purchase in stores.

The alert system was successfully tested during the May 2007 Pacific Wave Tsunami Exercise. The EAS system did a second alert test with all the schools. Every school and every village mayor has an NWR. Although some of the Manua Islands do have a strong signal, not all villages do. The NWS has identified weak signals and is working to improve them. The signal is good on the North Shore of Tutuila in pockets. There is movement to put a tower on Mount Olotele at 1617 feet. Also, the NWS may put a

repeater on Manua depending upon coverage from the Olotele site. This could happen in 2007 during the next several months.

This radio alert system is a low cost, practical alternative to a multimillion dollar siren system, which would deteriorate from salt air. In addition, sirens indicate you should go to your radios and television for warnings anyway.[53]

4.3.2. American Samoa GIS Users Group

The American Samoa GIS Users Group has a memorandum of understanding among their member agencies. The member agencies are "mutually interested in cooperative activities aimed at the development of "the American Samoa Spatial Data Infrastructure," which includes provisions for a territorial GIS dataset, metadata creation, and projection/datum scheme.[54]

Picture 6 PDM Flood Control Project. Mitigation for chronic flooding to LBJ Hospital

4.3.3. Tutuila Hazard Assessment Tool (T-HAT)

The Tutuila Hazard Assessment Tool is part of the Department of Commerce, American Samoa Coastal Management Program. ASCMP personnel can display the T-HAT tool and procedures for applicants proposing an activity in an area. They can check vulnerability of land use after site inspections and guide development away from hazard prone areas.

4.3.4. Emergency Shelter GIS Data Layer

TEMCO has begun upgrading and maintenance of the territorial emergency shelter layer of the GIS data base. This will dovetail with the PDM Shelter upgrade project to identify and record shelter parameters including roof wind ratings, accessibility, and power and water supply security and capacity. As TEMCO develops the in-house expertise required to manage the GIS data base, other layers will be added to this maintenance task. The goal is for TEMCO to be an active partner in the GIS users group and to help generate and manage critical spatial data for emergency management purposes.

4.4.Fiscal Capability

Financially, the Hazard Mitigation Grant Program has been managed by the American Samoa Disaster Recovery Office, under the Territorial Office of Financial Reform for all disasters since the enactment of the Hazard Mitigation Program in 1998 with the Robert T. Stafford Disaster Relief Act. This includes five Presidentially-declared disasters. The Pre-disaster Mitigation Grant Program is managed by TEMCO.

[53] June 7, Interview with Akapo Akapo, Warning Preparedness Meteorologist, National Weather Service (NWS) Office and Alan Olson, NWS MIC WSO Pago Pago.
[54] American Samoa GIS Users Group Memorandum of Understanding

The Hazard Mitigation Grant Program is under good management, has successfully completed all mitigation projects funded for Hurricane Ofa, 1990 and Hurricane Val, 1991. All HMGP projects funded under the Flood DR-1473, Hurricane Heta DR-1508 and Hurricane Olaf DR-1578 are completed or funded and on track for completion in 2008.

The Pre-disaster Mitigation Grant Program continues to be managed by TEMCO and has completed one of two funded projects successfully. The completed project is the Fagaalu Flood Control Project to protect the LBJ Hospital from repetitive flooding, see the picture 4-6 above. The second project, the Pago Pago Flood Control Project has completed an Environmental Assessment with a Finding of No Significant Impact and is finalizing the Department of Army Permit requirement, with an open public comment period ending June 9, 2007. After obtaining the Department of Army Permit, the project will go through the American Samoa Permit Notification and Review Process to obtain the proper land-use permit to proceed with the project. The project should begin in 2007.

TEMCO has worked with the Territorial Hazard Mitigation Council to submit additional PDM projects to FEMA in 2005, 2006, and 2007. Projects were not funded by FEMA in 2005 and 2006 due to insufficient documentation and or benefit-cost ratios that were not competitive nationally. Some of the rejected projects were underground utility projects submitted by ASTCA. As a result of the Mitigation Plan update process, ASTCA will work closely with ASPA and Public Works to submit the most efficient projects in order to increase the benefits and reduce the costs.

ASG, Public Works, ASPA and ASTCA have been able to meet the financial match requirements for all mitigation projects funded to date.

4.4.1. Funding Sources for Mitigation Programs and Projects

Ongoing mitigation activities undertaken by the Department of Public Works, the Department of Commerce, the American Samoa Power Authority, and other government agencies are funded by the American Samoa Government, the U.S. Department of the Interior, the Department of Housing and Urban Development, and a wide range of other federal agencies. Building Code administration is funded by the American Samoa Government through the Department of Public Works. The U.S. Department of the Interior and the Office of Insular Affairs has provided capital improvement program and operations support, as well as maintenance and improvement program support for the construction of new buildings and infrastructure and hardening of existing buildings and infrastructure.

The American Samoa Power Authority spends its funds on improving and hardening power, water, and waste water systems. FEMA and the U.S. Highways Administration have also provided funding for shoreline protection and road and bridge hardening projects.

The Mitigation Council has identified funding options for the mitigation measures. American Samoa must match FEMA mitigation grant funds with a 25 percent local match. The Mitigation Council identified five sources of matching funds that qualify for FEMA grants:

1. Housing and Urban Development funds can be converted to non-federal mitigation fund match.

2. Department of Interior Capital Improvement Project funds have been used in the past to match other federal grants and FEMA grants.
3. American Samoa Power Authority and American Samoa Telecommunications Authority private matching funds.
4. General funds from the American Samoa Government treasury.
5. In-kind labor on all projects.

4.4.2. Past Territorial Mitigation Projects

American Samoa has managed hazard mitigation projects aimed at reducing the risk of losses to existing critical facilities and infrastructure for many years. The Territorial government, American Samoa Power Authority, U.S. Department of Transportation, the U.S. Army Corps of Engineers, the U.S. Department of the Interior, and other federal agencies have funded such efforts. Following Hurricane Ofa and Val, the housing rehabilitation program and the reconstruction of government buildings and infrastructure were planned in ways to reduce the risk of future losses. The American Samoa Government has also participated in the Hazard Mitigation Grant Program since Cyclone Ofa struck American Samoa in 1990. Table 25 lists the Hazard Mitigation Grant Program projects completed following Ofa and Val.

Table 25 Ofa, Val, Heta and Olaf Mitigation Projects

	Project Name	Total Cost	Fed Share
DR-0855 Ofa			
2	Harden Tank Farm I	$500,000	$975,000
3	Underground Power Lines II	$1,850,000	$925,000
4	Underground Comm. Lines II	$1,476,064	$738,032
M01	Territory Management Cost	$120,000	$30,000
Ofa Subtotal		$3,946,064	$2,668,032
DR-0927 Val			
15	Harden Fitiuta Water Line	$126,000	$126,000
16	Harden Sewer Outfalls	$1,071,050	$200,000
17	Harden Satala Power Plant	$3,204,000	$1,602,000
18	Underground Power Lines I	$4,074,114	$2,037,057
19	Harden Tafuna Housing	$250,000	$125,000
20	Harden Haz Mat Storage Areas	$169,877	$169,877
22	Harden PEACESAT Earth station	$52,041	$52,041
23	Harden Public Safety Bldg	$395,570	$197,785
25	Harden Ta'u-Faleasao Water Line	$146,958	$146,958
27	Harden DCI/KVZK Bldg	$177,709	$177,709
28	Harden Tula Elementary School	$199,999	$199,999
29	Harden Procurement Warehouse	$466,918	$233,459
31	Underground Comm. Lines I	$703,625	$351,812

	Project Name	Total Cost	Fed Share
32	Harden Tafuna Power Plant	$97,482	$97,482
33	Harden LBJ Hospital Windows	$182,650	$182,650
34	Harden Fagatogo Fire station	$101,128	$101,128
35	Harden Vatia Elementary School	$112,600	$112,600
36	Harden High Court Bldg I	$400,000	$200,000
37	Harden High Court Bldg II	$198,875	$198,875
38	Harden Am Samoa Library Bldg	$199,000	$199,000
41	Harden OMV Bldg	$73,123	$73,123
42	Harden Tank Farm II	$1,175,000	$555,000
M01	Territory Management Cost	$196,000	$196,000
Val Subtotal		$13,773,719	$7,535,555
DR-1506 Heta			
	ASTCA Underground utilities from Route 1 to LBJ Hospital	$60,000	
	ASTCA Underground for ASPA to PPG Airport	$100,000	
	ASPA Underground for Route 1 to LBJ Hospital	$300,000	
	DEPW Matuu Stream	$211,000	
	Hardening Government Buildings Phase 1	$400,000	
Heta Subtotal		$1,071,000	
DR-1582 Olaf			
	State Hazard Mitigation Planning Grant	$58,000	
Olaf Subtotal		$58,000	
Flood DR-1473	ASPA to Airport Underground Utilities	$1,027,000	
Flood Subtotal		$1,027,000	
Total		**$19,875,783**	

Other mitigation projects completed or underway include shoreline protection structures to reduce the risk of damage to coastal roads, the most important of which is the highway linking the main urban and government center in Pago Pago with the International Airport and the Emergency Operations Center in Tafuna. This road protection program is being managed by the U.S. Army Corps of Engineers (USACE) and is funded by the U.S. Highway Administration.

The USACE, Pacific Ocean Division, Honolulu, completed the field study *American Samoa Shoreline Inventory Update II* in March 1994. Completed by Sea Engineering, Inc. and Belt Collins Hawaii, both of Honolulu, the study is in hard copy format. It is a shoreline inventory identifying the physical characteristics of the shoreline with emphasis on erosion and protection needs. The engineers

developed a rating system that identifies critical and potentially critical erosion in each coastal sector of American Samoa.

The American Samoa Department of Public Works has developed a multi-phased plan to repair and reconstruct a major portion of Route 1. Along the coastal reaches of Route 1, the project also includes mitigation of vulnerable shoreline hazards with the construction of shoreline revetments. The USACE has been involved for some of the design for coastal revetments and shoreline protection methods. To determine the design wave height for USACE projects, numerical models were developed by Sea Engineering, Inc. Three different hurricane scenarios were considered in arriving at the design wave height that was used for the project.

For all Route 1 projects, U. S. Federal Highways funded the Department of Public Works to manage the mitigation projects. The Department of Public Works contracted with the USACE as design and construction agents to complete some of the work and contracted with other companies to complete other projects. Currently, the USACE is constructing a road revetment in Faganeanea, between the hospital and the airport.[16]

4.4.3. Three Disaster Declarations (2003, 2004, 2005) and Their Impact

4.4.3.1. Flooding - DR-1473-AS55

There was a Presidential declaration of a major disaster for the Territory of American Samoa (FEMA-1473-DR), dated June 6, 2003. The amount granted to American Samoa was $890,582.00. "I have determined that the damage in certain areas of the Territory of American Samoa, resulting from heavy rainfall, flooding, landslides, and mudslides on May 19-21, 2003, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§ 5121-5206 (the Stafford Act). I, therefore, declare that such a major disaster exists in the Territory of American Samoa."

"The mudslides damaged roads, bridges, buildings, and equipment and burdened municipal resources for response, debris removal and protective measure costs in many communities," Lieutenant Governor Aitofele Sunia said. "Most of these communities would be hard-pressed to cover these costs without the help of federal disaster assistance." [56]

4.4.3.2. Tropical Cyclone Heta - DR-1506-AS

With high winds in excess of 190 mph, heavy rainfall and high surf, Tropical Cyclone HETA made landfall on January 5, 2004 in American Samoa, as well as other islands of the South Pacific. The impact of the cyclone created widespread power outages, scattered debris, and caused personal property damage, resulting in the displacement of more than 1,200 residents.[57]

[55] http://www.fema.gov/news/dfrn.fema?id=382
[56] http://www.fema.gov/news/newsrelease.fema?id=3599
[57] http://www.pbinspections.com/articles/01222004_tropical_cyclone_heta_strikes.asp

The Federal Emergency Management Agency (FEMA) provides this final update of federal disaster recovery assistance and services as a result of Cyclone Heta. [58]

FEMA has issued approximately $11.5 million in temporary disaster housing grants to people whose homes have been severely damaged and to those repairing their primary residences to make them safe, sanitary and functional. The agency has provided more than $13.8 million for other serious needs directly related to Heta.

The U.S. Small Business Administration (SBA) has approved approximately $5.6 million in low-interest disaster loans to homeowners, renters and business owners. The loans cover costs for the long-term repair or rebuilding of cyclone-damaged private property. Registered applicants who have already been issued an SBA loan application have until April 1 to submit their application to SBA.

Funding of approximately $1.2 million under FEMA's Public Assistance Program has been approved for the American Samoa Government (ASG). The money is reimbursement for 75% of the costs incurred by the territorial government due to Heta. The final "federal share" is expected to reach several million dollars more, once all eligible projects that ASG has submitted for funding have been approved.

4.4.3.3. Tropical Cyclone Olaf - DR-1582-AS59

There was a Presidential declaration of a major disaster for the Territory of American Samoa (FEMA-1582-DR), dated February 18, 2005. American Samoa received $722,587.00 in funding. "I have determined that the damage in certain areas of the Territory of American Samoa, resulting from Tropical Cyclone Olaf, including high winds, high surf, and heavy rainfall, beginning on February 15, 2005, and continuing, is of sufficient severity and magnitude to warrant a major disaster declaration under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. §§ 5121-5206 (the Stafford Act). Therefore, I declare that such a major disaster exists in the Territory of American Samoa."

4.5.Analysis and Evaluation of Capability Data

4.5.1. Evaluation of the Territory's Pre-Disaster Capabilities

The Permit Notification and Review System have proven to be a very effective way to restrict development in hazardous areas. The PNRS Board is composed of representatives from agencies with land use and environmental management responsibilities in the Territory, as listed in the table above. Three PNRS board subcommittees have been established: public awareness, compliance and enforcement, and customer service. These subcommittees developed actions that have been initiated. By improving the PNRS system, American Samoa has taken steps to improve the overall land use system. With a strategic planning process established, these subcommittees have continued to revise and improve the system since 2003.

4.5.2. Hazard Management Capabilities Changed Since 2003

American Samoa's hazard management capability has grown since 2003 through 1) the repeated yearly engagements of the HMC, 2) continuous disaster event management experiences in 2003, 2004 and

[58] http://www.fema.gov/news/newsrelease.fema?id=11567
[59] http://www.fema.gov/news/dfrn.fema?id=3822

2005, and 3) through the subsequent management of major mitigation projects that have improved life safety and reduced property losses throughout the Territory. Since 2003, the Territory has committed funds and expertise to completing 17 hazard mitigation projects which follow on a decade of substantial and critical mitigation improvements during the 1990s. American Samoa now has two decades of mitigation accomplishments, has improved the physical environment, and expanded its local technical expertise via projects that have been managed technically, fiscally, and administratively in a competent and prudent manner.

4.5.3. Evaluation of the Territory's Post-Disaster Capabilities

Yearly Plan updates involved addition of new projects added to the Plan and project priorities have been updated. These project list updates have occurred yearly during Council review time related to the internal PDM project review period. Seventeen projects from the 2003 Plan have been identified as funded for completion.

Two projects were accepted and funded by FEMA for the PDM Grant in 2004. The Pago Pago stream project is still ongoing and awaiting the approval of a permit from the USACE. All projects submitted for FEMA review since 2004 have been rejected because not enough supporting documentation was provided and/or because issues related to the benefit-cost ratio were not competitive enough.

Regarding Benefit-Cost Analysis training, American Samoa must have the key mitigation people trained so that they can assist on project BCA for all mitigation benefits. Training financial people to do BCA is not targeting the right people for training. (Two ASDRO employees were trained in BCA module, and one went back to school). One needs to know mitigation and work with agencies to understand their obkectives. Alternatively, project BCA Analysis could be contracted out if funds are set aside and available on a yearly basis.

4.6.Capability Assessment Conclusions

Through its past repetitive disaster experience, directed fiscal management, direct engineering project development and monitoring, and additional Federal technical expertise, American Samoa has completed or is in the process of completing numerous mitigation projects successfully. These projects have been funded through the FEMA Hazard Mitigation Grant Program and the Pre-disaster Mitigation Grant Program.

The Territorial Hazard Mitigation Council has proven to be an effective review and advisory body for the Hazard Mitigation Plan. The Council has met from one to as many as seven times a year to complete an annual thorough project review and prioritization of projects for funding. Five Departments, organizations and agencies have developed mitigation project worksheets for future funding.

The 2007 Mitigation Plan update process has identified TEMCO and ASDRO as the key administrative offices for managing mitigation project funding programs. The Department of Commerce continues to administer and effectively regulate the land use planning system known as the Permit Notification and Review System and the flood mitigation programs. The PNRS review has been enhanced through the instituted Territorial Hazard Assessment Tool risk management system, which utilizes the GIS mapping products developed for the 2003 Mitigation Plan.

5. Chapter 5 - Hazard Mitigation Strategy

Developing a mitigation plan is the third step in the mitigation planning process. This step is the culmination of work done to date. The input of the Territorial Mitigation Council and the different Territory Departments was essential to create the following mitigation strategies. Their input in creating and prioritizing the mitigation goals and objectives ensures that they will take ownership of the plan and value the implementation of the plan. Many of the mitigation strategies are similar to those in the 2003 Mitigation Plan and some are the result of disasters since 2003 such as Hurricanes Heta and Olaf.

Figure 12 Step 3 Develop the Mitigation Plan

There are four steps to developing a mitigation plan, as seen in Figure 13 above. The first step, developing mitigation goals and objectives, takes into consideration the impact of potential hazards to the people, land and property. The hazard profiles and loss estimates are used to develop goals and objectives. Mitigation goal statements according to FEMA 386-3 are "broad, forward-looking statements that succinctly describe your aims." Mitigation objectives are narrower and more specific than goals.

In addition to examining the hazard profiles and risk assessment results, a capability assessment was performed. The capability assessment is a review of the current and historic mitigation actions taken by the Territory as well as the technical and financial capability of the Territory. The capability assessment is explained in further detail in Chapter 4 of this plan.

The following goals and objectives were used in the 2003 Multi-Hazard Mitigation Plan. The only change made to the existing Goal statement was to add climate change and wildfire as hazards.

5.1. Hazard Mitigation Goals and Objectives

The Goal of the 2007 *Updated and Revised American Samoa Multi-Hazard Mitigation Plan,* endorsed by the Territorial Hazard Mitigation Council, is to:

Reduce the risks of all identified hazards to the Territory, thus alleviating loss of life and property from drought, earthquake, flood, global warming and climate change, landslide, tropical cyclone (including storm surge and high winds), tsunami and wildfire and insure the overall well being of the people of American Samoa.

The Objectives of the Plan are to:

1. Promote effective land use planning and regulation and public awareness to reduce damage from hurricanes, floods, storm waves and storm surge, landslides, tsunamis, and droughts.
2. Improve infrastructure development standards with special attention to mitigating the increasing flood hazard.
3. Develop and implement hazard mitigation projects aimed at reducing the risk of damage and destruction of existing assets and infrastructure from the full range of natural disasters threatening the territory.

5.2.2003 Goals Were Assessed and Deemed Valid for 2007

In 2003, mitigation plan goals were drafted by TEMCO with local mitigation experts and presented to the Governor's Authorized Representative and Mitigation Council for debate, review and approval. Specific 2003 focus groups were created during the planning process to develop objectives and mitigation strategies based on each of the draft goals. Each of the focus groups provided input during day-long public meeting sessions and summarized findings for the Mitigation Council. The goals and objectives were accepted and became the basis for development of over 50 potential mitigation projects.

The mitigation plan goals and objectives have been reviewed on a yearly basis by the Mitigation Council during project review meetings documented in the Plan.

In a special session on June 4 and June 7, 2007, the Mitigation Council reviewed the mitigation goals and objectives for continued relevance relative to the mitigation project completion progress since 1990. The 2003 mitigation plan goals and objectives were specifically reviewed and confirmed as valid as the basis for the Mitigation Plan. However, , the 2007 Mitigation Council decided to drop the building code goal from the Plan due to lack of building code expertise on the island. This was confirmed by the Director of Public Works who stated that the current building code in place, the 1997 building codes adopted by Los Angeles, California continue to adequately provide adequate design guidelines for buildings in American Samoa.

For the 2003 Plan, the Building Code Committee, , developed a plan to review and improve building codes as a proposed mitigation project. This $1,000,000 mitigation project was led by a competent Structural Engineer, trained in New Zealand, working for the Dept. of Public Works. Such a project would have been an ambitious, multi-year endeavor involving additional consulting engineers trained in building code development. Unfortunately, the lead engineer for this project has left American Samoa. At this time, there is no local technical expertise to champion the Building Code Mitigation Project developed and prioritized in 2003.

5.3.Territory Mitigation Goals that Guide Mitigation Activities

American Samoa has a long history of hazard mitigation going back to pre-European contact times. Samoan houses or *fales* were designed and constructed to reduce risk of destruction from strong winds

and earthquakes—roof framing was lashed together and thatch sheets were sewn on with coconut sennit. During strong windstorms, roofs could be lifted off of house posts and set on the ground to provide shelters. Structures were flexible and could tolerate earthquakes. House platforms were often elevated which made them less subject to flood damage.

In recent years, building codes and standards, land use regulations, and flood mitigation requirements have been developed to reduce the risk of disaster damage. Building codes aim at reducing the impacts of strong winds and earthquakes. Land use regulations restrict construction and development in areas subject to flooding, tsunami, storm surge, high surf, and landsides. Droughts are mitigated through water conservation programs, agricultural practices, and infrastructure repair. Environmental policies that protect the island ecosystems provide additional protection from storms and flooding. American Samoa is still vulnerable to losses from natural hazards. Mitigation strategies are summarized for each category of natural hazard.

The HMC adopted the above goal and objectives based on the risk and vulnerability assessment information and the knowledge and recommendations of the subcommittees on building codes and standards, land use management and regulation, and infrastructure standards and the flood hazard in American Samoa.

The specific tasks relating to each of the objectives listed above are contained in following sections of the Capability Assessment in Chapter 4:

- Improvements in Land Use Management Systems and Regulations
- Improvements in the American Samoa Floodplain Management Regulations
- Mitigation Projects

The first two include changes in laws and regulations, as well as development and implementation of public awareness and education programs about hazard mitigation. These sections are expanded in further detail in Chapter 4.

5.3.1. How Mitigation Actions Coincide with Local Goals and Territory Goals

Many of the mitigation strategies below and specific mitigation projects address chronic and repetitive flood, power, communications, and transportation problems that hinder productivity and livelihoods at the local level in between disasters. These same problems are exacerbated during repetitive hurricanes and other infrequent disasters. The HMC represents many of the local communities as well as understands the Territorial goals set by the General Plan.

5.4.Mitigation Measures Specific to each Hazard

Table 26 below represents general mitigation strategies for the listed hazards present in American Samoa.

Table 26 Hazard Mitigation Strategies

Hazard	Major Concern	Mitigation Strategies

Hazard	Major Concern	Mitigation Strategies
Drought	Droughts have historically been related to El Niño-Southern Oscillation (ENSO) events, but managed fairly effectively.	ASPA Water Resource Management, Agricultural Extension Programs for Farmers; Wildfire Suppression; Public Education and Awareness.
Earthquake	Frequent but minor damage historically.	Building Code Improvements; Hardening Existing Structures and Infrastructure; Public Education and Awareness.
Flood	Most chronic hazard—threat to roads, homes, businesses, and critical facilities.	Improvements in Land Use and Flood Plain Management and Regulation; Relocation of Existing Structures; Structural and Non-structural Flood Mitigation Projects.
Global Warming & Climate Change	Sea-level rise and coastal erosion as a result of more extreme periods of drought and flooding	Enforcement of the shoreline setback rules of the Coastal Zone Management Act through better risk maps and improved PRNS permitting and inspections. Education programs to increase awareness and mitigation of impacts of climate change on island environments.
Hazardous Materials	Abandoned toxic chemicals without proper storage affecting the environment and populations	Proper land use storage and disposal of hazardous materials. Cooperation with Federal EPA for proper off-island disposal of hazardous materials.
Landslide	Serious threat to villages and roads.	Improvements in Land Use Management and Regulation; Relocation of Existing Structures; Village Mitigation Ordinances; Public Awareness and Education. Mitigation of repetitive rock fall hazards to populations.
Tropical Cyclones (including storm surge)	Most serious threat in terms of economic impact and widespread damage to buildings and utilities.	Building Code Improvements; Hardening Existing Structures and Utilities; Public Education and Awareness.
Tsunami	Infrequent occurrence but potentially life threatening in Pago Pago Harbor. Serious threats to coastal roads and beaches due to increased wave action and storm surge.	Improvements in Land Use Management and Regulation; Flood Plain Management Enforcement; Public Education and Awareness. Shoreline Set Backs; Coastal Hardening; Relocation of Structures and Infrastructure. Improved emergency alert systems and public drills.
Wildfire	Infrequent occurrence but possible due to drought, earthquake or hazardous material incidents.	Identify high risk areas. Implement Firewise Communities program.

5.4.1. Drought Mitigation Strategies

Droughts often occur in American Samoa in conjunction with the El Niño-Southern Oscillation events. In an island ecosystem, a short period without rain may quickly deplete available potable water and harm agriculture and livestock. Three droughts have had significant economic impact on American Samoa. The following are drought mitigation strategies:

- Implement water conservation programs and water restrictions if a drought is predicted to be of significant duration.
- Improve the water supply system and storage system. Eliminate known leaks and damage to the storage containers and distribution lines.
- Implement agriculture programs through extension agents to help farmers. Provide early warning information and forecasts to improve decision making about planting and harvesting, as well as livestock management prior to the onset of drought.
- Increase public awareness and education about the risks from drought and preventative measures individuals and businesses can adopt to conserve water.

5.4.2. Earthquake Mitigation Strategies

Even though American Samoa is near an area of intense earthquake activity, historically, it has not experienced significant damage from earthquakes. However, the actual earthquake threat to the Territory is not well understood. In addition, the tsunami threat, generated locally from a south Pacific earthquake, poses a significant risk to American Samoa. From the perspective of these circumstances and conditions, several mitigation strategies are recommended:

- Design new buildings and infrastructure to minimize levels of seismic risk as determined from historic levels of earthquake activity and commensurate with local building codes.
- Define areas of landfill via a Territorial-wide survey. Earthquake shaking of structures is amplified on unconsolidated sandy soils and areas of known landfill. To understand and define the areas of highest earthquake hazard, complete a study to define known landfill areas in American Samoa.
- Request the U. S. Geological Survey to conduct a comprehensive Seismic Hazards Probability Analysis. These analyses have been completed throughout the United States. A similar analysis is required to understand the earthquake threat to American Samoa from both local and distant earthquake sources in the South Pacific. This information is required to adequately determine seismic building code requirements for American Samoa.
- Attend a US Geological Survey Pacific Island earthquake hazard seminar to be held in Hawaii in 2008 regarding seismic hazards for Pacific Islands.
- Institute a Seismic Monitoring Program for American Samoa. Currently, American Samoa does not have any seismic recording instruments to record ground motions

from earthquakes. Deploy an adequate network of seismic recording instruments on Tutuila and the Manua Islands in order to understand the nature of local earthquake fault activity.

- Increase public awareness and education about the risks from earthquakes and tsunamis.

5.4.3. Flood Mitigation Strategies

Recommendations for improvements in the American Samoa Floodplain Management process were made as part of the *American Samoa Flood Mitigation Plan*. The Mitigation Council endorses the recommendations contained in this Plan and acknowledges recent planning efforts to mitigate the increasing flood hazard in American Samoa.

In 2002, the Department of Commerce, with funding from FEMA's Flood Mitigation Assistance Program, commissioned the *American Samoa Flood Mitigation Plan,* which has been endorsed by the Mitigation Council and recommended for adoption. In 2003, FEMA approved the *Flood Mitigation Plan* as the official Flood Hazard Mitigation Plan for the Territory of American Samoa in support of the National Flood Insurance Program (NFIP). American Samoa has adapted the *Flood Mitigation Plan* to meet the requirements of the NFIP.

As part of the Flood Mitigation Plan, an individual county plan was developed as a pilot study. The Tualauta County Master Plan is a program to guide urban growth and development in the fastest growing area in American Samoa. The Plan provides objectives and policies for overall land development, establishes minimum development and performance standards, and locates land use activities and major infrastructure networks. The plan provides multiple recommendations, including water quality improvements, flood reduction, open space state, fish and wildlife habitat, and general watershed health.

Flood Mitigation Activities: Short-Term Recommendations

Short-term flood mitigation activities identified in the *American Samoa Flood Mitigation Plan* include general mitigation activities able to be implemented during in the first two years, given current resources and authorities.

1. Develop a sustained flood education and outreach program for American Samoa through the following actions:
   - Provide additional flood mitigation and flood insurance information, such as that developed by FEMA/NFIP, Flood Insurance Rate Maps (FIRMs), and information on flood-proofing methods to residents and businesses. For example, make information available on the Internet, at the public library, and in government offices.
   - Publicize the availability of flood information in existing local media, such as newsletters, radio, and television.
   - Develop a contact list of landowners, businesses (private architectural/engineering consultants), and local organizations that may have an interest in flood mitigation or flood response issues.

- Participate in a flood mitigation and emergency response workshop in coordination with Department of Commerce (DOC) and Territorial Emergency Management Coordinating Office (TEMCO). Invite private sector businesses and organizations to participate.

2. Amend the Floodplain Management Regulations and Zoning Ordinances to include additional provisions:

- Amend the Floodplain management regulations and zoning ordinances to better account for floodplain management.
- Update Flood Insurance Rate Maps. The American Samoa Government can coordinate with FEMA and the U.S. Army Corps of Engineers to develop new FIRMs for the Territory.
- Increase the base elevation requirement for new construction in the 100-year floodplain to at least one-foot above base flood elevation. An increased elevation standard is one activity to receive credit from the NFIP Community Ratings System Program.
- Develop a digital Territory Hazards Map, overlaying building and land development with flood hazard overlay zones, delineated wetland areas, and special conservation areas. Flood and general grade elevation data should be shown on the map. Maps can then be made available as part of the site plan for the land use permit application.
- Hire a Floodplain Administrator to oversee Floodplain Management Regulations.
- Develop Storm Water Management Plan. Structural and non-structural techniques should be encouraged in public and private development projects.
- Require storm water management practices for new proposed land development through the PNRS.
- Enforce accepted storm water management practices in land use application reviews.
- Develop policies and regulations for better land use planning and subdivision in development of communal and privately owned land.
- Work with villages and individual owners to preserve undeveloped open space, wetlands, and lowland rain forests.
- Investigate incorporation of specific floodways within certain 100-year flood plain areas. Develop an interior drainage master plan of streams and their tributaries to identify stream flow paths, drainage improvements, and stream bank stabilization measures to provide drainage easements.
- Increase setback distances to floodways and streams in flood-prone areas to provide an additional buffer for preventing residential encroachment.
- Generate a rainfall intensity curve for American Samoa, to be used in storm water calculations necessary for drainage design of proposed land development projects.

3. Identify, prioritize, and mitigate properties at risk to flooding through the following actions:

- Develop a list of improved structures within the Territory's floodplains using hazard assessment methods and other available data sources.
- Develop criteria to prioritize the mitigation needs of improved structures in the floodplain. Possible criteria include:

- Location in 100-year zone
- Existence of elevation certificates
- Available flood damage records
- Historical flood levels and damages

- Identify the mitigation activities appropriate for properties that are highest on the list of improved structures in the floodplain. Mitigation activities could include:
  - Elevation of structure
  - Acquisition/relocation
  - Improved flood insurance coverage
- Identify and pursue funding for resource intensive mitigation activities (e.g., flood proofing, elevation, acquisition). Possible funding sources include the Flood Mitigation Assistance Program and Community Development Block Grants.
- Implement mitigation activities for prioritized locations.

4. Advocate limiting the impact of new road networks on the Territory's floodplain. Coordinate with the Department of Public Works to identify flood mitigation needs that can be coordinated with future road improvements.

5.4.3.1. Flood Mitigation Activities: Long-Term Recommendations

Long-term flood mitigation activities recommended in the *American Samoa Flood Mitigation Plan* include activities likely to take more than two years to implement and that may require new or additional resources.

1. Reduce federal flood insurance premiums by pursuing a National Flood Insurance Program (NFIP) Community Ratings System (CRS) rating through the following recommended actions:
   - American Samoa Government staff should attend a CRS training workshop to learn the CRS administrative procedures. A weeklong CRS course for local officials is offered free at FEMA's Emergency Management Institute. Identify activities that Samoan government officials must take in order to obtain credits with the CRS. The four categories of activities are:
     - Public information
     - Mapping and regulations
     - Flood damage reduction
     - Flood preparedness
2. Link floodplain hazards to the Parks Master Plan, Wetlands Management Plan, and the Tualauta County Master Plan. Identify valuable wetlands and undeveloped parcels in the floodplain for possible acquisition as open space or conservation areas.

5.4.4. Global Warming and Climate Change

According to the United Nations Confronting Climate Change report, the significant impacts of climate change to the pacific islands and small island nations is: "inundation of low-lying coral islands as sea

level rises; salinization of aquifers; widespread coral bleaching; more powerful typhoons and possible intensification of ENSC extremes."[60] It is evident throughout the world that global warming and climate change are creating consequences that not only will intensify the impacts of disasters for American Samoa, but also include impacts to the populations' health and economy. However, mitigating these risks is not simple and requires change by individuals, businesses and governments.

For most of the Pacific Islands, global warming and climate change are increasing the intensity of flooding, droughts, and hurricanes. The media attention to global warming offers American Samoa the opportunity to educate every family, business, and government agency about mitigation strategies listed in this plan to minimize the impact of floods, droughts and hurricanes.

American Samoa can take advantage of a growing body of knowledge about the causes of global warming and how to reduce its effects. Five categories of action exist to mitigate the effects of global warming:

1. Reduction of energy use (per person)
2. Shifting from carbon-based fossil fuels to alternative energy sources
3. Carbon capture and storage
4. Geoengineering including carbon sequestration
5. Birth control, to lessen demand for resources such as energy and land clearing[61].

5.4.5. Hazardous Material Strategies[62]

Natural hazard events have often triggered technological hazards such as ruptured pipelines and building fires, clearly linking the natural and technological risks. Accordingly, the National Mitigation Strategy, as an all-hazards strategy, will build upon existing programs that mitigate technological hazards, and focus on the critical importance of coordination among efforts to mitigate hazards, regardless of the source of the risk. Steps include:

- Recognize the dangers posed by hazardous materials.
- Identify places where hazardous materials are likely to be encountered.
- Understand when a hazard may exist.
- Contact the appropriate persons or agencies to give or receive specific hazardous materials information.
- Identify procedures to minimize personal and community exposure to hazardous materials.

Hazardous materials events can and do occur as independent events. Natural hazard events, however, have often triggered technological hazards such as ruptured pipelines and building fires, clearly linking the natural and technological risks. Accordingly, the National Mitigation Strategy, as an all-hazards

[60] Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable, February 2007.
[61] http://en.wikipedia.org/wiki/Mitigation_of_global_warming
[62] http://www.nesec.org/hazards/hazardous_materials.cfm#history

strategy, will build upon existing programs that mitigate technological hazards, and focus on the critical importance of coordination among efforts to mitigate hazards, regardless of the source of the risk.

5.4.6. Landslide Mitigation Strategies

American Samoa has a high risk from landslides, as evidenced from the May 2003 flooding and landslide disaster as well as from chronic rock fall problems and documented landslides in the western Tutuila. Land area for building and development in American Samoa is very limited and thus, the landslide risk must be considered in all development decisions. Landslide mitigation strategies are as follows:

- Consider the landslide hazard map zones for land use decisions, where applicable.
- Enforce building setbacks through Permit Notification and Review System for slopes less than 40% grade and no building on slopes 40% or greater.
- Build on the least risky areas of the land parcel or leave a buffer between the building and a steep slope (above or below) the property.
- Relocate or condemn structures that are at high risk.
- Establish village mitigation ordinances that limit use of high-risk areas while allowing villagers to develop alternative parcels of land.
- Increase public awareness and education about the risks from landslides.
- For slopes in agricultural areas, prevent grading and clearance. Cultivate and reforest with deeply rooting plants to prevent erosion on slopes.

5.4.7. Tropical Cyclone/Storm Surge/High Wind Mitigation Strategies

American Samoa has experienced six hurricanes ranging from Category 1 to Category 3 and other tropical storms in recent history. Heavy rains, high wave action, storm surge, and resulting coastal erosion occur in conjunction with tropical cyclones. Strategies for reducing risks from storm surge include proper land use management and adherence to building codes with regard to flood design standards. Recommended mitigation strategies for tropical cyclones are as follows:

Include designing buildings and infrastructure to codes and standards that make these capable of withstanding high winds, storm surge, and flooding. The specific actions are as follows:

- Harden existing facilities and utilities. For example, install hurricane clips, provide shutters for windows, and anchor roofs.
- Harden or strengthen infrastructure with anchor utility poles, use steel or concrete poles, install underground wires and cables, harden bridges, and identify bypass roads.
- Increase public education and awareness, motivating people to prepare their homes and communities against disasters.
- Consider land use zoning to minimize development in areas of known potential high waves, storm surge, and coastal erosion.

- Consider new flooding design standards in the *International Building Code* to minimize risk in identified and/or mapped zones of high waves, storm surge, and coastal erosion.
- Increase public awareness and education about the risks from high waves, storm surge, and coastal erosion.
- Locate development away from the shoreline.
- Harden bridges and roads and allow proper drainage.
- Relocate facilities and houses out of the designated VE zones or away from eroding shorelines.

5.4.8. Tsunami Mitigation Strategies

Tsunami risks can be mitigated through the same actions that minimize floods, storm surge, and high waves. Pago Pago Harbor, the location of several critical facilities, as well as canneries and government facilities is at greatest risk from the impacts of storm surge and tsunami. Tsunami mitigation strategies are as follows:

- Consider land use zoning to minimize development in areas of known potential tsunami inundation.
- Consider new flooding design standards in the *International Building Code* to minimize risk in tsunami zones.
- Increase public awareness and education about the risks from tsunami.
- Develop a warning system to alert people to evacuate to higher ground.
- Conduct island evacuation drills such as Pacific Wave 2006.

5.4.9. Wildfire Mitigation Strategies

Wildfire mitigation strategies include prevention, property protection, and natural resource protection. Prevention may include zoning ordinances, planning, building code standards, maintenance programs for dead or dry wood and regulations regarding open space and open fires. Property protection includes retrofitting buildings, creating defensible space, insurance, installing sprinkler systems, and developing fire resistant plans. Natural resource protection includes prohibiting development in high-risk areas, developing watershed management plans and promoting fuel reduction.[63] American Samoa has written a Wildland Fire Management Plan.[64] This plan focuses on fire suppression.

American Samoa also intends to implement the Firewise Communities[65] programs where applicable. The national Firewise Communities program is a multi-agency effort designed to reach beyond the fire service by involving homeowners, community leaders, planners, developers, and others in the effort to protect people, property, and natural resources from the risk of wildland fire - before a fire starts. The Firewise Communities approach emphasizes community responsibility for planning in the design of a

[63] http://www.des.utah.gov/pdf/nathaz/Appendix_B.pdf
[64] National Park of American Samoa, Wildland Fire Management Plan, 2006.
[65] http://www.firewise.org/index.php

safe community as well as effective emergency response, and individual responsibility for safer home construction and design, landscaping, and maintenance.

The national Firewise Communities program is intended to serve as a resource for agencies, tribes, organizations, fire departments, and communities across the U.S. who is working toward a common goal: reduce loss of lives, property, and resources to wildland fire by building and maintaining communities in a way that is compatible with our natural surroundings.

Firewise Communities is part of the National Wildland/Urban Interface Fire Program, which is directed and sponsored by the Wildland/Urban Interface Working Team (WUIWT) of the National Wildfire Coordinating Group, a consortium of wildland fire organizations and federal agencies responsible for wildland fire management in the United States. The WUIWT includes: USDA Forest Service, USDI Bureau of Indian Affairs, USDI Bureau of Land Management, USDI Fish and Wildlife Service, USDI National Park Service, Federal Emergency Management Agency, US Fire Administration, International Association of Fire Chiefs, National Association of State Fire Marshals, National Association of State Foresters, National Emergency Management Association, National Fire Protection Association.

5.5.Mitigation Projects

This section describes specific mitigation projects prioritized by the HMC, as well as the project selection process and criteria. As discussed in Chapter 2, the HMC and its subcommittees developed an applicable mitigation project identification and selection process. The purpose of the mitigation projects is to protect life and safety and insure the well being of the people of American Samoa through a rapid recovery from future disasters.

As the project identification process evolved, in 2003 and again in 2007, FEMA's Pre-Disaster Mitigation Grant Program (PDM) guidance was circulated to members of the subcommittee established to prioritize projects for inclusion in this Plan and to the HMC. This Program Guidance became the primary selection criteria for project funding under the FY2003 PDM program. The PDM guidance states that the national priority is to address repetitive flood loss properties. It states that the following are eligible projects:

Acquisition or relocation of hazard-prone property for conversion to open space in perpetuity.

- Structural and non-structural retrofitting of existing buildings and facilities, including designs and feasibility studies when included as part of the construction project, for wildfire, seismic, wind or flood hazards (e.g., elevation, flood-proofing, storm shutters, and hurricane clips).
- Minor structural hazard control or protection projects that may include vegetation management, storm water management (e.g., culverts, floodgates, retention basins), or shoreline/landslide stabilization.
- Localized flood control projects, such as certain ring levees and floodwall systems that are designed specifically to protect critical facilities and that do not constitute a section of a larger flood control system.

Similar to in 2003, the HMC has selected projects for prioritization that emphasize flood hazard mitigation. However, all other hazard projects were considered. The Mitigation Council prioritized 25 projects. The associated project profiles are in Appendix C. Preliminary cost estimates were made by engineers and managers in each of the departments that submitted a project.

The HMC ranked projects in terms of their importance to protection of life and property and recovery from disaster. A High ranking was reserved for projects with widespread impact and those protecting critical facilities that served a large number of people.

Ranking of projects in terms of the risk of hazard impact was done by American Samoa Power Authority and Department of Public Works engineers from data presented in Chapter 3 of this plan and the impact of the May 2003 floods and landslides.

DPW and ASPA engineers made estimates of the value of the structure or facility at risk. Estimates for the flood mitigation projects were based on disaster losses in the recent floods. The value of other structures is based on the estimated replacement value of the roads and structures at risk.

Ranking of projects for environmental impact and historic preservations were made by DPW and the ASPA in consultation with the Office of Historic Preservation and the American Samoa Environmental Protection Agency based on knowledge of the areas concerned and experience with similar projects. Thus, rankings for environmental and historic preservation impact are relative to other projects handled by DPW and ASPA. All of the projects were deemed feasible and the environmental and historic Preservation impacts can be addressed.

5.6.Cost-Benefit Review of Projects

5.6.1. Mitigation Actions Prioritized

TEMCO and the HMC have worked together since the formation of the 2003 Mitigation Plan to identify and reprioritize mitigation projects on a yearly basis. In addition, as documented by the TEMCO Quarterly Reports to FEMA from 2003-2007, new projects have been identified as the result of the three declared Presidential disaster declarations since 2003.

- Table 27 represents the culmination of Territorial Hazard Mitigation Council meeting deliberations, ASG department project development, and meetings to complete the 2007 update of this Plan. The list contains projects in priority order, project description, project benefits and costs.
- Table 28 provides the same project priority list with a qualitative impact analysis to the environment, historical and cultural assets, relative risk of hazard impact, and the importance to protection of life and property and to recover from disaster. This added information weighs into the benefit and cost analysis for each project. This information is complete for the top 15 priority projects and added to other projects when expert opinion was available.
- In Table 30, the mitigation projects are sorted by organization.
- In

Table 31, Department of Public Works priority projects are listed with cost information.

- In Table 32 American Samoa Telecommunications Authority priority projects are listed with cost information.
- In Table 33 American Samoa Power Authority priority projects are listed with cost information.
- In Table 34, Office of Procurement and the Development Bank of American Samoa priority projects are listed with cost information.

Table 27 Prioritizations by Listing Benefits and Costs

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
Tualauta County Flood Mitigation	To mitigate the spread of stream runoff as well as the natural runoff of the land within the watershed of Tualauta County, by means of improving and defining a natural waterway that runs from the village of Pava'ia'l to Nuu'uli. To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. Currently, Route 001 (main road), Route 014 (airport road), Route 019 (Fagaima road) undergo heavy flooding during periods of heavy rain, due to blockage or the lack of an outlet. This project will minimize this flooding problem currently experienced within the district, as well as be a means for the protection and safety for residents within the area and more so for the general public. The proposed project will serve the villages of Iliili and Futiga in the Tualauta District.	- Improving and defining a natural waterway that runs from the village of Pava'ia'l to Nuu'uli. - To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. - The project will minimize the flooding problem currently experienced in the Route 001, Route 014, and Route 019 district, as well as be a means for the protection and safety for residents within the area and more so for the general public.	- $3,000,000.00 - Project will take 240 days to complete	1
Futiga Road Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both Fiber Optics and Copper) and replacing them in underground conduits with underground cables.	- Reduce or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, other windstorms, and traffic accidents. - Eliminate the disruption of telecommunications services to the populations affected.	- $2,457,044.00 - Project will take 36 months to complete	2
Tafuna Powerplant Wall Upgrading	To prevent damage to ASPA Tafuna Power Plant in the event of a cyclone or tropical storm. The proposed project will harden the plant against cyclones and storms. Installation and upgrading of the walls of the existing facility will also reduce noise emissions and enhance protection of the power	- This project will include the hardening of the Tafuna plant walls and the installation of ventilation ducting. - It will further weather-proof the generation equipment from the elements.	- $155,000.00 - Project will take 18 months to complete	3

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
	generation equipment from the weather.			
Underground Power Lines Poloa - Fagamalo	The plan is to shift the single phase tapline to run along the main road. The project will be done in three phases; first phase is from Poloa to Fagalii, second phase is from Fagalii to Malota, third phase from Malota to Fagamalo. Project involves undergrounding the main primary lines and terminating wires in padmount fiber boxes, underground services to hotel, retirement home, and water wells.	- Shifting the power lines to the roadside will make maintenance easier. - Undergrounding the power lines will minimize damages during cyclones, in turn improving reliability and speeds up restoration of power after a cyclone.	- Phase 1 - $301,000.00 - Phase 2 - $336,000.00 - Phase 3 - $227,500.00 - Project will take 19 months to complete	4
Rockfall Mitigation 6-sites	To minimize the danger of approaching traffic due to rockfalls on the following sites Matalesolo Pt. – bet. Alofau and Fogaau Village Anapepe Pt. – bet. Afulie and Amaua Village Tifa Pt. – bet. Alega and Avaio Village Lafiga Pt. – bet. Lauliituai and Aumi Village Sinamanoo Pt. – bet. Amaluai and Asili Village Atauloma (Mu Pt.) – Afao, Nua and Seetaga Village Scale unstable/loose rocks that are potentially dangerous to approaching traffic to reduce the severity of rockfall damage. Install earthen berms, fences and signs to warn the approaching traffic of potential rockfall sites.	- Reduces the severity of rockfall damage. - Warns approaching traffic of potential rockfall sites.	- $700,000.00 - Project will take 6 months to complete	5
Leone Underground Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, and other windstorms and hazards by removing ASTCA's Aerial Cables (both Fiber Optics and Copper telephone) and replacing them in Underground Conduits with Underground cables. The proposed project will serve the villages of in the Tualauta District consisting of the following villages: Lepuapua, Taputimu and	- Reduce and/or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, and other windstorms and hazards.	- $1,188,309.81 - Project will take 36 months to complete	6

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
	Leone.			
Underground Power lines from Cost-U-Less store to Ottoville	Project involves undergrounding main primary lines, terminating wires in distribution vaults and fiber boxes, underground services to hotel, churches, retirement home, and water wells.	- Proposed underground will feed the four water wells in Malaeimi and booster stations at the Community College. - Having the lines underground will maintain the power supply to the wells and booster station during cyclones. - Restoration of power to the wells will be quick after a cyclone because damages will be limited to overhead lines.	- $1,375,000.00 - Project will take 18 months to complete	7
Tago Stream	Mitigation to prevent the spread of stream runoff towards the residential and commercial settlement and ponds on low spots within the area. The proposed project is also to prevent future encroachments due to developments by redefining/structurally hardening the stream bankline. The proposed project is located on the village of Nuu'uli and adjacent to the famous Shoe Tree Commercial Building.	- Reduce flooding and the creation of ponds due to stream runoff. - Prevent future encroachment by hardening the stream bankline.	- $500,000.00 - Project will take 6 months to complete	8
Permanent Landslides Mitigation Project	To minimize the effect and damage of landslide during rainy days and to avoid closure of Route 11; Masausi Road. This road is an access from the Village of Masausi and Village of Sailele to Fagaitua and to other important government facilities like the hospital and other parts of the island. The proposed project calls for slope stabilization which includes excavation and benching to resist movement of loose material on the lower part of the slide. Install/construct drainage improvement to control surface and subsurface flow. Placing	- Avoid closure of Route 11 during rainy days. - Reduce the risk of landslides reaching the road. - Will improve the control of surface flow.	- $300,000.00 - Project will take 6 months to complete	9

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
	retaining walls or crib walls as deemed necessary to prevent further spread of the slide on the access road.			
Underground Nuuuli - Malaeimi/Atuu-Laulii	To underground existing overhead powerlines to underground powerlines to provide secure, reliable and maintainable power supply to ASPA Water Wells; ASPA Water Booster Stations. This project will also benefit private businesses with large freezers and frozen inventory, church buildings and schools which can be used as shelters and stores for food and supplies. This will also harden the ASPA Power system and increase ASPA's reliability to the community.	• Harden the ASPA Power system and increase ASPA's reliability to the community. - Restoration of power to ASPA Wells, Boosters, private businesses and schools will be quick after a major cyclone.	- $1,152,000.00 - Project will take 18 months to complete	10
Atu'u to Breaker's Point Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, and other windstorms and hazards by removing ASTCA's Aerial Cables (both fiber optics and copper telephone) and replacing them in underground conduits with underground cables. The proposed project will serve the villages of in the Maopuatasi County consisting of the following villages: Atu'u, Leloaloa, Lepua, Aua, Afono, Vatia and Lauli'I (Breaker's Point).	- Reduce the impact of damages caused by hurricanes, tropical cyclones and other windstorms and hazards.	- $2,591,326.36 - Project will take 36 months to complete	11
Fagaitua Seawall	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road)	- Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. - Secure access to all parts of the island	- $1,200,000.00 - Project will take 10 months to complete	12
Ta'u to Fitiuta Mitigation Project	The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both fiber optics and copper) and replacing them in	- Reduce the impact of damages caused by hurricanes, tropical cyclones and other windstorms and traffic accidents.	- $772,117.00 - Project will take 12 months to complete	13

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
	underground conduits with underground cables. The proposed project will serve the village of Fitiuta in the Manu'a District.			
Tafuna PowerPlant	To prevent/minimize the disruption of power in the event of a cyclone or tropical storm. The proposed project will harden the distribution system against damage from cyclones or storms and reduce the failure rate of feeders 5,6,7,9 and the tie line. This project will harden the distribution switch system from cyclones and storms by replacing the exposed overhead switches and solid blades with underground pad mounted switches.	- Using pad mounted switches will protect the feeders from cyclone, storm and traffic damage. - New switches will also reduce maintenance costs and increase the life-span of the system because the mechanisms are enclosed and protected from the weather. - Minimize the disruption of power in the event of a cyclone or tropical storm.	- $155,000.00 - Project will take 3 months to complete	14
Utumoa	To protect the reinforced concrete spring intake structure from bounders and mud due to landslide and high flood waters. To prevent damage to the raw water screen house from erosion of the river bank during high flow.	- Prevent damage to the raw water screen house from erosion of the river bank during high flow. - Protect the spring intake structure from bounders and mud due to landslides and high flood waters.	- $250,000.00 - Project will take 4 months to complete	15
Fagatogo	To prevent rocks, soil and other debris from being deposited into the raw water reservoir. To protect the river bank from eroding due to high stream flow and stop the river from overflowing into the MFP building and damaging the equipment.	- To prevent erosion due to high stream flow and to stop the river from overflowing into the Microfiltration Building and damaging the equipment.	- $300,000.00	16
Auto Road Seawall	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road).	- Protects shoreline roads, utilities, homes and businesses from storm surge and tsunami.	- $2,000,000.00 - Project will take 6 months to	17

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
	Supply and install rock reinforcing to vulnerable shoreline in Auto as per USACE shoreline inventory assessment.		complete	
Nuu'uli Seawall	Construction of seawalls along the road network.	- Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami.	- $1,000,000.00	18
Aua Seawall	Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road) A rock revetment or seawall is required to stop further erosion and to protect roadway from strong waves. Also, it shall provide additional shoulder width for vehicles to pull over. This project will allow the road to remain operational and safe after disasters for the public to commute to and from the hospital.	- Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. - Project will allow the road to remain operational and safe after disasters for the public to commute to and from the hospital.	- $1,000,000.00	19
Enhancement of American Samoa Vertical Control	To reestablish intermediate benchmarks for leveling and recheck the vertical and horizontal controls for coordinate verification. Rechecking these controls can determine how far our island has sunk and moved if the controls have changed due to global warming and plate movements.	- Rechecking these controls can determine how far our island has sunk and moved if the controls have changed due to global warming and plate movements.		20
Relocation of Government Gas Station in Tafuna	To relocate the existing Government Gas Station to new proposed site inside the fence of the government compound to ensure security of the station from the public. Also the new plan will provide easier access for vehicles to enter and exit gas station.	- Ensures security of the station from the public. - The new plan will provide easier access for vehicles to enter and exit gas station.	- $200,000.00	21
Alternate Road Routing	FS/Design preparation for hospital alternate route.		- $3,000,000.00	22
Evacuation Shelters	Design and construction of shelters. Construction of access roads.		- $2,000,000.00	23
Hazardous Materials	Reinforce the facility so that it will withstand cyclones and other	- Valuable information within the facility will		24

Project Title	Objectives	Benefits (Pros)	Costs (Cons)	Priority
Warehouse	hazards.	not be lost. - Reduce the impact of future hazards.		
Stream Retaining Wall	The project proposes to make flood mitigation improvements along 200 feet of stream that borders the bank building.	- Protection of the bank buildings and contents worth about $600,000. - Protection of standby power supply to the main building, $50,000.	- $75,000.00	25

Table 28 Project Priority List with Impact Analysis

Prioritized Benefit Cost Review						
Impact: 1 = High 2 = Medium 3 = Low						
Project Title	Priority	Environmental Impact	Historical Preservation Impact	Risk of Hazard Impact	Importance to Protection of Life and Property and Recovery from Disaster	Cost of Project
Tualauta County Flood Mitigation	1	2	3	1	1	$3,000,000.00
Futiga Road Mitigation Project	2	2	2	1	1	$2,457,044.00
Tafuna Power Plant Wall	3	3	2	1	1	$155,000.00
Underground Power Lines Poloa - Fagamalo	4	2	2	1	1	$864,500.00
Rockfall Mitigation – 6 Sites	5	2	3	1	1	$700,000.00
Leone Underground Mitigation Project	6	3	3	1	1	$1,188,309.81
Underground Power lines from Cost-U-Less store to Ottoville	7	2	2	1	1	$1,375,000.00
Tago Stream	8	2	3	2	2	$500,000.00
Permanent Landslide Mitigation Project – Route 11 & 5	9	2	3	1	1	$300,000.00
Underground Nuuuli - Malaeimi/ Atuu-Laulii	10	2	2	1	1	$1,152,000.00
Atu'u to Breaker's Point Mitigation Project	11	3	3	1	1	$2,591,326.36

Fagaitua Seawall	12	2	3	1	1	$1,200,000.00
Ta'u to Fitiuta Mitigation Project	13	2	2	1	1	$772,117.00
Tafuna Power Plant Switch	14	3	2	1	1	$155,000.00
Utumoa	15	3	2	1	1	$250,000.00
Fagatogo Reservoir	16					
Auto Road Seawall	17	2	3	1	1	$2,000,000.00
Nuu'uli Seawall	18	2	3	1	1	$1,000,000.00
Aua Seawall	19	2	3	1	1	$1,000,000.00
Enhancement of American Samoa Vertical Control	20	3	3	1	1	
Relocation of Government Gas Station in Tafuna	21	3	3	1	1	$200,000.00
Alternate Road Routing	22					$3,000,000.00
Evacuation Shelters	23					$2,000,000.00
Hazardous Materials Warehouse	24					
Stream Retaining Wall	25					$75,000.00

Table 29 Mitigation Strategies Prioritized for Technical Feasibility and Cost Effectiveness

Mitigation Strategies Prioritized for Cost-Effectiveness, Environmental Soundness, Technical Feasibility, and Life Safety Categories Scored 1-3, 1=Best					
Project Title	Priority Order	Cost-Effective	Environmentally Sound	Technically Feasible	Life Safety
Tualauta County Flood Mitigation	1	1	1	1	1
Futiga Road Mitigation	2	1	2	1	2

Mitigation Strategies Prioritized for Cost-Effectiveness, Environmental Soundness, Technical Feasibility, and Life Safety Categories Scored 1-3, 1=Best					
Project Title	Priority Order	Cost-Effective	Environmentally Sound	Technically Feasible	Life Safety
Project					
Tafuna Power Plant Wall	3	1	3	1	2
Underground Power Lines Poloa - Fagamalo	4	1	2	1	2
Rockfall Mitigation – 6 Sites	5	2	1	2	1
Leone Underground Mitigation Project	6	1	2	1	2
Underground Power lines from Cost-U-Less store to Ottoville	7	1	2	1	2
Tago Stream	8	2	2	2	2
Permanent Landslide Mitigation Project – Route 11 & 5	9	3	2	2	1
Underground Nuuuli - Malaeimi/ Atuu-Laulii	10	1	2	1	2
Atu'u to Breaker's Point	11	2	3	2	2

Mitigation Strategies Prioritized for Cost-Effectiveness, Environmental Soundness, Technical Feasibility, and Life Safety Categories Scored 1-3, 1=Best					
Project Title	Priority Order	Cost-Effective	Environmentally Sound	Technically Feasible	Life Safety
Mitigation Project					
Fagaitua Seawall	12	2	2	1	1
Ta'u to Fitiuta Mitigation Project	13	2	2	2	2
Tafuna Power Plant Switch	14	2	3	1	2
Utumoa	15	2	3	2	2
Fagatogo Reservoir	16	3	1	3	1
Auto Road Seawall	17	2	2	1	1
Nuu'uli Seawall	18	2	2	1	1
Aua Seawall	19	2	2	1	1
Enhancement of American Samoa Vertical Control	20	3	3	2	3
Relocation of Government Gas Station in Tafuna	21	3	1	3	2
Alternate Road Routing	22	3	2	3	1

Mitigation Strategies Prioritized for Cost-Effectiveness, Environmental Soundness, Technical Feasibility, and Life Safety Categories Scored 1-3, 1=Best					
Project Title	Priority Order	Cost-Effective	Environmentally Sound	Technically Feasible	Life Safety
Evacuation Shelters	23	2	3	3	1
Hazardous Materials Warehouse	24	3	1	1	1
Stream Retaining Wall	25	3	2	1	2

The project priority order is subjective and considers cost and the impact on the environment, historical preservation, the risk of the hazard, and the importance of the protection of life and property and the recovery of a disaster. The ultimate decision does lie with the Territorial Hazard Mitigation Council which considers the needs of the community.

5.7.Mitigation Projects from Each Organization

Tables 5-26 below name each of the 25 priority projects with their associated priority number sorted by department. Tables 5-27 through 5-30 show each department's projects with their associated project cost. Following these tables are six project profiles that represent the first six project priorities. There happen to be two projects for each of the submitting departments. All of the project profiles, including four projects not found in the list of twenty-five can be found in Appendix C.

Table 30 Mitigation Projects Sorted by Organization

Project Priority Number	Name of Project
Department of Public Works (DPW)	
1	Tualauta County Flood Management Project
5	Rockfall Mitigation 6-Sites
8	Tago Stream Bankline Improvement
9	Permanent Landslides Repair Route 11 and Route 5
12	Fagaitua Seawall
17	Auto Road Seawall
18	Nuuuli Seawall
19	Aua Seawall
20	Enhancement of American Samoa Vertical Control
21	Relocation of Government Gas Station in Tafuna
22	Alternate Road Routing
23	Evacuation Shelters
American Samoa Telecommunications Authority (ASTA)	
2	Futiga Road Mitigation Project
6	Leone Underground Mitigation Project
10	Underground Nuuuli – Malaeimi/Atuu-Laulii
11	Atu'u Breaker's Point Mitigation Project
13	Ta'u to Fitiuta Mitgation Project
American Samoa Power Authority (ASPA)	
3	Tafuna Powerplant Wall Upgrading
4	Underground Poloa – Fagamalo
7	Underground from Cost-U-Less
10	Underground Nuuuli – Malaeimi/Atuu-Laulii
14	Tafuna PowerPlant
15	Utumoa
16	Fagatogo Reservoir
Office of Procurement (OP)	
24	Hazardous Materials Warehouse
Development Bank of American Samoa (DBAS)	
25	Stream Retaining Wall

Table 31 Department of Public Works Priority Project List

Department of Public Works		
Priority	**Project Name**	**Costs**
1	Tualauta County Flood Management Project	$ 3,000,000.00
5	Rockfall Mitigation 6-Sites	$ 700,000.00
8	Tago Stream Bankline Improvement	$ 500,000.00
9	Permanent Landslides Repair Route 11 and Route 5	$ 750,000.00
12	Fagaitua Seawall	$ 400,000.00
17	Auto Road Seawall	$ 1,000,000.00
18	Nuuuli Seawall	$ 1,000,000.00
19	Aua Seawall	$ 1,000,000.00
20	Enhancement of American Samoa Vertical Control	$ 100,000.00
21	Relocation of Government Gas Station in Tafuna	$ 200,000.00
22	Alternate Road Routing	$ 3,000,000.00
23	Evacuation Shelters	$ 2,000,000.00
	Total Project Costs	**$ 30,956,960.06**

Table 32 American Samoa Telecommunications Authority Priority Project List

American Samoa Telecommunications Authority		
Priority	**Project Name**	**Costs**
2	Futiga Road Mitigation Project	$ 2,457,044.00
6	Leone Underground Mitigation Project	$ 1,188,309.81
10	Atu'u Breaker's Point Mitigation Project	$ 2,591,326.36
11	Atuu Undergrounding	$ 1,644,622.86
13	Ta'u to Fitiuta Mitigation Project	$ 772,177.00
	Total Project Costs	**$ 8,653,480.03**

Table 33 American Samoa Power Authority Project List

American Samoa Power Authority		
Priority	**Project Name**	**Costs**
3	Tafuna Power Plant Wall	$155,000.00
4	Underground Power Lines Poloa - Fagamalo	$864,500.00
7	Underground Power lines from Cost-U-Less store to Ottoville	$1,375,000.00
14	Tafuna Power Plant Switch	$155,000.00
15	Utumoa	$250,000.00
16	Fagatogo Reservoir	$250,000.00
	Total Project Costs	**$2,799,500.00**

Table 34 Office of Procurement/Development Bank of American Samoa Project List

Office of Procurement/Development Bank of American Samoa		
Priority	**Project Name**	**Costs**
24	Hazardous Materials Warehouse	
25	Stream Retaining Wall	75,000.00
	Total Project Costs	**$75,000.00**

5.7.1. Project Priority 1 – Tualauta Flood Management – DPW

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: DPW</td></tr>
<tr><td colspan="2" rowspan="3">Project Title: Tualauta Flood Management Project</td><td colspan="2">Contact Person: Faleosina Voigt</td></tr>
<tr><td colspan="2">Phone: (684) 633-4141</td></tr>
<tr><td colspan="2">e-mail: Faleosina@yahoo.com</td></tr>
<tr><td colspan="4">Hazard(s): Risk to government facilities/assets, residents and businesses situated along the waterway, and flooding within the area.</td></tr>
<tr><td>Flood Zone: AE</td><td colspan="2">Base Flood Elevation:</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

<u>Facilities</u>: Manulele Elementary School, Manulele Jr. High School, Juvenile Correctional Facility, Correctional Facility, American Samoa Community College, Route 001, Route 002, Route 014, Route 019

<u>Population</u>:</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $3,000,000.00</td><td colspan="2">Project Period (duration) 240 days</td></tr>
<tr><td colspan="3">Value of Structure or Facility: $25,000,000.00</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents: $10,000,000.00</td></tr>
<tr><td colspan="4">Sources of Financial Support:</td></tr>
<tr><td colspan="4">Project Objectives: To mitigate the spread of stream runoff as well as the natural runoff of the land within the watershed of Tualauta County, by means of improving and defining a natural waterway that runs from the village of Pava'ia'l to Nuu'uli. To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. Currently, Route 001 (main road), Route 014 (airport road), and Route 019 (Fagaima Road) undergo heavy flooding during periods of heavy rain, due to blockage or the lack of an outlet. This project will minimize this flooding problem currently experienced within the district, as well as be a means for the protection and safety of residents within the area and more so for the general public.</td></tr>
</table>

Project Description: The Tafuna Flood Management Project is an improvement and redefinition of an existing natural waterway. However, an easement for future maintenance work will be considered. The project shall consist of a lined open channel with check structures for velocity reduction and sedimentation/debris settlement before discharge point. These structures are positioned at the most advantageous locations, taking into consideration the available land area, possible use for groundwater well recharge purposes, as well as for aesthetics if possible. The channel is approximately 3 miles in length and begins at the village of Pava'ia'l and ends in Nuu'uli, adjacent to the Correctional Facility across the Lion's Park.

A major portion of the proposed activity is located within the Central Tafuna Plain watershed south of Route 001, with a catchment area of approximately 5.50 square miles. The proposed drainage project would intercept runoff from the major streams: Taumata, Vaitele, Mapusagatui, Leaveave, and Drainageway 2 (see project map), which contributes greatly to floods within the lower Tafuna area. Tafuna, if not one of, is the largest plains area in the Territory. Due to its terrain being favorable to development as compared to the mountainous terrain on most of Tutuila Island, it has a high population number as well as a major industrial district. Installation of the proposed activity would benefit not only the residents within the area, but also private and government schools, commercial and residential buildings, and government and private facilities and assets from the threat of damage due to flooding.

A study from the U.S. Army Corps of Engineers, Pacific Ocean Division for the Tafuna Flood Plain was published in October 1994, concluding that flooding on the lower Tafuna Plain is caused by heavy vegetation and lack of well defined stream bed(s). Residential and commercial development within the area is growing rapidly, thus reducing the hydraulic capacity by infringing on the existing drainageway stream banks. In addition, uncontrolled filling activities changes or diverts to spreading runoff from normal flow patterns. This is causing flooding in areas that have never experienced flooding before and causing damages to homes, infrastructure, and safety hazards to motorists, pedestrians, and the general public. Currently, most of the Lower Tafuna Plain areas experiences flooding during minor rains of high intensities with short durations. This situation is increasingly getting worse with each passing raining season.

The proposed project will not only convey the runoff in a safe manner to its normal discharge point, but will also benefit the government by reducing the cost of infrastructure, assets, and building repairs and maintenance incurred each year due to the current flooding situation. This is especially true during natural disasters.

5.7.2. Project Priority 2 – Futiga Road Mitigation – ASTCA

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: ASTCA</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Futiga Road mitigation Project</td><td colspan="2">Contact Person: James Taylor</td></tr>
<tr><td colspan="2">Phone: 684.733.9014</td></tr>
<tr><td colspan="2">e-mail: jtaylor@samoatelco.com</td></tr>
<tr><td colspan="4">Hazard(s): Tropical Cyclones and Tsunami – traffic accidents</td></tr>
<tr><td>Flood Zone:</td><td>Base Flood Elevation:</td><td colspan="2">Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

Government Road, residents and businesses on the road</td></tr>
<tr><td colspan="2">Environmental Impact:
High Medium X Low</td><td colspan="2">Historical Preservation Impact:
High Medium X Low</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:
High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $2,457,044.00</td><td colspan="2">Project Period (duration): 36 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents: $5,500,000.00</td></tr>
<tr><td colspan="4">Sources of Financial Support: ASTCA % matching</td></tr>
<tr><td colspan="4">Project Objectives:
The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both fiber optics and copper) and replacing them in underground conduits with underground cables.

**Note that the Communications Agency is the sole entity in the territory for land-line communications.</td></tr>
</table>

Project Description:
The proposed project will serve the villages of Iliili and Futiga in the Tualauta District

The total length of the proposed project is 10,560 linear feet.

Property Risk includes the following: the current stretch of 10,560 X 4 linear feet of aerial primary telecommunications cable located along the main public highway between the village of Iliili and Taputimu.

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunications service include Highway 1 and the territorial land fill.

5.7.3. Project Priority 3 – Tafuna Power Plant Wall – ASPA

<table>
<tr><td colspan="2">Location: Tafuna Power Plant</td><td colspan="2">Agency/Organization: ASPA</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Tafuna Power Plant Wall</td><td colspan="2">Contact Person: Andra Samoa/Reno Vivao</td></tr>
<tr><td colspan="2">Phone: 733-1740/699-7166 258-3601/699-1357</td></tr>
<tr><td colspan="2">e-mail: andra@aspower.com or reno@aspower.com</td></tr>
<tr><td colspan="4">Hazard(s): Cyclones, Storms</td></tr>
<tr><td>Flood Zone:</td><td>Base Flood Elevation:</td><td colspan="2">Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:
Tafuna Power Plant supplies power for all users from Fagaalu to the West side, including government emergency facilities, emergency shelters, the airport and most of the island’s population.</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium Low X</td><td colspan="2">Historical Preservation Impact:

High Medium X Low</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster:

High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $500,000.00</td><td colspan="2">Project Period (duration) 18 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility: $14,000,000.00</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents:</td></tr>
<tr><td colspan="4">Sources of Financial Support: FEMA with local match</td></tr>
<tr><td colspan="4">Project Objectives: To prevent damage to ASPA Tafuna Power Plant in the event of a cyclone or tropical storm. The proposed project will harden the plant against cyclones and storms. Installation and upgrading of the walls of the existing facility will also reduce noise emissions and enhance protection of the power generation equipment from the weather.</td></tr>
</table>

Project Description:

This project will include the hardening of the Tafuna plant walls and the installation of ventilation ducting. The ventilation equipment has a dual role. It allows ventilation of the plant and helps reduce noise emission. It will also further weather-proof the generation equipment from the elements.

The Tafuna plant supplies power to essential government facilities such as the water wells, US Army Reserve Center, Airport, Public Safety substation, Emergency Center, and also supplies power to most of the residents and businesses on Tutuila.

5.7.4. Project Priority 4 – Underground Power Lines from Poloa to Fagamalo - ASPA

<table>
<tr><td colspan="2">Location:
Poloa to Fagamalo</td><td colspan="2">Agency/Organization:
American Samoa Power Authority(ASPA)</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:
Underground Power lines from Poloa village to Fagamalo village.</td><td colspan="2">Contact Person:
Andra Samoa, CEO or Reno Vivao, Acting COO</td></tr>
<tr><td colspan="2">Phone:
684-644-2772 or 684-733-1740 or 684- 258-3601</td></tr>
<tr><td colspan="2">e-mail:
andra@aspower.com or reno@aspower.com</td></tr>
<tr><td colspan="4">Hazard(s):
Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami</td></tr>
<tr><td>Flood Zone:</td><td>Base Flood Elevation:</td><td colspan="2">Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

1. Poloa Village: ASG Facilities-(Poloa Elementary School, ASPA Water Booster, ASPA Water Tank), Public Facilities-(Poloa CCCAS Church, Poloa CCCAS Hall, Poloa Methodist Church), Business-(2 Retail Stores)
2. Fagali'I Village: ASG Facilities-(2 ASPA Water wells), Public Facilities-(Fagali'I CCCAS Church, Fagali'I CCCAS Church Hall), Business-(1 Retail store)
3. Fagamalo Village: Public Facilities-(Fagamalo CCCAS Church)</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium X Low</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster:

High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $864,500.00</td><td colspan="2">Project Period (duration): 18months</td></tr>
<tr><td colspan="3">Value of Structure or Facility: $30,000,000.00</td><td></td></tr>
<tr><td colspan="4">Sources of Financial Support: FEMA [FEMA 90%, ASPA 10%]</td></tr>
<tr><td colspan="4">Project Objective:
To install underground power lines to lessen chances of having long awaited power restoration hours. To help maintain reliability of available electrical sources to and within ASG and Public Facilities at this certain area when disaster strikes. Some of the ASG and Public facilities will be used as shelters and rely mostly for availability of power to accommodate any immediate needs. This project will also improve location of existing overhead lines which are set far away from equipment access.</td></tr>
</table>

Project Description:

Project length is 1.6 miles from Poloa to Fagali'I, 1.8 miles from Fagali'I to Maloata, and 1.2 miles from Maloata to Fagamalo. Project involves under-grounding the main primary lines, terminating wires in padmount fiber boxes, and underground services to churches and water wells. The rest of the customers will be fed off from overhead service lines connected to underground primary lines. Install 3 x 2-1/2 inch conduits for electrical cables; install a single phase to feed present, provide 2 extra conduits on reserve in case we need to convert to phase three in future.

ASPA will share trenches with ASTCA for the installation of underground telephone lines.

5.7.5. Project Priority 5 – Rockfall Mitigation (6 Sites) – DPW

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: DPW</td></tr>
<tr><td colspan="2" rowspan="3">Project Title: Rockfall Mitigation</td><td colspan="2">Contact Person: Faleosina Voigt</td></tr>
<tr><td colspan="2">Phone: 633-4141</td></tr>
<tr><td colspan="2">e-mail: Faleosina@yahoo.com</td></tr>
<tr><td colspan="4">Hazard(s):</td></tr>
<tr><td>Flood Zone:</td><td colspan="2">Base Flood Elevation:</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

<u>Facilities</u>:

<u>Population</u>:</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $700,000.00</td><td colspan="2">Project Period (duration) 6 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents:</td></tr>
<tr><td colspan="4">Sources of Financial Support:</td></tr>
<tr><td colspan="4">Project Objectives: To minimize the danger of approaching traffic due to rockfalls on the following sites:
Matalesolo Pt. – bet. Alofau and Fogaau Village
Anapepe Pt. – bet. Afulie and Amaua Village
Tifa Pt. – bet. Alega and Avaio Village
Lafiga Pt. – bet. Lauliituai and Aumi Village
Sinamanoo Pt. – bet. Amaluai and Asili Village
Atauloma (Mu Pt.) – Afao, Nua and Seetaga Village</td></tr>
</table>

Project Description: Scale unstable/loose rocks that are potentially dangerous to approaching traffic to reduce the severity of rockfall damage. Install earthen berms, fences and signs to warn the approaching traffic of potential rockfall sites.

5.7.6. Project Priority 6 – Leone Underground Mitigation – ASTCA

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: ASTCA</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Leone Underground Mitigation Project</td><td colspan="2">Contact Person: James Taylor</td></tr>
<tr><td colspan="2">Phone: 684.733.9014</td></tr>
<tr><td colspan="2">e-mail: jtaylor@samoatelco.com</td></tr>
<tr><td colspan="4">Hazard(s): Tropical Cyclones and Tsunamis – Traffic Accidents</td></tr>
<tr><td>Flood Zone:</td><td>Base Flood Elevation:</td><td colspan="2">Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

Government road, health clinic and school. Residents and businesses along the road.</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium Low X</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $1,188,309.81</td><td colspan="2">Project Period (duration): 36 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents: $3,000,000.00</td></tr>
<tr><td colspan="4">Sources of Financial Support: ASTCA % matching</td></tr>
<tr><td colspan="4">Project Objectives:
The proposed activity will reduce and / or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and provide protection from vehicle accidents by removing ASTCA's aerial cables (both fiber optics and copper) and replacing them in underground conduits with underground cables.

**Note that the Communications Agency is the sole entity in the territory for land-line communications.</td></tr>
</table>

Project Description:

The proposed project will serve the villages of in the Tualauta District consisting of the following villages: Lepuapua, Taputimu and Leone. The total length of the proposed project is 6,400 linear feet.

Property Risk includes the following: the current stretch of 6,400 X 4 linear feet of Aerial primary telecommunications cable located along the main public highway between the villages of Taputimu and Leone

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunications service include: Fa'asao School and the Leone Health Clinic.

5.7.7. Additional Mitigation Projects

These projects have not been included in the Priority Project List. These projects are still valid for consideration for future funding or have been removed from the project priority list by the HMC. The following projects are included as part of this deliverable for completeness's sake and are explained in detail in Appendix C.

- Afono Culvert Improvement
- Airport Aviation Fuel Farm Relocation
- Airport Runway Shoreline Protection
- Pago Pago International Airport Terminal Roof Rehabilitation

5.8. Mitigation Project Funding

5.8.1. Joint Projects

Project priority number ten is a joint project between the ASPA and ASTCA. The Territorial Hazard Mitigation Council has asked that Public Works, ASPA and ASTCA continue to communicate on all potential projects that involve roads and utility lines along roads in order to implement cost-effective projects by improving benefits through multi-department coordination and by lowering project cost. These three departments and authorities have been working together for this plan update to maximize coordination for several additional projects.

5.8.2. Potential Funding Sources within FEMA[66]

5.8.2.1. Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) provides grants to States and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters and to enable mitigation measures to be implemented during the immediate recovery from a disaster. The HMGP is authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

5.8.2.2. Pre-Disaster Mitigation Program (PDM)

The Pre-Disaster Mitigation (PDM) program provides funds to States, territories, Indian tribal governments, communities, and universities for hazard mitigation planning and the implementation of mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. PDM grants are to be awarded on a competitive basis and without reference to Territory allocations, quotas, or other formula-based allocation of funds.

5.8.2.3. Public Assistance (PA)

The objective of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to States, local governments, and certain Non-Profit

[66] www.fema.gov

organizations to alleviate suffering and hardship resulting from major disasters or emergencies declared by the President.

Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations.

The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee (usually the Territory) determines how the non-Federal share (up to 25%) is split with the sub grantees (eligible applicants).

5.8.2.4. Flood Mitigation Assistance (FMA)

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist States and communities as they implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program.

Three types of FMA grants are available to States and communities:

- **Planning Grants** to prepare Flood Mitigation Plans. Only NFIP-participating communities with approved Flood Mitigation Plans can apply for FMA Project grants
- **Project Grants** to implement measures to reduce flood losses, such as the elevation, acquisition, or relocation of NFIP-insured structures. States are encouraged to prioritize FMA funds for applications that include repetitive loss properties; these include structures with 2 or more losses each with a claim of at least $1,000 within any ten-year period since 1978.
- **Technical Assistance Grants** for the Territory to help administer the FMA program and activities. Up to ten percent (10%) of Project grants may be awarded to States for Technical Assistance Grants.

5.8.2.5. Repetitive Flood Claims (RFC)

The Repetitive Flood Claims (RFC) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004 (P.L. 108–264), which amended the National Flood Insurance Act (NFIA) of 1968 (42 U.S.C. 4001, et al). Up to $10 million is available annually for FEMA to provide RFC funds to assist States and communities in reducing flood damages to insured properties that have had one or more claims to the National Flood Insurance Program (NFIP).

Eligible Mitigation Activities: Acquisition of properties, and either demolition or relocation of flood-prone structures where the property is deed restricted for open space uses in perpetuity.

Federal/Non-Federal Cost Share: FEMA may contribute up to 100 percent of the total amount approved under the RFC grant award to implement approved activities, if the Applicant has

demonstrated that the proposed activities cannot be funded under the Flood Mitigation Assistance (FMA) program due to lack of Territory or local capacity, which includes either inability to manage the sub grant or lack of 25% match.

5.8.2.6. Severe Repetitive Loss (SRL)

The Severe Repetitive Loss (SRL) grant program was authorized by the Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004, which amended the National Flood Insurance Act of 1968 to provide funding to reduce or eliminate the long-term risk of flood damage to severe repetitive loss (SRL) structures insured under the National Flood Insurance Program (NFIP).

- **Funding**: Authorized up to $40 million for each fiscal year 2005 through 2009.
- **Purpose**: To reduce or eliminate claims under the NFIP through project activities that will result in the greatest savings to the National Flood Insurance Fund (NFIF).
- **Eligible flood mitigation project activities:** Flood proofing (historical properties only); Relocation; Elevation; Acquisition; Mitigation reconstruction (demolition rebuild); and Minor physical localized flood control projects.
- **Federal / Non-Federal cost share:** 75 / 25 %; up to 90 % Federal cost-share funding for projects approved in States, Territories, and Federally-recognized Indian States with FEMA-approved Standard or Enhanced Mitigation Plans or Indian tribal plans that include a strategy for mitigating existing and future SRL properties.

SRL Properties are residential properties:

a. That have at least four NFIP claim payments over $5,000 each, when at least two such claims have occurred within any ten-year period, and the cumulative amount of such claims payments exceeds $20,000; or

b. For which at least two separate claims payments have been made with the cumulative amount of the building portion of such claims exceeding the value of the property, when two such claims have occurred within any ten-year period.

5.9. How the Territory Supports Local Mitigation through Funding and Technical Assistance

5.9.1. Historical Support

Historically, all counties in Tutuila and the Manua Islands have received benefits from mitigation projects constructed and completed over the past two decades. All mitigation project funding decisions are the responsibility of the HMC for the benefit of all the citizens through strengthening of critical facilities, flood control projects, and other mitigation projects.

5.9.2. Criteria for Prioritizing Who Receives Support

The criteria for who receives mitigation support rests with the active, well-informed, and well-educated HMC as the advisory authority. The Council has demonstrated a history of prioritization on past

mitigation projects based on criteria described in this plan. All of the counties in Tutuila and the Manua Islands are considered for local funding through the master mitigation project list presented above, in this chapter.

5.9.2.1. Highest Risk Communities

The HMC has recognized the Tualauta county drainage basin in the Tafuna Plain as the most chronic and highest risk community. This flood problem dwarfs any other flood condition on Tutuila. Many of the roads and 8,000 homes in the county become flooded by diverted sheet flow and overflowing stream channels on a daily and weekly basis due to American Samoa's persistent rainfall which reaches over 200 inches per year for some parts of the island.

Each of the other flood control projects, Tago, Fagamalo, and Afono, are secondary in flood risk and secondary in mitigation priority.

The other three high risk flood problems which affect large populations and critical facilities are being addressed by flood control projects funded by the HMGP and PDM grant programs. These are Fagaalu (hospital) Stream (PDM-completed), Pago Pago stream (PDM-permitting process) and Fagamalo stream (HMGP).

5.9.2.2. Repetitive Loss Communities

Due to per capita income levels American Samoa has very few citizens that have joined the National Flood Insurance Program. Therefore, there are no formally designated repetitive loss communities.

5.9.2.3. Intense Development Pressure Communities

The area recognized as having the most intense development pressure is Tualauta County due to its flat useable land and accessibility. This is also the area that has developed haphazardly, with no land use planning and a poorly planned infrastructure. AS a result, the area residents experience chronic flooding problems. However, this flooding can be controlled through detention basins and channelization of the streams.

5.9.3. Future Support

The Hazard Mitigation will continue to take advantage of the various funding programs available and described herein for the projects that have been developed, scrutinized, prioritized, and described via this Mitigation Plan Update planning process.

6. Chapter 6 - Plan Maintenance Procedures

The American Samoa Territorial Hazard Mitigation Council and TEMCO will implement the strategies outlined in this mitigation plan according to the procedures below. TEMCO and the Hazard Mitigation Council will use the Plan's priorities and analysis of risk to weigh the available resources against the costs and benefits for each mitigation strategy. The American Samoa Government understands the value of this plan and its positive mitigation impact and intends to continue updating this plan and implementing the Plan's strategies.

6.1. Monitoring, Evaluating and Updating the Plan

The mitigation plan needs both continual and formal periodic updating and review. Its accuracy and relevance will change as mitigation strategies are implemented and as hazards impact the Territory. The American Samoa Hazard Mitigation Council will continue to monitor the implementation of this Hazard Mitigation Plan and subsequent plans approved by the Council. TEMCO is responsible for documenting Plan monitoring and update activities. Documentation of Plan updates will occur as frequently as on a quarterly basis and minimally at least on an annual basis. TEMCO is the agency responsible for maintenance of the Hazard Mitigation Plan. TEMCO will continue to work with the Council and other relevant departments to review mitigation priorities and identify projects for funding under the Pre-Disaster Mitigation Competitive Grant Program, the Hazard Mitigation Grant Program, and other sources of support for mitigation activities identified in this plan and subsequent plans. The PDM Grant Program is administered by TEMCO. The TEMCO, Hazard Mitigation Council and representatives from key mitigation government departments will evaluate and update the most recent plan updates and submit to FEMA for final approval.

The primary focus of the 2003 plan was to improve building codes, promote land-use planning, improve infrastructure and develop mitigation projects. The primary focus of the 2007 Plan update is to continue implementing mitigation projects, promote land-use planning and improve infrastructure.

6.1.1. Method and Schedule for Monitoring and Updating the Plan

The mitigation plan will be monitored and updated by TEMCO at least annually and provide updates as required. The plan must then be reviewed and approved by the Mitigation Council. FEMA requires review and approval process for all state plans every three years.

TEMCO is responsible for the Mitigation Plan implementation and all recorded changes to the Plan before and following a disaster. TEMCO will conduct a Plan annual review with the GAR and the Mitigation Council; they may request comments from government and private agencies and departments, and be responsible for recording changes and updates, gaining Council concurrence and finally FEMA concurrence. The annual update will be conducted in a timely manner to prioritize submissions to FEMA for potential PDM grant funding.

The Plan will be reviewed following each major disaster and updated to include a narrative of all relevant impacts from the disaster and the affects and damages to critical infrastructure, the

government and population. The mitigation plan project priorities will be formally reviewed for priority and relevance by the Council following every disaster, with project updates recorded per event.

Quarterly reports are due to FEMA Region 9 from TEMCO and ASG DHS that summarize: 1) all mitigation and planning activities and actions that have been implemented to identify and reduce risk and 2) provide the ASG and FEMA with a reporting mechanism on mitigation project status and progress. In the past, these plans have not been attached to the Mitigation Plan.

For the 2007 Mitigation Plan, these quarterly progress reports will serve as the Plan update mechanism for the Plan during an annual update. At least on an annual basis, the Mitigation council will review the quarterly reports, modify and add to them with Department mitigation activity reports, and incorporate the mitigation progress into the yearly Plan update. These quarterly reports will become an Annual Plan Update Appendix to the Mitigation Plan.

On a quarterly basis, if possible, TEMCO will coordinate with ASDRO to obtain the quarterly Mitigation Project data and provide a summary for the Quarterly Mitigation Report. An outline of the minutes from each Hazard Mitigation Council meeting will also be included in the Annual Plan Update Appendix. These reports and minutes will serve as a permanent record of the mitigation progress for American Samoa. During the Mitigation Council meetings, TEMCO will suggest any new updates to the Plan, and the Council will provide advice and recommendations.

The Plan will also be formally reviewed and re-written every three years to meet FEMA requirements. In 2009, TEMCO will allocate available FEMA funding to update the plan.

6.1.2. Method and Schedule for Evaluating the Plan

The Territorial Hazard Mitigation Council will convene at least once a year for the purpose of evaluating the Hazard Mitigation Plan. TEMCO will advise the GAR and the Council of the date, time and place. Additional Ad-hoc Plan evaluation meetings will be held following any significant disaster event. Meetings will be day-long meetings conducted by the GAR, with individual departmental inputs to be completed within one month following. Each requested Department will provide project, disaster, and risk assessment updates to the Plan. TEMCO will record plan and project updates for the Plan.

6.1.3. Analysis of Previous Plan – What Worked and What Was Changed

The 2003 FEMA-approved American Samoa Mitigation Plan has proven useful for American Samoa. TEMCO and the Territorial Hazard Mitigation Council used the document and revised it annually and following each major disaster. TEMCO's record of mitigation activities is contained in Mitigation Plan Quarterly Reports to FEMA. These quarterly reports have been reviewed for the documentation of the 2007 Mitigation Plan. The Gap Analysis for the Revision and Update of the 2003 Mitigation Plan was the method used to analyze the 2003 plan. The Gap Analysis included FEMA's comments on the 2003 Mitigation Plan Crosswalk. It was determined through this review to expand the number of hazards and hazard scope. Specifically, climate change, wildfire and hazardous materials have been analyzed while additional information has been analyzed for disasters related to earthquakes and tsunamis. At the Territorial Hazard Mitigation Council meeting on June 7, 2007, it was decided to remove the mitigation objective related to improving building codes due to lack of required technical engineering expertise on

island to evaluate and update current building codes. At the June 2007 Hazard Mitigation Council meetings, the Director of Public Works and the Hazard Mitigation Council concurred that the current Los Angeles-based building code provides adequate building guidelines and code requirements. TEMCO intends to create a similar Gap Analysis as part of the 2010 plan update process.

6.2.Monitoring Progress of Mitigation Strategies

On at least an annual basis, beginning at least three months prior to each Grant application deadline, the State Hazard Mitigation Officer (SHMO) will inform the Hazard Mitigation Council of project status as well as requirements for upcoming grant applications. The SHMO will monitor grant application development and ensure final review by the HMC prior to finalization. The above process and timing will ensure political and community consensus on mitigation requirements and mitigation activities.

6.2.1. Mitigation Strategies will be monitored

TEMCO will continue to produce Quarterly Reports for FEMA regarding plan implementation with a focus on mitigation strategy implementation. These reports will include information regarding implementation, project closeouts and review of progress made including progress for individual projects and the plan's goal and objectives. These quarterly reports will be catalogued, reviewed, and used as the basis for demonstrating enhanced mitigation programs and activities for American Samoa.

6.2.2. Mitigation Goals will be monitored

The mitigation plan goal and three mitigation plan objectives will be monitored through the implementation of the mitigation strategies. However, as strategies are implemented and as hazards impact the Territory, it may be necessary to change the order of priority of mitigation strategies. As the strategies are re-evaluated annually and following each disaster, the Hazard Mitigation Council will review the mitigation goal and objectives. It is anticipated that this goal and objectives will remain relevant into 2010.

6.2.3. A System for Reviewing Progress or Implementing Mitigation Strategies

The Territorial Hazard Mitigation Council will review progress of the implementation of mitigation activities during the annual review of mitigation priorities. TEMCO will report on the status of projects funded under the Pre-Disaster Mitigation Grant program, HMGP and other sources of support for mitigation activities identified in this plan and subsequent plans in order to set priorities for the subsequent year.

The Territorial Hazard Mitigation Council may commission an external review of mitigation plans and mitigation activities carried under such plans. The plan will be evaluated and updated with the purpose of understanding and documenting changes, additions, and progress in mitigation programs and activities. This will encourage the Territory to solicit additional project funding through available funding sources.

FEMA has provided guidance for funding of the nationally competitive Pre-Disaster Mitigation Grant Program. The Territorial Hazard Mitigation Council is responsible for establishing project priorities for funding under the Pre-Disaster Mitigation Grant Program to meet annual application deadlines. Following any Presidentially-declared disaster in American Samoa, the Territorial Hazard Mitigation

Council will reprioritize mitigation projects for the Hazard Mitigation Grant Program as soon as possible following the disaster.

6.2.4. Were Mitigation Strategies Implemented as Planned?

Mitigation strategies have been implemented as planned.

Since the Mitigation Plan acceptance in May, 2004, through Plan implementation and ten deliberations by the Hazard Mitigation Council, American Samoa has demonstrated successful implementation of mitigation outreach and training programs to schools, villages, government, and industry as well as managed substantial funds from the Hazard Mitigation Grant Program for three disaster declarations, to include pending mitigation project completions to include twelve projects:

- Severe Flooding, DR- 1477, 2003, one project, total cost: $1,029,000.
- Hurricane Heta, DR-1506, 2004, eight projects, total cost: $1,268,763.
- Hurricane Olaf, DR-1582, 2005, three projects, total cost: $834,676.

Two Pre-disaster Mitigation Grant projects have been approved and implemented since the Plan acceptance in 2004 for a total cost of $3,098,317.

These funded projects included a substantial cost share by American Samoa. Since 1990, the total dollar amount for hazard mitigation projects, including Federal and local costs, is nearly $25,000,000, with accomplishments to include major flood control projects, utility underground projects, shoreline protection, and hardening of schools, critical facilities, lifelines, and government buildings. The most substantial mitigation accomplishment since 2003 has been the floodproofing of the only acute-care hospital on island, the LBJ Hospital, funded through the Pre-disaster Mitigation Program. Previously a chronic problem, this project has fully mitigated the most vital critical facility on island.

Following the completion and acceptance of the Hazard Mitigation Plan by FEMA in May 2004, TEMCO and the Hazard Mitigation Council have been active, serving as the advisory body to the American Samoa Government. The Hazard Mitigation Council met a total of seven times in 2004. Lt. Governor Sunia, Chairman of the Council, chaired every meeting. Council meetings were conducted on the following dates:

- June 2, Sept 7, Sept 15, and Sept 22, 2004 to make decisions on projects to nominate and complete for the FEMA Pre-disaster Mitigation Grant Program.
- December 8, 14, and 20, 2004 to finalize and submit the Pre-disaster Mitigation Grant Program applications and to review the projects and accept the existing project list.

For these meetings, departments developed and added new projects for inclusion and prioritization in the Plan. Departments were given the responsibility for completing their projects on line through the Grants Program, for TEMCO review. Each department was issued passwords to add projects to the egrants application web site. These meetings also provided the Council with education and explained the status of the Hazard Mitigation Grant Program projects.

Each year, following the 2004 initial application period for Pre-disaster Mitigation Grant Program, the departments completed projects that were selected by the Hazard Mitigation Council for submission to

meet early January and February FEMA application deadlines. Mitigation Council meetings were conducted on the following dates in 2005 and 2006:

- April 14, 2005
- September 14 and October 10, 2006

At the September 14, 2006 Council meeting, new Council members were selected for the Council and introduced and briefed on mitigation programs and their roles and responsibilities. This membership represents the current Council members. The Council met again on October 10, 2006 to review projects. Council members are elected to a two-year term.

Chapter 7 - List of Acronyms

ASCMP	American Samoa Coastal Management Act
ASDRO	American Samoa Disaster Recovery Office
ASEPA	American Samoa Environmental Protection Agency
ASG	American Samoa Government
ASHPO	American Samoa Historical Preservation Office
ASPA	American Samoa Power Authority
ASTCA	American Samoa Telecommunications Authority
BCA	Benefit-Cost Analysis
BFE	Base Flood Elevations
CHAMP	Coastal Hazard Assessment and Management Program
COO	Chief Operating Officer
CRAG	Coral Reef Advisory Group
CRS	Community Ratings System
DBAS	Development Bank of American Samoa
DHS	Department of Homeland Security
DHSS	Human and Social Services
DMWR	Department of Marine and Wildlife Resources
DOC	Department of Commerce
DOE	Department of Education
DOH	Department of Health
DOJ	Department of Justice
DPA	Department of Port Administration
DPS	Department of Public Safety
DPW	Department of Public Works
DRG	Digital Raster Graphics
EAS	Emergency Alert System
ENSO	El Niño/Southern Oscillation
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration

FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FMA	Flood Mitigation Assistance
GAR	Governor Appointed Representative
GIS	Geographic Information Systems
GRD	Geologic Resources Division
GRE	Geologic Resources Evaluation
HMGP	Hazard Mitigation Grant Program
HMGP	Hazard Mitigation Grant Program
HMC	Territorial Hazard Mitigation Council
I&M	Inventory and Monitoring Program
IBC	International Building Code
LUPA	Land Use Permit Application
MSL	Mean Sea Level
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFIRA	National Flood Insurance Reform Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NPS	Non-Point Source
NRCS	Natural Resources Conservation Service (part of USDA)
NRID	Natural Resources Information Division
NWR	NOAA Weather Radio
NWS	National Weather Service
OP	Office of Procurement
OTICIDE	Officer of Territorial and International Criminal Intelligence and Drug Enforcement
PA	Public Assistance
PDC	Pacific Disaster Center

PDM	Pre-Disaster Mitigation
PNP	Private Non-Profit
PNRS	Project Notifications and Review System
RFC	Repetitive Flood Claims
SBA	Small Business Administration
SHMO	State Hazard Mitigation Officer
SOI	Southern Oscillation Index
SRL	Severe Repetitive Loss
SSRI	Social Science Research Institute
TAOA	Territorial Administration on Aging
TEMCO	Territorial Emergency Management Coordinating Office
T-HAT	Tutuila Hazard Assessment Tool
TOFR	Territorial Office of Fiscal Reform
U.S.CRTF	United States Coral Reef Task Force
UBC	Uniform Building Code
USACE	United State Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USGS	United States Geological Survey
WUIWT	Wildland/Urban Interface Working Team

Chapter 8 - 2007 Resources

"American Samoa Flood Mitigation Plan." PPG Consultants. 10 January 2003.

"American Samoa Governor Declares State of Emergency." Samoa News. 7 June 1998.

"ASPA Director Says This is American Samoa's Worst Drought." Samoa News. 17 September 1998.

"Drought Conditions Developing in American Samoa." Samoa News. 18 May 1998.

"Drought Conditions Remain in American Samoa." Samoa News. 18 May 1998.

"Global Warming or Not, Ocean's Rising Over Pacific Islands." Samoa News 4 June 2007: 29.

"M6.7 Quake Hits Near Samoa, Causes Small Tsunami." Asian Economic News 2 October 2006.

"Water Department Officials Take Water Conservation to the Schools." Samoa News. 1 June 1998.

<http://www.motication-tools.com/hunky-dory/feb27-90.htm>.

About Firewise. 2006. Firewise Communities. 20 July 2007 <http://www.firewise.org/index.php>.

Akapo, Akapo. Personal Interview. 7 June 2006.

American Samoa Government. 2007. Office of the Governor. 20 July 2007 <http://americansamoa.gov/>.

American Samoa Government. Department of Commerce. American Samoa Coastal Management Program. "Land Use Permit System."

American Samoa Government. Department of Commerce. National Oceanic and Atmospheric Administration. American Samoa Coastal Management Program. "Tutuila Hazard Assessment Tool."

American Samoa Power Authority. 2005. 20 July 2007 <http://www.aspower.com/>.

American Samoa Telecommunications Authority. 2007. 20 July 2007 <http://www.samoatelco.com/>.

Beattie, Mollie H. The Federal Register 1 July 1994, Vol. 59. 30 July 2007 <http://www.fws.gov/endangered/policy/pol004.html>.

Bierbaum, Rosina et al. Confronting Climate Change: Avoiding the Unmanageable and Managing the Unavoidable. United Nations Foundation. Sigma Xi The Scientific Research Society. February 2007.

Buika, Jim. "Buika Trip Report: American Samoa Hazard Mitigation Plan Update." 4-9 June 2007.

Development Bank of American Samoa. 2005. 20 July 2007 <http://www.dbas.org/>.

Earth Observatory. David Herring. National Aeronautics and Space Administration. 20 July 2007 <http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=17300>.

El Nino. National Oceanic and Atmospheric Administration. 20 July 2007 <http://www.pmel.noaa.gov/tao/elnino/nino-home.html#>.

ENSO and Sea Level Variability. 4th Quarter, 2004 Vol. 10 No. 4. Pacific ENSO Update. 20 July 2007 <http://www.soest.hawaii.edu/MET/Enso/peu/2004_4th/special_section.htm>.

Federal Emergency Management Agency. "Recommendations to the Governor: Hurricane Hazard Mitigation Survey Team Report for Hurricane Ofa, February 2-4, 1990." FEMA-855-DR-AS. May 1990.

Federal Emergency Management Agency. 2007. United States Department of Homeland Security. 20 July 2007 <http://www.fema.gov/>.

Flooding. North Carolina Division of Emergency Management. June 2003 <http://www.dem.dcc.state.nc.us/mitigation/flood.htm>.

Hazardous Materials. Northeast States Emergency Consortium. 20 July 2007 <http://www.nesec.org/hazards/hazardous_materials.cfm#history>.

International Conference of Building Officials. 1997 Uniform Building Code. Vol. 1.

Local Climatological Data Annual Summary with Comparative Data. National Oceanic and Atmospheric Administration. NOAA Tafuna Weather Station. 1985.

Menu of Mitigation Strategies. 2007. Utah Department of Public Safety. 20 July 2007 <http://www.des.utah.gov/pdf/nathaz/Appendix_B.pdf>.

Mitigation of Global Warming. 2007. Wikipedia. 20 July 2007 <http://en.wikipedia.org/wiki/Mitigation_of_global_warming>.

Nakaoka, Harold. Personal Communications. Army Corps of Engineers. 10 September 2003.

Natural Disaster Profile of American Samoa. Office of Foreign Disaster Assistance. EM-DAT: The OFDA/CRED International Database. May 2003 <http://www.cred.be/emdat/profiles/natural/amsamoa.htm#chronological%20table>.

NOAA El Nino Page. 2002. National Oceanic and Atmospheric Administration. 20 July 2007 <http://www.elnino.noaa.gov/>.

NOAA La Nina Page. 2002. National Oceanic and Atmospheric Administration. 20 July 2007 <http://www.elnino.noaa.gov/lanina.html>.

Our Most Recent Tsunami. 2007. Pacific Tsunami Museum. 20 July 2007 <http://tsunami.org/>.

Pacific ENSO Update – Special Bulletin. National Oceanic and Atmospheric Administration. 27 March 1998.

Reverberations of the Pacific Warm Pool. John Weier. 2006. Intute. 20 July 2007 <http://www.intute.ac.uk/sciences/worldguide/html/805_articles.html>.

Rising Sea Levels Threaten Small Pacific Island Nations. Jonathan Adams. 2007. International Herald-Tribune. 20 July 2007 < http://www.iht.com/articles/2007/05/03/asia/pacific.php?page=1>.

Sagapolutele, Fili. "Federal Freeze on Funds for TOHS and TEMCO Force Togiola to Consider Local Funding." Samoa News 4 June 2007: 17.

Sagapolutele, Fili. Samoa News. 4 June 2006.

Schirmer, Seugogo Ben. Personal Interview. April, May 2003.

Sea Level Rise. 2006. World Wildlife Fund. 20 July 2007 <http://www.panda.org/about_wwf/what_we_do/climate_change/problems/impacts/sea_levels/index.cfm>.

Sea Level Rise. 2007. Wikipedia. 20 July 2007 <http://en.wikipedia.org/wiki/Sea_level_rise>.

Soil Conservation Service. U.S. Department of Agriculture. "Landslide Hazard Mitigation Study, Tutuila Island, American Samoa." October 1990.

Southern Oscillation Index. . 4th Quarter, 2004 Vol. 10 No. 4. Pacific ENSO Update. 20 July 2007 <http://lumahai.soest.hawaii.edu/Enso/peu/2004_4th/soi.htm>.

Sudden and Severe Economic Dislocation Grant for Manu'a. University of Hawaii and Pacific Basin Development Council.

Sword, Willie. Personal Interview. April, May 2003.

Territorial Emergency Management Coordinating Office. Annual Reports: FY2004-2007 Quarterly Performace Report: Pre-Disaster Mitigation Grant. October 2003-March 2007.

The Coastal Nonpoint Pollution Control Plan. 2007. National Oceanic and Atmospheric Administration. 20 July 2007 <http://coastalmanagement.noaa.gov/nonpoint/welcome.html>.

The Physics Behind the Wave. 1999. NASA's Observatorium. 20 July 2007 <http://observe.arc.nasa.gov/nasa/exhibits/tsunami/tsun_physics.html>.

U.S. Flag Pacific Islands Vessel Grounding Workshops January and February 2002: Summary and Next Steps. National Oceanic and Atmospheric Administration. May 2002.

United States. American Samoa Government. "ASG Tank Farm Terminal Operations Mitigation Plan." 2007.

United States. American Samoa Government. Department of Commerce. “American Samoa Statistical Yearbook 2000.” 14 June 2002.

United States. American Samoa Government. Department of Commerce. “Pago Pago Bay Shoreside Development Plan.” 2003.

United States. American Samoa Government. Department of Commerce. “Territorial Plan” April 2003.

United States. Congressional Research Service. The Library of Congress. CRS Report for Congress: American Samoa Emergency Management and Homeland Security Statutory Authorities Summarized. Washington, 2004.

United States. Federal Emergency Management Agency. “Hazard Mitigation Strategies, Hurricane Val.” DR-927-AS. 22 December 1991.

United States. Federal Emergency Management Agency. Jamie Caplan Consulting LLC and Jim Buika. “Gap Analysis for the Revision and Update of the American Samoa State Multi-Hazard Mitigation Plan.” 16 May 2007.

United States. Federal Emergency Management Agency. Jamie Caplan Consulting LLC and Jim Buika. “Proposed Mitigation Project List for the Revision and Update of the American Samoa State Multi-Hazard Mitigation Plan.” 2 July 2007.

United States. National Park Service. “National Park of American Samoa (NPSA) Wildland Fire Management Plan.” 2006.

United State. United States Army Corps of Engineers. Department of Public Works. “Pago Pago Stream Mitigation Project.” 2003.

United States. United States Department of Homeland Security. Federal Emergency Management Agency. “Developing the Mitigation Plan.” State and Local Mitigation Planning: How-To Guide FEMA 386-3. April 2003.

United States. United States Department of Homeland Security. Federal Emergency Management Agency. “Getting Starting: Building Support for Mitigation Planning.” State and Local Mitigation Planning: How-To Guide FEMA 386-1. September 2002.

United States. United States Department of Homeland Security. Federal Emergency Management Agency. “Multi-Hazard Mitigation Planning Guidance.” November 2006.

United States. United States Department of Homeland Security. Federal Emergency Management Agency. “Understanding Your Risks: Identifying Hazards and Estimating Losses.” State and Local Mitigation Planning: How-To Guide FEMA 386-2. August 2001.

United States. United States Department of Homeland Security. Federal Emergency Management Agency. “Using Benefit-Cost Review in Mitigation Planning.” State and Local Mitigation Planning: How-To Guide Number 5 FEMA 386-5. May 2007.

United States. United States Environmental Protection Agency. “Marine Transportation-Related Facility Response Plan: American Samoa Terminal.” 31 January 2007.

United States. United States Environmental Protection Agency. “Non-Transportation-Related Facility Response Plan: American Samoa Terminal.” 31 January 2007.

Webb, Robert L. Hurricane Ofa – American Samoa. 2000

Wendt, Henry. Consultant. Pago Pago, American Samoa. February-August 2003.

Chapter 9 - 2003 Resources

Aitofele Sunia, Lieutenant Governor, American Samoa. Personal Interview. Pago Pago, American Samoa. April, May, September 2003.

American Samoa Coastal Non-point Source Monitoring Strategy. American Samoa Environmental Protection Agency and American Samoa Coastal Management Program, Pago Pago. March 2002

American Samoa Environmental Protection Agency FY2003 Consolidated Environmental Program. Pago Pago. 2003

American Samoa Non-point Source Pollution Control Program. American Samoa Environmental Protection Agency and American Samoa Coastal Management Program, Pago Pago. July 1995

American Samoa Watershed Protection Plan. Pederson Planning Consultants, for American Samoa Environmental Protection Agency. 1998.

Arno Percival, Structural Engineer, A/E Division. Department of Public Works. Personal Interview. Pago Pago, American Samoa. May 2003.

David Kulberg, Program Manager. American Samoa Community College. Personal Interview. Pago Pago, American Samoa. May 2003.

Alefa Afalava, Mitigation Specialist. Territorial Emergency Management Coordinating Office. Personal Interview. Tafuna, American Samoa. May 2003.

Evelyn Stevens, Mitigation Program Manager. Territorial Emergency Management Coordinating Office. Personal Interview. Tafuna, American Samoa. February, April, May 2003.

Federal Emergency Management Agency, Developing the Mitigation Plan – Identifying Mitigation Actions and Implementation Strategies. FEMA 386-3. FEMA, April 2003.

Federal Emergency Management Agency, Getting Started – Building Support for Mitigation Planning. FEMA 386-1. FEMA, September 2002.

Federal Emergency Management Agency, HAZUS99 Estimated Annualized Earthquake Loss for the United States. FEMA-366. February 2001.

Federal Emergency Management Agency, Understanding Your Risks – Identifying Hazards and Estimating Losses. FEMA 386-2. FEMA, August 2001.

Fili Sagapolutele. *The Samoa News.* "Territory Will Receive Federal Drought Assistance for Water Treatment System." October 22, 1998.

Genevieve Brighouse, Manager. Department of Commerce Coastal Zone Management Program. Personal Interview. Pago Pago, American Samoa. May 2003.

Jack Kachmarik, Director. Territorial Office of Financial Reform. Personal Interview. Tafuna, American Samoa. May 2003.

Kevin Cronk, GIS Specialist. Department of Commerce GIS Group. Personal Interview. Pago Pago, American Samoa. May 2003.

Manuolevasa S. T. Tagaloa, General Manager, Building Branch. Department of Public Works. Personal Interview. Pago Pago, American Samoa. May 2003.

Mark Hayward, GIS Specialist. American Samoa Power Authority. Personal Interview. Tafuna, American Samoa. February, April, May 2003.

National Drought Mitigation Center. *Understanding ENSO and Forecasting Drought.* Online. 2003. NDMC. Available: http://www.drought.unl.edu/whatis/elNiño.htm [May 2003].

National Weather Service. *PagoPago, American Samoa.* Online. Available: http://www.prh.noaa.gov/samoa/ [June 2003].

Naval Pacific Meteorology and Oceanography Center, Joint Typhoon Warning Center. *January Tropical Cyclone Occurrences for the Years 1972 to 2001*, Online. Available: http://www.npmoc.navy.mil/jtwc/climostats/trackclimo/janaor.html.[June 2003].

Port Master Plan 1999-2019. Lyon Associates, Inc. for Department of Port Administration, American Samoa Government. October 2000.

Richmond, Bruce M., U.S. Department of the Interior U.S. Geological Survey. Tutuila, American Samoa Coastal Resource Inventory Sites: Reconnaissance Shoreline Geology. Open-file Report 95-512. USGS.

Silila Patane, Harbor Master. Pago Pago Harbor. Personal Interview. Pago Pago, American Samoa. May 2003.

Taeaotui Punaofo Tilei, Director. Public Works. Chairman. American Samoa Disaster Mitigation Council. Personal Interview. Pago Pago, American Samoa. May 2003.

Territorial General Plan. Department of Commerce, American Samoa Government. October 2002.

Territory of American Samoa State of the Environment Report 2002. American Samoa Environmental Protection Agency, Pago Pago.

The Samoa News. American Samoa Finds Ways to Conserve Water. August 11, 1998.

The Samoa News. American Samoa Receives Heavy Rainfall, But Needs More. June 23, 1998.

The Samoa News. American Samoa Water Conservation Campaign Organized. May 27, 1998.

Thompson, Edward F., and Demirbilek, Z., U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory. Wave Response, Pago Pago Harbor, Island of Tutuila, Territory of American Samoa. ERDC/CHL TR-0220. September 2002.

Toafa Vaiagae, Ph.D. Director. Territorial Emergency Management Coordinating Office. Personal Interview. Tafuna, American Samoa. February, April, May 2003.

Togiola T. A. Tulafono, Governor (and previous Lieutenant Governor), American Samoa. Personal Interview. Pago Pago, American Samoa. February, April, May 2003.

Uniform Building Code. (ATC, 1984, Tentative Provisions for the Development of Seismic Regulations for Buildings, ATC-3-06. Applied Technology Council, Palo Alto, California.)

USDA/NRCS (formerly SCS, Soil Conservation Service) soils report: *Soil Survey of American Samoa* (1984).

U.S. All Islands Coral Reef Initiative Strategy. Prepared by USAICRICC. 1999

U.S. Department of the Interior, U.S. Geological Survey, USGS Fact Sheet 008-00, The National Flood-Frequency Program – Methods for Estimating Flood Magnitude and Frequency in Rural Areas on the Island of Tutuila, American Samoa, 2000. USGS, October 2000.

U.S. Geological Survey, *USGS National Landslide Information Center*. ONLINE. USGS. Available: http://landslides.usgs.gov/html_files/nlicsun.html [May 2003].

Vaitoelau Filiga, Chief Statistician. Department of Commerce. Personal Interview. Pago Pago, American Samoa. May 2003.

2003 Data Resources

Spatial data from a variety of sources were used in constructing the maps and in supporting analysis that led to the conclusions reached in this document. Complete metadata records will be available on the Pacific Disaster Center's website in Fall 2003. The PDC would like to thank the following organizations and individuals for providing, gathering, and/or processing spatial data used in the report.

- Henry Wendt, Civil Engineer, PPG Consulting, HW Consulting
- Mark Hayward, American Samoa Power Authority (ASPA)
- Kevin Cronk, American Samoa Government – Department of Commerce, SDI
- American Samoa Disaster Mitigation Council
- Territorial Emergency Management Coordinating Office (TEMCO)
- American Samoa Power Authority (ASPA)
- American Samoa Government – Department of Commerce

- Fagatele Bay National Marine Sanctuary (FBNMS) GIS Data Archive: http://dusk.geo.orst.edu/djl/samoa/
- American Samoa GIS User Group: http://www.americansamoagis.com/
- Eric Yamashita, University of Hawaii Social Science Research Institute
- Rhett Rebold, Pacific Disaster Center
- Rich Nezelek, Pacific Disaster Center
- Thomas Emmsley, Pacific Disaster Center

Appendix A – GIS Data

Map	Layer_Name	Source_Agency	File_Name	Web_Source
Base	Aunu'u Buildings 1990	ASG DOC & Pederson	aun_bld90.shp	ASG DOC FTP
Base	Aunu'u Roads 2002	ASG DOC CMP	Aun_roads02.shp	ASG DOC FTP
Base	Coastline	PDC	as_water_mask.shp	http://www.pdc.org/mde/
Base	Manu'a DEM	USGS	manua_dem.tif	http://www.pdc.org/mde/
Base	Manu'a Hillshade	PDC	manua_hillshade.tif	http://www.pdc.org/mde/
Base	Ofu Buildings 1989	ASG DOC & Pederson	man_bld.shp	http://www.pdc.org/mde/
Base	Ofu-Olosega Roads 2002	ASG DOC CMP	Ofu-Olo_roads02.shp	ASG DOC FTP
Base	Ta'u Buildings 2003	ASG DOC CMP	tau_bld03.shp	ASG DOC FTP
Base	Ta'u Critical Facilities (bldgs 2003)	ASG DOC CMP	tau_bld03.shp	ASG DOC FTP
Base	Ta'u Roads 2003	ASG DOC CMP	tau_roads03.shp	ASG DOC FTP
Base	Tutuila Buildings 2006	ASG DOC	tut_blds06_v1.shp	ASG DOC FTP
Base	Tutuila Critical Facilities	PDC	tut_critfac_church.shp	ASG DOC FTP
Base	Tutuila DEM (10M)	USGS	tutuila_dem.tif	http://www.pdc.org/mde/
Base	Tutuila Hillshade (10M)	PDC	tutuila_hillshade.tif	http://www.pdc.org/mde/
Base	Tutuila Hydrography USGS	ASG DOC & USGS	tut_hydro_USGS.shp	ASG DOC FTP
Base	Tutuila Roads 2006	ASG DOC	tut_roads06.shp	ASG DOC FTP
Coastline Types	Tutuila Coastline Type (Status)	USACE	tut_coastline_type.shp	ASG DOC FTP
Cyclone Storm Tracks	Cyclone Storm Tracks	PDC	stormtracks.shp	ASG DOC FTP
Earthquake Hazard Areas	Geologic Faults	NPS	npsaflt.shp	http://science.nature.nps.gov/nrdata/
Earthquake Hazard Areas	Tutuila Earthquake Hazard Areas	ASG DOC & Pederson	Tut_Soil.shp	ASG DOC FTP
Flood Hazard Zones	Flood Hazard Zones	FEMA	s_fld_haz_ar.shp	ASG DOC FTP
Historic Earthquakes	Historic Earthquakes	USGS/NEIC	Historic_EQs.shp	http://neic.usgs.gov/neis/epic/epic_rect.html
Landslide Risk Areas	Tutuila Landslide Risk	PDC	tut_landslide_risk_utmnad83.shp	ASG DOC FTP
Landslide Risk Areas	Tutuila Landslides	PDC	tut_landslide_pts_utmnad83.shp	ASG DOC FTP
Mitigation Projects	Mitigation Projects	JCC (Gale Foss Design)	MitigationProjects.shp	none

Appendix B – Critical Facilities

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
Church/Shelter	Catholic Hall	434	Alao		Tafilele Pua?auli	622-7068	$580,000	
Church/Shelter	Catholic Hall	374	Alao		Tafilele Pua?auli	622-7068	$580,000	
Church/Shelter	CCCAS	460	Amanave		Aveao F. Fonoti	258-4601	$480,000	
Church/Shelter	CCCAS	292	Amanave		Aveao F. Fonoti	258-4601	$480,000	
Church/Shelter	CCCAS	333	Amanave		Aveao F. Fonoti	258-4601	$480,000	
Church/Shelter	CCCAS	204	Asili		Augafa Eteuini	688-2194	$760,000	
Church/Shelter	CCCAS	413	Asili		Augafa Eteuini	688-2194	$760,000	
Church/Shelter	CCCAS Church	270	Fagamalo		Taliloa Tafavalu	688-7502	$572,000	
Church/Shelter	CCCAS Church	211	Fagamalo		Taliloa Tafavalu	688-7502	$572,000	
Church/Shelter	CCCAS Hall	408	Aasu		Sinipao Roberts	699-2926	$360,000	
Church/Shelter	CCCAS Hall	272	Aasu		Sinipao Roberts	699-2926	$360,000	
Church/Shelter	CCCAS Hall	532	Afono		Tootoo Maugaotega	622-7919	$288,000	
Church/Shelter	CCCAS Hall	460	Amaua		Tialavea Misi	644-2276	$616,000	
Church/Shelter	CCCAS Hall	670	Amaua		Tialavea Misi	644-2276	$616,000	
Church/Shelter	CCCAS Hall	658	Amouli		Malala Salu	622-7460	$560,000	
Church/Shelter	CCCAS Hall	439	Aoa		Raymond Tautala	622-7435	$781,500	
Church/Shelter	CCCAS Hall	565	Aoa		Raymond Tautala	622-7435	$781,500	
Church/Shelter	CCCAS Hall	855	Aoloau		Moananu Vaiala	258-3544	$792,000	
Church/Shelter	CCCAS Hall	266	Aoloau		Moananu Vaiala	258-3544	$792,000	
Church/Shelter	CCCAS Hall	575	Aoloau		Moananu Vaiala	258-3544	$792,000	
Church/Shelter	CCCAS Hall	276	Auasi		Danny Masaniai	622-7651	$318,000	
Church/Shelter	CCCAS Hall	167	Auasi		Danny Masaniai	622-7651	$318,000	
Church/Shelter	CCCAS Hall	470	Fagaalu		Taatiliga Tapuvae	633-2608	$360,000	
Church/Shelter	CCCAS Hall	458	Fagasa		Simanu Palauni	633-4546	$784,000	
Church/Shelter	CCCAS Hall	260	Fagasa		Simanu Palauni	633-4546	$784,000	
Church/Shelter	CCCAS Hall	498	Fagatogo		Tusipa Anoai	633-1881	$288,000	
Church/Shelter	CCCAS Hall	410	Malaeloa		Roe J. Gagai	699-5845	$861,000	
Church/Shelter	CCCAS Hall	729	Malaeloa		Roe J. Gagai	699-5845	$861,000	
Church/Shelter	CCCAS Hall	466	Masausi		Migi Leaea	622-7209	$120,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
Church/Shelter	CCCAS Hall	301	Onenoa		Moega Soi	622-7820	$162,000	
Church/Shelter	CCCAS Hall	401	Sailele		Faagau Toliniu	633-7653	$486,000	
Church/Shelter	CCCAS Hall	397	Taputimu		Esera V. Fusive?a	688-1769	$852,000	
Church/Shelter	CCCAS Hall	639	Taputimu		Esera V. Fusive?a	688-1769	$852,000	
Church/Shelter	CCCAS Hall	416	Tula		Alefosio Taulagi	-	$594,000	
Church/Shelter	CCCAS Hall	276	Tula		Alefosio Taulagi	-	$594,000	
Church/Shelter	CCCAS Hall	240	Tula		Alefosio Taulagi	-	$594,000	
Church/Shelter	CCCAS Hall	145	Tula		Alefosio Taulagi	-	$594,000	
Church/Shelter	CCCAS Hall	322	Utumea		Danny Masaniai	622-7460	$560,000	
Church/Shelter	CCCAS Hall	849	Vailoatai		Maiava Peniamina	688-1549	$460,000	
Church/Shelter	CCCAS Hall	594	Vaitogi		Tupuola Filimaua	699-2273	$528,000	
Church/Shelter	CCCAS Hall	569	Vaitogi		Tupuola Filimaua	699-2273	$528,000	
Church/Shelter	CCCAS Hall	475	Vatia		Patea Asovale	644-1028	$360,000	
Church/Shelter	CCCAS Maota Tina	1099	Tafuna		Fagaima Milo	699-2852	$714,000	
Church/Shelter	LDS Church	188	Auto		Tialavea Misi	622-7651	$210,000	
Church/Shelter	LDS Church	1141	Mapusaga		Tuitama Kilepoa	699-1035	$966,000	
Church/Shelter	LDS Church	269	Mapusaga		Tuitama Kilepoa	699-1035	$966,000	
Church/Shelter	Methodist Hall	531	Fagatogo		Tusipa Anoai	633-2608	$712,500	
Church/Shelter	Methodist Hall	0	Nuuuli-tai		Vaealuga M. Mataafa	633-5822	$303,900	
Commercial	Star Kist Samoa Co.	3703	Satala		General Manager	644-4231	$17,909,360	3000
Commercial	Star Kist Samoa Co.	20752	Satala		General Manager	644-4231	$17,909,360	3000
Commercial	VCS Samoa Packing Co	18239	Atuu		General Manager	644-5272	$16,382,320	2400
Communications	American Samoa Telec	550	Fagatogo	ASG	Mr. Aleki Sene	633-1221	$960,000	161
Communications	Blue Sky Company	893	Tafuna		Ms. Faye Rose	699-7669	$400,000	33
Communications	KKHJ Radio Station	2929	Pago Pago		Mr. John Summers	633-7344		5
Communications	KSBS Radio Station	270	Fagaalu	A. Sene	Ms. Esther Prescott	633-7000	$384,000	10
Communications	KVZK-TV	1031	Fagatogo	ASG	Ms. Vaoita Sotoa	633-4191	$650,000	46
Fire	DPS Fire Division	162	Fagatogo	ASG	DPS, Commisioner	633-5858	$150,000	25
Fire	DPS Fire Division	168	Fagatogo	ASG	DPS, Commisioner	633-5858	$150,000	25
Fire	Sub-station East	148	Fagaitua	ASG	Watch Commander	622-7250	$288,000	0
Fuel Storage	Airport Tank Farm	11	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	4	PPG Airport				$7,000,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
Fuel Storage	Airport Tank Farm	35	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	35	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	35	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	12	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	35	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	28	PPG Airport				$7,000,000	
Fuel Storage	Airport Tank Farm	29	PPG Airport				$7,000,000	
Government	ASG Gov.'t Bldgs.	3654	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	444	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	410	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	450	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	260	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	411	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	1527	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	462	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	ASG Gov.'t Bldgs.	283	Fagatogo	ASG	Chief of Staff	633-4116	$14,000,000	
Government	Dept of Education	844	Utulei					
Government	District Court	1136	Pago Pago				$54,349	
Government	Faletusi Library	750	Utulei				$960,000	
Government	Governors House	687	Fagatogo					
Government	High Court	729	Fagatogo				$1,452,328	
Government	LT Gov House	597	Utulei					
Government	Samoan Affairs	1678	Utulei				$550,000	
Government	Temco and DMV	562	Tafuna				$349,080	
Hospital	LBJ Tropical Medical	13909	Fagaalu	ASG	Chief Executive Officer	633-1594	$18,836,193	500
Hospital	LBJ Tropical Medical	449	Fagaalu	ASG	Chief Executive Officer	633-1594	$18,836,193	500
Hospital	LBJ Tropical Medical	426	Fagaalu	ASG	Chief Executive Officer	633-1594	$18,836,193	500
Hospital	LBJ Tropical Medical	443	Fagaalu	ASG	Chief Executive Officer	633-1594	$18,836,193	500
Police	DPS Central Station	713	Fagatogo	ASG	DPS, Commisioner	633-1111	$770,414	230
Police	Faqaitua Sub-station	152	Fagaitua	ASG	Watch Commander	622-7250	$144,000	12
Processing Site	Samoa Packing	18239	Atuu				$16,382,320	2400

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
Processing Site	Samoa Seiner Suppls	0	Container Dck					
Processing Site	Star Kist Samoa	20752	Atuu				$17,909,360	3000
School/Shelter	Alofau Elementary	207	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	85	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	188	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	193	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	188	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	196	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	193	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	206	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	184	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Alofau Elementary	189	Alofau	ASG	Misifoa Sakaio	622-7981	$745,000	
School/Shelter	Aua Elementary	449	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	150	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	196	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	195	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	200	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	262	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	200	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	198	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	202	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Aua Elementary	204	Aua	ASG	Maafala Finagalo	644-1261	$1,500,000	
School/Shelter	Faqaitua High	386	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	163	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	1273	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	382	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	385	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	375	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	895	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Faqaitua High	264	Fagaitua	ASG	Tauoa M. Muagututia	622-7371	$1,750,000	
School/Shelter	Illiili Elementary	452	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	140	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	309	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
School/Shelter	Illiili Elementary	102	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	200	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	201	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	202	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	238	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	488	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	203	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	199	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	195	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Illiili Elementary	203	Iliili	ASG	Tupua Tapualii	699-7386	$1,250,000	
School/Shelter	Laulii Elementary	336	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	135	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	207	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	259	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	73	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	201	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Laulii Elementary	203	Laulii	ASG	M. Peau P.	644-4074	$545,000	
School/Shelter	Leone High	759	Leone	ASG	Koko D. Puletuimalo	688-7179	$1,960,000	
School/Shelter	Leone High	434	Leone	ASG	Koko D. Puletuimalo	688-7179	$1,960,000	
School/Shelter	Leone High	568	Leone	ASG	Koko D. Puletuimalo	688-7179	$1,960,000	
School/Shelter	Manulele Elementary	459	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	199	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	203	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	135	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	195	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	204	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	164	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	227	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	211	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	197	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	202	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	199	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Manulele Elementary	628	Nuuuli-uta	ASG	Taufete?e Taumaoe	699-9473	$940,000	
School/Shelter	Masefau Elementary	188	Masefau	ASG	Gaoa U. Mui	622-7209	$675,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
School/Shelter	Masefau Elementary	190	Masefau	ASG	Gaoa U. Mui	622-7209	$675,000	
School/Shelter	Masefau Elementary	172	Masefau	ASG	Gaoa U. Mui	622-7209	$675,000	
School/Shelter	Masefau Elementary	154	Masefau	ASG	Gaoa U. Mui	622-7209	$675,000	
School/Shelter	Pago Pago Elementary	233	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	200	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	83	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	393	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	204	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	206	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	197	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	200	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	13	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	203	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	126	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	575	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	605	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	143	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	244	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	213	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	198	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
School/Shelter	Pago Pago Elementary	200	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pago Pago Elementary	200	Pago Pago	ASG	Tufele Vila ?Asi?	633-2995	$1,400,000	
School/Shelter	Pavaiai Elementary	207	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	198	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	201	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	478	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	201	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	204	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	198	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	203	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	197	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	225	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	87	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	139	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	455	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Pavaiai Elementary	290	Pavaiai	ASG	Letuli B. Faimalo	699-2239	$2,650,000	
School/Shelter	Samoana High	1350	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	595	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	657	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	697	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	832	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	591	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	277	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	567	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	1808	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Samoana High	621	Utulei	ASG	Tavai Tafoimalo S.	- -	$1,055,000	
School/Shelter	Seetaqa Elementary	19	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	40	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	132	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	61	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	185	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	122	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	

FACILITY_TYPE	NAME	AREA	LOCATION	OWNERSHIP	CONTACT	PHONE#	ESTIMATE	EMP#
School/Shelter	Seetaqa Elementary	192	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	92	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	191	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	195	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	202	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
School/Shelter	Seetaqa Elementary	731	Seetaga	ASG	Leo A. Talo	688-1866	$520,000	
Transportation	Container Dock	0	Fagatogo	ASG			$18,131,380	68
Transportation	InterIsland Ferry T.	178	Fagatogo	ASG			$400,000	
Transportation	PPG Intern. Airport	2254	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	108	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	1954	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	238	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	199	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	242	Tafuna	ASG			$69,080,080	77
Transportation	PPG Intern. Airport	819	Tafuna	ASG			$69,080,080	77
Utilities	ASPA Tafuna Plant	88	Tafuna	ASG	Mr. Abe U. Malae	644-2772	$18,000,000	
Utilities	ASPA Tafuna Plant	38	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	43	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	53	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	47	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	22	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	682	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	28	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	144	Tafuna	ASG			$18,000,000	
Utilities	ASPA Tafuna Plant	0	Tafuna	ASG	Mr. Abe U. Malae	644-2772	$18,000,000	

Appendix C – Project Profiles

Project Priority 1 – Tualauta Flood Management – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Tualauta Flood Management Project	***Contact Person:*** Faleosina Voigt	
	Phone: (684) 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Risk to government facilities/assets, residents and businesses situated along the waterway, and flooding within the area.		
Flood Zone: AE	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** Manulele Elementary School, Manulele Jr. High School, Juvenile Correctional Facility, Correctional Facility, American Samoa Community College, Route 001, Route 002, Route 014, Route 019 ***Population:***		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $3,000,000.00	***Project Period (duration)*** 240 days	
Value of Structure or Facility: $25,000,000.00	***TMK #:***	
Estimated Value of Facility Contents: $10,000,000.00		
Sources of Financial Support:		
Project Objectives: To mitigate the spread of stream runoff as well as the natural runoff of the land within the watershed of Tualauta County, by means of improving and defining a natural waterway that's runs from the village of Pava'ia'l to Nuu'uli. To minimize the risk of damage to government facilities/assets in the area within the Tafuna Flood Plain. Currently, Route 001 (main road), Route 014 (airport road), Route 019 (Fagaima Road) undergo heavy flooding during periods of heavy rain, due to blockage or the nonexistence of an outlet. This project will minimize this flooding problem currently experienced within the district, as well as be a means for the		

protection and safety for residents within the area and more so for the general public.

Project Description: The Tafuna Flood Management Project is an improvement and redefining of an existing natural waterway. However, an easement for future maintenance work will be considered. The project shall consist of a lined open channel with check structures for velocity reduction and sedimentation/debris settlement before discharge point. These structures are positioned at the most advantageous locations, taking into consideration the available land area, possible usage for groundwater well recharge purposes, as well as for aesthetics if possible. The channel is approximately 3 miles in length and begins at the village of Pava'ia'l and ending in Nuu'uli, adjacent to the Correctional Facility across the Lion's Park.

A major portion of the proposed activity is located within the Central Tafuna Plain watershed south of Route 001, with a catchment area of approximately 5.50 square miles. The proposed drainage project would intercept runoff from the major streams: Taumata, Vaitele, Mapusagatui, Leaveave, and Drainageway 2 (see project map), which contributes greatly to floods within the lower Tafuna area. Tafuna, if not one of, is the largest plains area in the Territory. Due to its terrain being favorable to development as compared to the mountainous terrain on most of Tutuila Island, it has a high population number as well as a major industrial district. Installation of the proposed activity would benefit not only the residents within the area, but also private and government schools, commercial and residential buildings, government and private facilities and assets, from the threat of damage due to flooding.

A study from the U.S. Army Corps of Engineers, Pacific Ocean Division for the Tafuna Flood Plain was published in October 1994, concluding that flooding on the lower Tafuna Plain is caused by heavy vegetation and lack of well defines stream bed(s). Residential and commercial development within the area is growing rapidly, thus reducing the hydraulic capacity by infringing on the existing drainageway stream banks. In addition, uncontrolled filling activities changes or diverts to spreading runoff from normal flow patterns. This is causing flooding in areas that have never experienced flooding before; causing damages to homes, infrastructure, and safety hazards to motorists, pedestrians, and the general public. Currently, most of the Lower Tafuna Plain areas experiences flooding during minor rains of high intensities with short durations. This situation is increasingly getting worse with each passing raining season.

The proposed project will not only convey the runoff in a safe manner to its normal discharge point, but will also benefit the government in reducing the cost of infrastructure, assets, and building repairs and maintenance incurred each year due to the current flooding situation. This is especially true during natural disasters.

Project Priority 2 – Futiga Road Mitigation – ASTCA

Jurisdiction:	***Agency/Organization:*** ASTCA	
Project Title: Futiga Road mitigation Project	***Contact Person:*** James Taylor	
	Phone: 684.733.9014	
	e-mail: jtaylor@samoatelco.com	
Hazard(s): Tropical Cyclones and Tsunami – traffic accidents		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: Government Road, residents and businesses on the road		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $2,457,044.00	***Project Period (duration):*** 36 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents: $5,500,000.00		
Sources of Financial Support: ASTCA % matching		
Project Objectives: The proposed activity will reduce and/or eliminate the impact of damages caused by hurricanes, tropical cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both fiber optics and Copper) and replacing them in underground conduits with underground cables. **Note that the Communications Agency is the sole entity in the territory for land-line communications.		

Project Description:

The proposed project will serve the villages of Iliili and Futiga in the Tualauta District

The total length of the proposed project is 10,560 linear feet.

Property Risk includes the following: the current stretch 10,560 X 4 linear feet of aerial primary telecommunications cable located along the main public highway between the village of Iliili and Taputimu.

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunications service include Highway 1 and the territorial land fill.

Project Priority 3 – Tafuna Power Plant Wall – ASPA

Location: Tafuna Power Plant	***Agency/Organization:*** ASPA	
Project Title: Tafuna Power Plant Wall	***Contact Person:*** Andra Samoa/Reno Vivao	
	Phone: 733-1740/699-7166 258-3601/699-1357	
	e-mail: andra@aspower.com or reno@aspower.com	
Hazard(s): Cyclones, Storms		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: Tafuna Power Plant supplies power for all users from Fagaalu to the West side, including government emergency facilities, emergency shelters, the airport and most of the island's population.		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $500,000.00	***Project Period (duration)*** 18 months	
Value of Structure or Facility: $14,000,000.00		***TMK #:***
Estimated Value of Facility Contents:		
Sources of Financial Support: FEMA with local match		
Project Objectives: To prevent damage to ASPA Tafuna Power Plant in the event of a cyclone or tropical storm. The proposed project will harden the plant against cyclones and storms. Installation and upgrading of the walls of the existing facility will also reduce noise emissions and enhance protection of the power generation equipment from the weather.		

Project Description:

This project will include the hardening of the Tafuna plant walls and the installation of ventilation ducting. The ventilation equipment has a dual roll. It allows ventilation of the plant, and helps reduce noise emission. It will also further weather-proof the generation equipment from the elements.

The Tafuna plant supplies power to essential government facilities such as the water wells, US Army Reserve Center, Airport, Public Safety substation, Emergency Center, and also supplies power to most of the residents and businesses on Tutuila.

Project Priority 4 – Underground Power Lines from Poloa to Fagamalo - ASPA

Location: Poloa to Fagamalo	***Agency/Organization:*** American Samoa Power Authority(ASPA)
Project Title: Underground Power lines from Poloa village to Fagamalo village.	***Contact Person:*** Andra Samoa, CEO or Reno Vivao, Acting COO
	Phone: 684-644-2772 or 684-733-1740 or 684- 258-3601
	e-mail: andra@aspower.com or reno@aspower.com

Hazard(s):
Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami

Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***

Critical Facility/Population/Asset at Risk:

4. **Poloa Village:** ASG Facilities-(Poloa Elementary School, ASPA Water Booster, ASPA Water Tank), Public Facilities-(Poloa CCCAS Church, Poloa CCCAS Hall, Poloa Methodist Church), Business-(2 Retail Stores)
5. **Fagali'I Village:** ASG Facilities-(2 ASPA Water wells), Public Facilities-(Fagali'I CCCAS Church, Fagali'I CCCAS Church Hall), Business-(1 Retail store)
6. **Fagamalo Village:** Public Facilities-(Fagamalo CCCAS Church)

Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***
Estimated Cost of Project: $864,500.00	***Project Period (duration):*** 18months
Value of Structure or Facility: $30,000,000.00	

Sources of Financial Support: FEMA [FEMA 90%, ASPA 10%]

Project Objective:
To install underground power lines to lessen chances of having long awaited power restoration hours. To help maintain reliability of available electrical sources to and within ASG and Public Facilities at this certain area when disaster strikes. Some of the ASG and Public facilities will be used as shelters will rely mostly for availability of power to accommodate any immediate needs. This project will also improve location of existing overhead lines which are set far away from Equipment access.

Project Description:

Project length is 1.6 miles from Poloa to Fagali'I, 1.8 miles from Fagali'I to Maloata, and 1.2 miles from Maloata to Fagamalo. Project involves under-grounding the main primary lines, terminate wires in padmount fiber boxes, underground services to churches and water wells. Rest of customers will be fed off from overhead service lines connected to underground primary lines. Install 3 x 2-1/2 inch conduits for electrical cables; install a single phase to feed present, 2 extra conduits on reserve in case we need to convert to three phase in future.

ASPA will share trenches with ASTCA for installation of telephone lines underground as well.

Project Priority 5 – Rockfall Mitigation (6 Sites) – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Rockfall Mitigation	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s):		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** ***Population:***		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $700,000.00	***Project Period (duration)*** 6 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents:		
Sources of Financial Support:		
Project Objectives: To minimize the danger of approaching traffic due to rockfalls on the following sites: Matalesolo Pt. – bet. Alofau and Fogaau Village Anapepe Pt. – bet. Afulie and Amaua Village Tifa Pt. – bet. Alega and Avaio Village Lafiga Pt. – bet. Lauliituai and Aumi Village Sinamanoo Pt. – bet. Amaluai and Asili Village Atauloma (Mu Pt.) – Afao, Nua and Seetaga Village		

Project Description: Scale unstable/loose rocks that are potentially dangerous to be approaching traffic to reduce the severity of rockfall damage. Install earthen berms, fences and signs to warn the approaching traffic of potential rockfall sites.

Project Priority 6 – Leone Underground Mitigation – ASTCA

Jurisdiction:	***Agency/Organization:*** ASTCA	
Project Title: Leone Underground Mitigation Project	***Contact Person:*** James Taylor	
	Phone: 684.733.9014	
	e-mail: jtaylor@samoatelco.com	
Hazard(s): Tropical Cyclones and Tsunami – traffic accidents		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: Government road, health clinic and school. Residents and businesses along the road.		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $1,188,309.81	***Project Period (duration):*** 36 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents: $3,000,000.00		
Sources of Financial Support: ASTCA % matching		
Project Objectives: The proposed activity will reduce and / or eliminate the impact of damages caused by Hurricane, Tropical Cyclones, other windstorms and protection from vehicle accidents by removing ASTCA's aerial cables (both Fiber Optics and Copper) and replacing them in underground conduits with underground cables. **Note that the Communications Agency is the sole entity in the territory for land-line communications.		

Project Description:

The proposed project will serve the villages of in the Tualauta District consisting of the following villages: Lepuapua, Taputimu and Leone The total length of the proposed project is 6,400 linear feet.

Property Risk includes the following: the current stretch of 6,400 X 4 linear feet of Aerial primary telecommunications cable located along the main public highway between the villages of Taputimu and Leone

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunications service, include: Fa'asao school and the Leone health clinic.

Project Priority 7 – Underground Power Lines from Cost U Less to Ottoville – ASPA

<table>
<tr><td>Location:
Tafuna, Ottoville via Malaeimi</td><td colspan="3">Agency/Organization:
American Samoa Power Authority (ASPA)</td></tr>
<tr><td rowspan="3">Project Title:
Underground Power lines – Cost U Less /Trade wind Intersection to Ottoville corner, Tafuna Water Well Field</td><td colspan="3">Contact Person:
Andra Samoa, CEO or Reno Vivao, acting COO</td></tr>
<tr><td colspan="3">Phone:
684-644-2772, or 684-733-1740 or 684-258-3601</td></tr>
<tr><td colspan="3">e-mail:
andra@aspower.com or reno@aspower.com</td></tr>
<tr><td colspan="4">Hazard(s):
Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami</td></tr>
<tr><td>Flood Zone:</td><td colspan="2">Base Flood Elevation:</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:
Trade Winds Hotel, Fatu o Aiga Nazareth Nursery for disable and senior citizens, Fatu o Aiga , Total of 10 ASPA Water Wells (30% of Island wide Water supply), Total of 6 Church possible facilities use for Shelters, Total of 4 Private School, Total of 6 Private Business & Retail Store, Halecks Diary factory</td></tr>
<tr><td>Environmental Impact:
High Medium X Low</td><td colspan="3">Historical Preservation Impact:
High Medium X Low</td></tr>
<tr><td>Risk of Hazard Impact:
High X Medium Low</td><td colspan="3">Importance to Protection of Life and Property and Recovery from Disaster:
High X Medium Low</td></tr>
<tr><td>Estimated Cost of Project: $1,375,000.00</td><td colspan="3">Project Period (duration) 18 months</td></tr>
<tr><td colspan="4">Value of Structure or Facility: $50,000,000.00</td></tr>
<tr><td colspan="4">Sources of Financial Support: FEMA [FEMA 90%, ASPA 10%]</td></tr>
</table>

Project Objectives:

Objective is to Underground existing overhead power lines to all the above mentioned critical facilities, this new proposed underground project will maintain adequate and reliable electrical supply to private business in the area, private schools, water well field, and this is one of government main water well supplied water to LBJ medical and part of eastern side of the village and to the canneries. Tafuna water wells supply a 30% of whole island water supply.

One of the Main goal and objective of the project will increase system reliability and flexibility and will harden our Power system and maintain utility services to the business and Community of American Samoa in this area.

This is one of American Samoa most Populated areas.

Project Description:

Total project length is 3 miles. Project involves undergrounding the main power lines, terminate wires in distribution vaults and Fiber boxes. Underground Service lines to all critical facilities, and including all government water wells. Installations of Pad-mounted switches and Transformers, installation of Single & Three phase risers for existing facilities. Rest of the customers will still be fed off from overhead services lines connected to underground power lines. ASPA will share trenches with ASTCA, Telecommunication authority for installation of telephone conduits as well.

Installation for electrical & Phone conduits and 4/0 of copper URD Power cable, install Pad-mount Switches, install Pad-mount Transformers, built Single &Three phase risers to pick up existing overhead loads.

Project Priority 8 – Tago Stream Bankline Improvement Nuu'uli Village – DPW

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: DPW</td></tr>
<tr><td colspan="2" rowspan="3">Project Title: Tago Stream Bankline Improvement Nuu'uli Village, American Samoa</td><td colspan="2">Contact Person: Faleosina Voigt</td></tr>
<tr><td colspan="2">Phone: 633-4141</td></tr>
<tr><td colspan="2">e-mail: faleosina@yahoo.com</td></tr>
<tr><td colspan="4">Hazard(s): Stream runoff is overtopping the bank of the existing culvert and spreading into residential areas which will damage the properties during heavy downpour.</td></tr>
<tr><td>Flood Zone:</td><td>Base Flood Elevation:</td><td colspan="2">Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

<u>Facilities</u>:

<u>Population</u>:</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High Medium X Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High Medium X Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $500,000.00</td><td colspan="2">Project Period (duration) 6 Months</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents:</td></tr>
<tr><td colspan="4">Sources of Financial Support:</td></tr>
<tr><td colspan="4">Project Objectives: Mitigation to prevent the spread of stream runoff towards the residential and commercial settlement and ponds on low spots within the area. The proposed project is also to prevent future encroachments due to developments by redefining/structurally hardening the stream bankline.</td></tr>
</table>

Project Description: The proposed project is located on the village of Nuu'uli and adjacent to the famous Shoe Tree Commercial Building. Reconstruction of the existing damaged flood protection structure on upstream off of the main road (Route 001) and redefining/structural hardening of the stream bankline downstream off the main road (Route 001). Access driveways will be constructed as necessary in order to continue stream flow without interruption and avoid unsafe condition to the pederian during high velocity stream flow which will cross on access driveways.

Environmental Concern:

1. Stream runoff spreads and ponds on private/communal land which may damage the property;
2. Stream runoff ponding on the adjacent areas becomes a health hazard to the residents;
3. Unsafe condition of the residents that will occur during heavy downpour;
4. Property damaging during high rainfall intensity which usually creates high runoff velocity.

Project Priority 9A – Permanent Landslide Repair Route 11 – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Permanent Landslide Repair Route 11	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Landslide on Route 11 during continuous rain and blocked the traffic		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** ***Population:***		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $300,000.00	***Project Period (duration)*** 6 months	
Value of Structure or Facility:		***TMK #:***
Estimated Value of Facility Contents:		
Sources of Financial Support:		
Project Objectives: To minimize the effect and damage of landslide during rainy days and to avoid closure of Route 11; Masausi Road. This road is an access from the Village of Masausi and Village of Sailele to Fagaitua and to other important government facilities like the hospital and other parts of the island.		

Project Description: The proposed project calls for slope stabilization which includes excavation and benching to resist movement of loose material on the lower part of the slide. Install/construct drainage improvement to control surface and subsurface flow. Placing retaining walls or crib walls as deemed necessary to prevent further spread of the slide on the access road.

Project Priority 9B – Permanent Landslide Repair Route 5 – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Permanent Landslide Repair Route 5	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Landslide on Route 5 during continuous rain and blocked the traffic		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** ***Population:***		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $450,000.00	***Project Period (duration)*** 6 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents:		
Sources of Financial Support:		
Project Objectives: To minimize the effect and damage of the landslide during rainy days to avoid closure of Route 005 known as Pago-Pago – Fagasa Road. This road is an access to the northern part from Fagasa Village to the southern part and to other important government facilities like the hospital, fire station, and the DPS.		

Project Description: The proposed project calls for slope stabilization which includes excavation and benching to resist movement of loose material on the lower part of the slide. Install/construct drainage improvements to control surface and subsurface flow. Placing retaining walls or crib walls as deemed necessary to prevent further spread of the slide on the access road.

Project Priority 10 – Underground Power Lines from Nuuuli Airport to Malaeimi – ASPA

Location: Nu'uuli to Malaeimi	***Agency/Organization:*** American Samoa Power Authority (ASPA)
Project Title: Underground Powerlines - Nuuuli Airport Road Intersection to Malaeimi and the American Samoa Community College	***Contact Person:*** Andra Samoa CEO or Reno Vivao Acting COO
	Phone: 684-644-2772 or 684-733-1740 or 684-258-3601
	e-mail: andra@aspower.com or reno@aspower.com

Hazard(s):
Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami

Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***

Critical Facility/Population/Asset at Risk:

ASG Facilities: Manulele Elementary School, American Samoa Community College (ASCC), ASPA Water Booster, ASPA Water Wells (4), ASCC Gymnasium, Land Grant, Public Health.

Public Facilities: Malaeimi LDS Stake Center, Manumalo Baptist School, Cornerstone Church, BP Housing.

Businesses: Ace American Industries, Ma Store, Tutila Store, Aveina Store, Tui's Market, Krystal Burger.

Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***
Estimated Cost of Project: $1,152,000.00	***Project Period (duration)*** 18 months
Value of Structure or Facility: $40,000,000.00	
Sources of Financial Support: FEMA [FEMA 90%, ASPA 10%]	

Project Objectives:

To underground existing overhead powerlines to underground powerlines to provide secure, reliable and maintainable power supply to ASPA Water Wells, ASPA Water Booster Stations This project will also benefit Private Businesses with large freezers and frozen inventory, Church Buildings and Schools which can be used as shelters and Stores for food and supplies. This will also harden the ASPA Power system and increase ASPA's reliability to the community.

Restoration of power to ASPA Wells, Boosters, Private Businesses and Schools will be quick after a major cyclone because many lines are now underground and the amount of overhead lines are limited.

Project Description:

Total length of underground is about 1.4 mile. Project includes supply and installation of padmount transformers, padmount fiber boxes and 13 concrete vaults to terminate wires and feed off to services, and underground services to the critical wells. Padmounted Switches will also be installed because Feeder 6 can also feed power to the Tafuna well field by closing a parallel switch in Malaeimi. This will all be converted to underground switches. Four two and a half (2.5) inch conduits will be installed for underground wire placement and two spare two (2) inch conduits will be included for future use to install a fiber optic cable. Three Phase and Single Phase Risers will be built to take over existing loads in area.

Project will combine with ASTCA telephone cables and crew. ASPA will share trenches with ASTCA for installation of telephone lines underground as well.

Project Priority 11 – Atu'u Breaker's Point Mitigation - ASTCA

Jurisdiction:	***Agency/Organization:*** ASTCA	
Project Title: Atu'u Breaker's Point Mitigation Project	***Contact Person:*** James Taylor ***Phone:*** 684.733.9014 ***e-mail:*** jtaylor@samoatelco.com	
Hazard(s): Tropical Cyclones and Tsunami – traffic accidents		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **ATU'U to BREAKER'S POINT**		
Environmental Impact: High Medium **Low** X	***Historical Preservation Impact:*** High Medium **Low** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: **$2,591,326.36**	***Project Period (duration):*** 36 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents: $6,000,000		
Sources of Financial Support: ASTCA % matching		
Project Objectives: The proposed activity will reduce and / or eliminate the impact of damages caused by Hurricane, Tropical Cyclones, other windstorms and protection from vehicle accidents by removing ASTCA's aerial cables (both Fiber Optics and Copper) and replacing them in underground conduits with underground cables. **Note that the Communications Agency is the sole entity in the territory for land-line communications.		

Project Description:

The proposed project will serve the villages of in the Maopuatasi County consisting of the following villages: Atu'u, Leloaloa, Lepua, Aua, Afono, Vatia and Lauli'I (Breaker's Point). The total length of the proposed project is 14,256 linear feet.

Property Risk includes the following: the current stretch of 14,256 X 4 linear feet of Aerial primary telecommunications cable located along the main public highway between the village of Atu'u to Lauli'I (Breaker's Point)

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunications services, include:

St. Francis Elementary, Aua, Afono and Vatia Elementary Schools. These schools were fully equipped with computers and internet in 1999 using Federal Erate program funds.

Project Priority 12 – Fagiatua Seawall - DPW

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: DPW</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Fagiatua seawall</td><td colspan="2">Contact Person: Faleosina Voigt</td></tr>
<tr><td colspan="2">Phone: 633-4141</td></tr>
<tr><td colspan="2">e-mail: Faleosina@yahoo.com</td></tr>
<tr><td colspan="4">Hazard(s): Tropical Cyclones,Floods, Tsunami</td></tr>
<tr><td>Flood Zone: shoreline</td><td colspan="2">Base Flood Elevation: sea level</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

Facilities: Shoreline houses, businesses, government buildings, roads and utilities Population: Shoreline residents, all residents East of vulnerable roadway.</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster:

High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $1.2M</td><td colspan="2">Project Period (duration) 10 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility: $3M</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents: $</td></tr>
<tr><td colspan="4">Sources of Financial Support: FEMA</td></tr>
<tr><td colspan="4">Project Objectives: Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road)</td></tr>
</table>

Project Description: Supply and install rock reinforcing to vulnerable shoreline in Fagaitua as per USACE shoreline inventory assessment. Refer to attached page SE 5. Area in most need is in section 'A', 560ft of shoreline and 640ft of section 'C' for a total of 1,200LF. Current cost for rock reinforcing is approximately $1000/LF if concrete tribar is required or selected the cost would be nearly double at $1,800/LF. Above costing is based on rock reinforcement. Loss due to severe surge would include road and access to East side of the island, homes businesses and church facilities in Fagaitua, the Eastern Substation of the DPS, and the utility connections.

Project Priority 13 – Ta'u to Fitiuta Mitigation – ASTCA

Jurisdiction:	***Agency/Organization:*** ASTCA	
Project Title: Ta'u to Fitiuta Mitigation Project	***Contact Person:*** James Taylor	
	Phone: 684.733.9014	
	e-mail: jtaylor@samoatelco.com	
Hazard(s): Tropical Cyclones and Tsunami – traffic accidents		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **Government Road, residents and businesses on the road**		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $772,117.00	***Project Period (duration):*** 12 months	
Value of Structure or Facility:	***TMK #:***	
Estimated Value of Facility Contents: $2,000,000.00		
Sources of Financial Support: ASTCA % matching		
Project Objectives: The proposed activity will reduce and / or eliminate the impact of damages caused by Hurricanes, Tropical Cyclones, other windstorms and traffic accidents by removing ASTCA's aerial cables (both Fiber Optics and Copper) and replacing them in underground conduits with underground cables. **Note that the Communications Agency is the sole entity in the territory for land-line communications.		

Project Description:

The proposed project will serve the village of Fitiuta in the Manu'a District.

The total length of the proposed project is 5,000 linear feet.

Property Risk includes the following: the current stretch of 5,000 X 4 linear feet of aerial primary telecommunications cable located along the main public highway between the village of Ta'u and Fitiuta.

This project will eliminate the disruption of these services to the populations affected.

Government facilities that are at risk of interruption of telecommunication services, include Fitiuta Elementary School, the airport and public safety office. Fituta School is fully computer and internet equipped via the Federal Erate program and serves as a community refuge during natural disasters.

Project Priority 14 – Tafuna Power Plant Switch – ASPA

Location: Tafuna Power Plant	***Agency/Organization:*** ASPA	
Project Title: Tafuna Power Plant Switch	***Contact Person:*** Andra Samoa/Reno Vivao	
	Phone: 733-1740/699-7166 258-3601/699-1357	
	e-mail: andra@aspower.com or reno@aspower.com	
Hazard(s): Cyclones, Storms, traffic accidents		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: Tafuna Power Plant supplies power for all users from Fagaalu to the West side, including government emergency facilities, emergency shelters, the airport and most of the island's population.		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost: $155,000.00	***Project Period (duration)*** 3 months	
Value of Structure or Facility: $35,000,000.00	***TMK #:***	
Estimated Value of Facility Contents:		
Sources of Financial Support: FEMA with local match		
Project Objectives: To prevent minimize the disruption of power in the event of a cyclone or tropical storm. The proposed project will harden the distribution system against damage from cyclones or storms and reduce the failure rate of feeders 5,6,7,9 and the tie line.		

Project Description:

This project will harden the distribution switch system from cyclones and storms by replacing the exposed overhead switches and solid blades with underground pad mounted switches. Using pad mounted switches will protect the feeders from cyclone, storm and traffic damage. New switches will also reduce maintenance costs and increase the life-span of the system because the mechanisms are enclosed and protected from the weather.

The Tafuna plant supplies power to essential government facilities such as the water wells, US Army Reserve Center, Airport, Public Safety substation, Emergency Center, and also supplies power to most of the residents and businesses on Tutuila.

Project Priority 15 – Utumoa River Bank Stabilization – ASPA

Location: Utumoa	***Agency/Organization:*** ASPA	
Project Title: Utumoa River Bank Stabilization	***Contact Person:*** Dave Dacanay/Reno Vivao	
	Phone: 644-2772/ 258-3601/699-1357	
	e-mail: dave@aspower.com or reno@aspower.com	
Hazard(s): Cyclones, Storms, floods, landslide		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: Two tuna canneries, residents, businesses and government facilities in the upper Pago area		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost: $250,000	***Project Period (duration)*** 4 months	
Value of Structure or Facility: $2M	***TMK #:***	
Estimated Value of Facility Contents: $		
Sources of Financial Support: FEMA with local match		
Project Objectives: 1. To protect the reinforced concrete spring intake structure from bounders and mud due to landslide and high flood waters. 2. To prevent damage to the raw water screen house from erosion of the river bank during high flow.		

Project Priority 16 – Fagatogo Reservoir Retaining Wall – ASPA

Location: Fagatogo	***Agency/Organization:*** American Samoa Power Authority (ASPA)
Project Title: Fagatogo Reservoir Retaining Wall (Fagatogo Microfiltration Plant Facility)	***Contact Person:*** Andra Samoa CEO or Reno Vivao Acting COO
	Phone: 684-644-2772 or 684-733-1740 or 684-258-3601
	e-mail: andra@aspower.com or reno@aspower.com

Hazard(s):
Erosion of river bank.

Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***

Critical Facility/Population/Asset at Risk

The 1.0 MGD Microfiltration Plant, Well 101, Well 102 and the Fagatogo Reservoir.

Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***
Estimated Cost of Project: $300,000.00	***Project Period (duration)*** 18 months
Value of Structure or Facility: $1,300,000.00	

Sources of Financial Support: FEMA [FEMA 90%, ASPA 10%]

Project Objectives:
1. To prevent rocks, soil and other debris from being deposited into the raw water reservoir.

2.To protect the river bank from eroding due to high stream flow and stop the river from overflowing into the MFP building and damaging the equipment.

Project Description:

The work consists of the following:

1. Slope stabilization and the construction of a 10’ by 120’ reinforced concrete retaining wall on the periphery of the Fagatogo reservoir.

2.Construction of a reinforced concrete retaining wall along the bank of the stream in order to prevent erosion due to high stream flow and stop the river from overflowing into the Microfiltration building and damaging the equipment.

Project Priority 17 – Auto Road Seawall – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Auto road seawall	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Tropical Cyclones,Floods, Tsunami		
Flood Zone: shoreline	***Base Flood Elevation:*** sea level	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **Facilities:** Shoreline houses, businesses, roads and utilities **Population**: Shoreline residents, all residents East of vulnerable roadway.		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $2,000,000.00	***Project Period (duration)*** 6 months	
Value of Structure or Facility: $5,000,000.00		***TMK #:***
Estimated Value of Facility Contents:		
Sources of Financial Support: FEMA		
Project Objectives: Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road)		

Project Description:

Supply and install rock reinforcing to vulnerable shoreline in Auto as per USACE shoreline inventory assessment. Refer to attached page SE 6. Area in most need is section 'B', 2000ft of shoreline. Current cost for rock reinforcing is approximately $1000/LF if concrete tribar is required or selected the cost would be nearly double at $1,800/LF. Above costing is based on rock reinforcement.

Loss due to severe surge would include road and access to East side of the island, homes businesses and church facilities in Auto and the utility connections.

Project Priority 18 – Nuuuli Seawall – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Nuuuli seawall	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Tropical Cyclones,Floods, Tsunami		
Flood Zone: shoreline	***Base Flood Elevation:*** sea level	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **Facilities:** Shoreline houses, businesses, roads and utilities **Population**: Shoreline residents on coconut point.		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $3,600,000.00	***Project Period (duration)*** 10 months	
Value of Structure or Facility: $7,500,000.00	***TMK #:***	
Estimated Value of Facility Contents:		
Sources of Financial Support: FEMA		
Project Objectives: Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami.		

Project Description: Supply and install rock reinforcing to vulnerable shoreline in Nuuuli as per USACE shoreline inventory assessment. Refer to attached page S3. Area in most need is in section 'A', 2,600ft of shoreline and 1,000ft of section 'B' for a total of 3,600LF. Current cost for rock reinforcing is approximately $1000/LF if concrete tribar is required or selected the cost would be nearly double at $1,800/LF. Above costing is based on rock reinforcement. Loss due to severe surge would include road, homes businesses and church facilities along coconut point in Nuuuli, and the utility connections.

Project Priority 19 – Aua Road Seawall – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Aua road seawall	***Contact Person:*** Faleosina Voigt ***Phone:*** 633-4141 ***e-mail:*** Faleosina@yahoo.com	
Hazard(s): Tropical Cyclones,Floods, Tsunami		
Flood Zone: shoreline	***Base Flood Elevation:*** sea level	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **Facilities:** Shoreline houses government facilities, businesses, roads and utilities **Population**: Shoreline residents, all residents East of vulnerable roadway.		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $3,200,000.00	***Project Period (duration)*** 15 months	
Value of Structure or Facility: $7,000,000.00		***TMK #:***
Estimated Value of Facility Contents:		
Sources of Financial Support: FEMA		

Project Objectives:

Protect shoreline roads, utilities, homes and businesses from storm surge and tsunami. Secure access to all parts of the island (shoreline road is the only road) A rock revetment or seawall is required to stop further erosion and to protect roadway from strong waves. Also, it shall provide additional shoulder width for vehicles to pull over. This project will allow the road to remain operational and safe after disasters for the public to commute to and from the hospital.

Project Description:

Supply and install rock reinforcing to vulnerable shoreline in Aua as per USACE shoreline inventory assessment. Refer to attached page PH1. Area in most need is section 'C', 1780ft and section 'D' 1500feet for a total of 3,280ft of shoreline. Current cost for rock reinforcing is approximately $1000/LF if concrete tribar is required or selected the cost would be nearly double at $1,800/LF. Above costing is based on rock reinforcement. Loss due to severe surge would include road and access to East side of the island, roadside and neighboring government buildings, homes businesses and church facilities in Aua and all of the utility connections.

Project Priority 20 – Enhancement of American Samoa Vertical & Horizontal Controls – DPW

<table>
<tr><td colspan="2">Jurisdiction:</td><td colspan="2">Agency/Organization: DPW</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Enhancement of American Samoa Vertical & Horizontal Controls</td><td colspan="2">Contact Person: Faleosina Voigt</td></tr>
<tr><td colspan="2">Phone: (684)733-2699</td></tr>
<tr><td colspan="2">e-mail: faleosina@yahoo.com</td></tr>
<tr><td colspan="4">Hazard(s): Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami</td></tr>
<tr><td>Flood Zone:</td><td colspan="2">Base Flood Elevation:</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

<u>Facilities</u>:

<u>Population</u>:</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium Low X</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster:

High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project:</td><td colspan="2">Project Period (duration)</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents:</td></tr>
<tr><td colspan="4">Sources of Financial Support:</td></tr>
<tr><td colspan="4">Project Objectives:
To reestablish intermediate benchmarks for leveling and recheck the vertical and horizontal controls for coordinate verification. Rechecking these controls can determine how far our island have sinked and moved if the controls have changed due to global warming and plate movements.</td></tr>
</table>

Project Description:

Reestablish and recheck existing controls by shooting and confirming levels for all the controls islandwide.

Project Priority 21 – Relocation of Government Gas Station in Tafuna – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Relocation of Government Gas Station in Tafuna	***Contact Person:*** ***Phone:*** ***e-mail:***	
Hazard(s): Tropical Cyclones and Thunderstorm, Earthquakes, Floods, Tsunami		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: **Facilities:** **Population**:		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $200,000.00	***Project Period (duration)***	
Value of Structure or Facility: $100,000.00	***TMK #:***	
Estimated Value of Facility Contents:		
Sources of Financial Support:		
Project Objectives: To relocate existing Government Gas Station to new proposed site inside the fence of the government compound to ensure security of the station from the public. Also the new plan will provide easier access for vehicles to enter and exit gas station.		

Project Description:

Relocate gas station to secured area inside government compound and provide easier accessibility of the station.

Project Priority 24 – Hazardous Materials Warehouse – OP

Jurisdiction: Pago Pago	***Agency/Organization:*** Office of Procurement of American Samoa
Project Title: Office of Procurement Hazardous Materials Storage Room	***Contact Person:*** Pat Tervola
	Phone: 684 699-1770
	e-mail: ptervola@samoatelco.com
Hazard(s): Tropical Cyclones, Earthquakes, Floods	

Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***

Critical Facility/Population/Asset at Risk:

Facilities: Government Procurement Warehouse

Population: Neighboring residents and customers of local businesses including McDonalds, Red Cross and a home improvement center. A near-by government health clinic and two schools are in the possible impact area of a major spill.

Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***
Estimated Cost of Project: $85,000.00	***Project Period (duration)*** 6 months
Value of Structure or Facility:	***TMK #:***
Estimated Value of Facility Contents: $250,000.	
Sources of Financial Support: FEMA Mitigation Funds	

Project Objectives:
Protect hazardous materials inventory from damage and escape into the environment due storms or earthquakes. This project will also bring the storage facility up to USEPA Hazmat storage requirements.

Project Description:

Construct a separate concrete warehouse room approximately 35x48ft. for storage of hazardous materials. Warehouse will include barriers and bunkers to separate materials and will be hardened to resist hurricanes (140MPH) and earthquakes (Zone II exposure \D). Ventilation will be provided.

A preliminary design has been completed.

The Office of Procurement is located in Tafuna, American Samoa and is the sole government agency primarily responsible for the purchase, warehousing, and distribution of all goods/belonging to the American Samoa Government. The Office is currently housed in its warehouse facility which is a converted warehouse building acquired from the US Air Force in the early seventies. Its distance from the Pago Pago International Airport is approximately ½ mile.

The building is a 100'x300' steel framed girder beam type with concrete foundation and floor. It houses office space for sixty employees and warehouse space for approximately 950-1,000 line items of numerous goods/supplies that are drawn down and issued to various government agencies. It also serves as a receiving point/center for goods that are purchased by the government for direct transfer to government departments. Supply inventory ranges from office equipment and furniture, building supplies, electrical & plumbing, to farming equipment.

The facility and compound has also served as the primary logistics center (storage and disbursement of emergency response supplies) for FEMA in the aftermath of two cyclones as well as the most recent Cyclone Olaf which struck the Manu'a group.

Included in the warehouse as a separate part of its storage capacity are "paint lockers", military jargon for storage areas for hazardous materials which consist of; paints thinners, solvents, lubricants, cleaning agents, detergents, adhesives, battery acid, Freon, and various pesticides.

There are no specific grouping or separation of stock as would be required by USEPA for chemical items. There is no ventilation with only the entrance door into the rest of the warehouse serving this purpose. Also absent are requisite barriers/bunkers for purpose of separation from stock items contained in the warehouse.

Both Cyclones Ofa and Val respectively dealt serious damage to the warehouse facility with subsequent repair following soon after. Repair involved the replacing of damaged purloins, strengthening of steel beams, construction of new offices and a complete re-sheathing of the entire facility to withstand 120 mile an hour winds.

On both occasions hazardous materials were exposed to the elements.

The leakage incidents resulted in a team of USEPA, Coast Guard, and private contractors from the US conducting a major cleanup, removal and disposal of chlorine tanks and additional hazardous material containers from the facility.

A separate facility built to applicable specifications for the purpose of chemical storage that will guarantee safe storage of hazardous materials is required. A relocation of all hazardous materials to its own facility is highly desirable. [67]

[67] Excerpts from a Letter to Aitofele T.F. Sunia GAR/Lt. Governor, American Samoa Government from L.M. Seui, Chief Procurement Officer, May 6, 2007.

Project Priority 25 – Stream Retaining Wall – DBAS

<table>
<tr><td colspan="2">Jurisdiction: Pago Pago</td><td colspan="2">Agency/Organization: Development Bank of American Samoa</td></tr>
<tr><td colspan="2" rowspan="3">Project Title:

Protection of the Development Bank from flooding</td><td colspan="2">Contact Person: Jilla Piroozmandi</td></tr>
<tr><td colspan="2">Phone: 633-4664</td></tr>
<tr><td colspan="2">e-mail: jilla@dbas.org</td></tr>
<tr><td colspan="4">Hazard(s): Tropical Cyclones and Thunderstorm, Floods</td></tr>
<tr><td>Flood Zone: VE</td><td colspan="2">Base Flood Elevation:</td><td>Erosion Rate:</td></tr>
<tr><td colspan="4">Critical Facility/Population/Asset at Risk:

<u>Facilities</u>: Development Bank of American Samoa Building and its contents

<u>Population</u>: Population of Pago Pago or the loan records of $25 mil portfolio covering the whole population of the Territory</td></tr>
<tr><td colspan="2">Environmental Impact:

High Medium X Low</td><td colspan="2">Historical Preservation Impact:

High Medium Low X</td></tr>
<tr><td colspan="2">Risk of Hazard Impact:

High X Medium Low</td><td colspan="2">Importance to Protection of Life and Property and Recovery from Disaster: High X Medium Low</td></tr>
<tr><td colspan="2">Estimated Cost of Project: $75,000.00</td><td colspan="2">Project Period (duration) 3 months</td></tr>
<tr><td colspan="3">Value of Structure or Facility:</td><td>TMK #:</td></tr>
<tr><td colspan="4">Estimated Value of Facility Contents: $650,000.00</td></tr>
<tr><td colspan="4">Sources of Financial Support: FEMA Mitigation Funds</td></tr>
<tr><td colspan="4">Project Objectives:
Protect bank building and contents from flood waters resulting from overflow of adjacent stream</td></tr>
</table>

Project Description:

Construct approximately 200 feet of revetment along stream bank adjacent to DBAS office building to contain water during flood events. A current project to reroute the road will raise its level and put additional pressure on the lower bank property. The road project will likely include additional mountain-side catchment structures.

The project proposes to make flood mitigation improvements along 200 feet of stream that borders the bank building.

DBAS is located on the southwest corner of the Pago Park fill area, next to the old Soli's Restaurant, at present an outlet for a building supplier. The elevation of DBAS and TAOA (Office of the Aging) are only a few feet above mean sea level and is considered within Flood Plain, VE designation. Between said supplier and DBAS runs a small perennial stream. The stream crosses underneath the road diagonally.

Fortunately, DBAS has not been harmed by the stream flooding in the past 30 years. But it is conceivable that a combination of unuasally high tides, storm surge or tsunami and heavy rains might flood the area, damaging DBAS Buildings and contents.

Project cost is about $75,000.

Benefits:

- *Protection of the bank buildings and contents worth about $600,000.*
- *Protection of standby power supply to the main building, $50,000.*[68]

[68] Excerpts from a Letter to Ipulasi Aitofele T.P. Sunia, GAR/Lt. Governor, American Samoa Government from Utu Abe Malae, CEO, Development Bank of American Samoa, May 3, 2007.

Afono Culvert Improvement – DPW

Jurisdiction:	***Agency/Organization:*** DPW	
Project Title: Afono Culvert Improvement Afono Village, American Samoa	***Contact Person:*** Faleosina Voigt	
	Phone: 633-4141	
	e-mail: Faleosina@yahoo.com	
Hazard(s): Flooding the school premises and the road		
Flood Zone:	***Base Flood Elevation:***	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** Afono Elementary School ***Population:***		
Environmental Impact: ***High*** ***Medium*** X ***Low***	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $250,000.00	***Project Period (duration)*** 6 months	
Value of Structure or Facility: $2,000,000.00	***TMK #:***	
Estimated Value of Facility Contents: $500,000.00		
Sources of Financial Support:		
Project Objectives: Mitigation to prevent Afono Elementary School from flooding during heavy downpour due to over flowing of the stream on the lower bankline adjacent to the school and the insufficient capacity of the existing culvert to convey this stream runoff towards the shore.		

Project Description:

The project is located in the village of Afono, a closer distance to the Afono Elementary School on Route 006. The proposed project will consist of bankline improvement on both sides of the stream using gabion basket for soil stabilization, and improving/replacing the existing culvert crossing to increase hydraulic capacity. Reconstruction of the seawall which will be affected during the construction of the outlet protective structure of the culvert to match to the existing seawall. Sidewalks will be constructed for safety of the pedestrian particularly to school children living nearby using this culvert to cross to other parts of the village. Improving this drainage system would minimize future flooding particularly within the school premises.

Environmental Concern:

1. Overflowing of stream runoff during heavy downpour on the lower bank always settled on the school ground. A nuisance flooding on the school turns out to be a health hazard to the residents particularly to the school children since stream runoff ponding on the school premises will not subside for at least a day or more and becomes a potential mosquito breeding ground;
2. Minor modification of the existing waterway to increase the hydraulic capacity of the stream and the culvert.

Airport Aviation Fuel Farm Relocation – DPA

Jurisdiction:	***Agency/Organization:*** Department of Port Administration	
Project Title: Protection of Critical Facility: Airport Aviation Fuel Farm Relocation	***Contact Person:*** Chris Soli ***Phone:*** (684) 733-4548 ***e-mail:*** chrissoli@yahoo.com	
Hazard(s): Tropical Cyclones, strong winds, and fires		
Flood Zone:	***Base Flood Elevation:*** 0-5 ft	***Erosion Rate:***

Critical Facility/Population/Asset at Risk:

Facilities: Airport Terminal and Operations, Airline offices, Customs, Airport Shops, Immigration, Aircraft Hangars, Airport Users, NOAA.

Airport Terminal and facilities, Ramp area, Aircraft

Population: All Airport Users and the public

Environmental Impact: ***High*** X ***Medium*** ***Low***	***Historical Preservation Impact:*** ***High*** X ***Medium*** ***Low***
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***
Estimated Cost of Project: $6,500,000.00	***Project Period (duration)*** 18 months
Value of Structure or Facility: >$20,000,000.00	***TMK #:***
Estimated Value of Facility Contents: To be assessed	
Sources of Financial Support: FEMA/ASG	

Project Objectives:
To relocate the existing Aviation Fuel Farm and associated pipelines to new proposed site. This is to ensure that the public and airport users are safe from the high hazard that existing Fuel Farm location poses when cyclones or natural disasters occur.

Project Description:

To relocate the existing Aviation Fuel Farm and its associated pipelines away from the Airport Terminal and the public to a safe isolated area on the other side of Runway 8-26.

Airport Runway Shoreline Protection – DPA

Jurisdiction:	***Agency/Organization:*** Department of Port Administration	
Project Title: Protection of Critical Facility: Airport Runway Shoreline Protection	***Contact Person:*** Chris Soli	
	Phone: (684) 733-4548	
	e-mail: chrissoli@yahoo.com	
Hazard(s): Tropical Cyclones, Strong Winds, and Wave Action		
Flood Zone:	***Base Flood Elevation:*** 0-2 ft MSL	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** Airport and Operations Runway 8-26 and Runway 5-23, Security Perimeter Fence, Security Perimeter Road ***Population:*** Airport Users, passengers, and public		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** ***Low*** X	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $3,175,000.00	***Project Period (duration)*** 12 months	
Value of Structure or Facility: >$20,000,000.00		***TMK #:***
Estimated Value of Facility Contents: To be assessed		
Sources of Financial Support: FEMA/ASG		
Project Objectives: To protect the Runways, Security Perimeter Fence and Road from the strong waves, flooding and erosion occurring along the Airport Shoreline. Allow the Runways and Airport to remain operational, safe and secure after cyclones and storms. This will allow urgent aid and help to arrive by air.		

Project Description:

To construct a rock seawall along the elected Airport Shorelines to protect the Runways and Security Perimeter Fence and Road which have become undermined by cyclones and heavy storms.

Total length of the Airport shoreline to be protected is 6,350 linear feet; i.e. 4,850 feet for Runway 8-26 and 1,500 feet for Runway 5-23.

Pago Pago International Airport Terminal Roof Rehabilitation – DPA

Jurisdiction:	***Agency/Organization:*** Department of Port Administration	
Project Title: Protection of Critical Facility: Pago Pago International Airport Terminal Roof Rehabilitation	***Contact Person:*** Chris Soli ***Phone:*** (684) 733-4548 ***e-mail:*** chrissoli@yahoo.com	
Hazard(s): Tropical Cyclones, Strong Winds, and Heavy Rain		
Flood Zone:	***Base Flood Elevation:*** 0-3 ft MSL	***Erosion Rate:***
Critical Facility/Population/Asset at Risk: ***Facilities:*** Airport and its operations Runway 8-26 and Runway 5-23, Security Perimeter Fence, Security Perimeter Road, Airport Terminal, Airport Rescue Fire Fighting Building and equipment, Airport Aircraft Navigational etc. Instruments, Aircraft ***Population:*** Airport Users, passengers and public		
Environmental Impact: ***High*** ***Medium*** ***Low*** X	***Historical Preservation Impact:*** ***High*** ***Medium*** X ***Low***	
Risk of Hazard Impact: ***High*** X ***Medium*** ***Low***	***Importance to Protection of Life and Property and Recovery from Disaster:*** ***High*** X ***Medium*** ***Low***	
Estimated Cost of Project: $2,000,000.00	***Project Period (duration)*** 9 months	
Value of Structure or Facility: >$20,000,000.00	***TMK #:***	
Estimated Value of Facility Contents: To be assessed		
Sources of Financial Support: FEMA/ASG		
Project Objectives: To protect and secure the Pago Pago International Airport Terminal and all operations that it houses at all times during a cyclone or natural disaster so that airport will be operational at all times after a major disaster. This protecting and securing of the airport terminal with the construction of a stronger and more secure roof will help allow the airport administration and operations be operational during and after a cyclone.		

Project Description:

To remove the existing PPG Airport Terminal wooden shakes roofing and replacing it with Ultra-Trimdeck roofing which will survive much better during cyclones, heavy rain and strong winds. Improved runoff drainage will help protect the offices and operations within. Wooden shakes easily get loose during high winds, thus acting as missiles therefore damaging the other objects. Water leaks also arise due to wind-pushed rain under the wooden shakes. New better roofing such as Ultra-Trimdeck roofing and improved runoff gutters and drainage will mitigate these problems and protect the airport terminal.

Appendix D – List of Mitigation Projects from 2005 Mitigation Plan Update

Project Number and Agency	Project Name	Project Components	Estimated Cost/Value of Structure
1 **DPW**	Fagatogo streams. Improvements to the streams shall include improving alignments of channels, concreting channel sidewalls and floors to mitigate and/or prevent silt and debris getting into the channels, introduction of inlet grates and other preventative covers to disallow larger rock debris and trash from entering (or blocking) covered and/or closed channels such as pipe culverts and/or concrete catch basins, etc.	To improve and/or upgrade the three main streams within Fagatogo village which have caused severe flooding and over-flowing to nearby residents and both public and private facilities in the main town area of Fagatogo. Total length of streams to be improved and/or upgraded is approximately 2,200 linear feet. Improved channels shall be concreted, both sidewalls and floor to prevent silt and debris accumulating in channels, also to improve storm water flow into covered channels.	1,007,000
2 **ASPA**	Under-grounding power lines to EOB, TV, DOE, SA, Library etc.	Installation of electrical conduits including copper wires, padmount switches and connection to services to various government offices and facilities.	$ 200,000 >$50,000,000
3 **LBJ**	Fire Protection Water Supply	Construction of 250,000 gallon tank, procurement and installation of booster pump set, and procurement and installation of 500 lf of 6-inch diameter transmission line.	$ 260,000 $ 42,000,000
4 **ASTCA**	Iliili Road Underground Conduit Installation	Removal of copper and fiber aerial cables, install 4,000lf of underground cables.	$ 400,000
5 **ASTCA**	Futiga Road Underground Conduit Installation	Removal of copper and fiber aerial cables. Installation of 10,600lf of underground cables.	$1,600,000
6 **ASTCA**	Leone Road Underground Conduit Installation	Removal of copper and fiber aerial cables. Installation of 6,500lf of underground cables.	$ 600,000
7 **ASPA**	Under-grounding alternate feeder to Hospital	Installation of underground electrical conduits including copper wires, concrete vaults and connection to existing padmount auto transfer switch inside hospital.	$ 300,000 >$30,000,000
8 **DPA**	Protection to Critical Facility: Airport Runway Shoreline Protection	To construct a rock seawall along the elected Airport Shorelines to protect the runways and security perimeter fence and road which have become undermined by cyclones and	3,175,000 20,000,000

Project	Project Name	Project Components	Estimated
		heavy storms. Total length of the Airport shoreline to be protected is 6350 linear feet; i.e. 4850 feet for runway 8-26 and 1500 feet for runway 5-23	
9 **DPA**	Aviation Fuel Farm Relocation	To relocate the existing Aviation Fuel Farm and associated pipelines to new proposed site. This is to ensure that the public and airport users are safe from the high hazard that existing Fuel Farm location poses when cyclones or natural disasters occur.	$5,500,000 20,000,000
10 **LBJ**	Back-Up Power Supply	Replacement of 3 PCB transformers, upgrading of bus bar and switch gear, disposal of PCB transformers, installation of dedicated backup power for the operating theatre, ICU, labor and delivery, dialysis facility, EMS HQ and the LBJ/DOH emergency operations center.	$ 325,000 $42,000,000
11 **DPS**	DPS HQ Emergency Operations Center	Design and construction of a retaining wall and drainage system, procurement and installation of a reliable communication system.	$ 500,000 $ 900,000
12 **ASTCA**	Underground conduits from Fagaalu bridge to LBJ general set hut.	To install three 4” underground conduits and 6 vaults, next to the Fagaalu bridge running parallel with a proposed stream wall and ending in the vicinity of the LBJ Tropical Medical Center. Hardening project will serve both the LBJ’s expanding facility as well as the neighboring community.	60,000
13 **ASTCA**	Under grounding conduit from Procurement to Airport.	To install three 4” underground conduits and four vaults, beginning at the existing ASTCA underground vault next to the ASPA Scrap metal yard, running parallel along the airport fence and ending in the vicinity of the airport cargo area. This project will completely underground ASTCA infrastructure in the airport area, protecting communications infrastructure between the airport terminal and its support services.	100,000
14 **ASDRO**	Harden Government buildings.	To harden government buildings and facilities that does not meet the structural criteria required by insurance companies to be eligible for insurance. Part of the project will be to identify and categorize the facilities that can be economically hardened and to prioritize the hardening based on the available budget and the cost effectiveness of each.	300,000
15 **DPW**	Matu’u village flood management	To remove as much debris as possible, harden/reinforce embankment so it can	250,000

Project	Project Name	Project Components	Estimated
		withstand strong pressure during heavy stream flow and improve existing crossings.	
16 **DPW**	Afono School flood management	To raise and construct new culvert to match upstream invert of stream. Provide sidewalk and harden embankment at upstream. Survey, design and right of way will be integral part of the plan. Hydraulic and soil studies will be implemented for more accurate design.	350,000
17 **ASDRO**	Malaeimi drainage improvements	The drainage area at the lower end of the ASCC campus adjacent to and in front of the Land Grant planting area has become silted up and no longer allows flood waters to filter into the Malaeimi valley. Flow from this area has been blocked by road and building construction downstream and a soakage system will be required.	100,000
18 **DPS**	Manua DPS Substation/DOC	Construction of a new building to serve as a DOC	$ 500,000 $ 350,000
19 **ASHPO**	Satala Storm Water Drainage Improvements	Stream diversion, rocks and debris removal, rock wall construction, historic grave repair.	$ 85,000 $1,000,000
20 **ASPA**	Satala Power Plant Drainage Upgrading Works	Widening and realignment of existing drain. Raising of containment wall.	$ 145,000 $22,000,000
21 **ASPA**	Fagatogo Reservoir retaining wall	Design and construction of reinforced concrete cover. Stabilization of the upstream slopes.	$ 80,000 $2,000,000
22 **DPW**	Fagaitua Road Seawall Protection	Construction of seawalls along the road network.	$400,000 $ 600,000
23 **DPW**	Auto Road Seawall Protection	Construction of seawalls along the road network.	$1,000,000 $1,500,000
24 **DPW**	Nu'uuli Road Seawall Protection	Construction of seawalls along the road network.	$1,000,000 $1,500,000
25 **DPW**	Aua Road Seawall Road Protection	Construction of seawalls along the road network.	$1,000,000 $1,500,000
26 **ASPA**	Solid Waste HazMit Program	Purchase of hydraulic baler for scrap metals, improvement of lighting facilities at the landfill, improvement of the recycling center, construction of slabs, walls and drainage of dumpster sites.	$ 475,000 $4,000,000
27 **ASPA**	Wastewater Distribution Pump Station serving Utulei and Tafuna WW Collection Area-HazMit Project	Replacement of electric service drops from overhead to underground, raising lift stations, standardization and installation of stand-by generator receptacles, improvement of access roads, installation of emergency overflows, installation of radio antennae, inspection and repair of outfalls.	$ 660,000 $4,000,000
28	Utumoa River Bank Stabilization	Design and construction of rock wall	$ 100,000

Project	Project Name	Project Components	Estimated
ASPA		riverbank embankment.	$2,000,000
29 **ASPA**	Utulei and Tafuna Wastewater Treatment Plants HazMit-Project	Replacement of safety guardrails and walkways of the clarifiers, improvement of the sludge drying beds, provision of auxiliary sludge disposal area, installation of outside lighting and hardening of the outfalls.	$ 350,000 $6,000,000
30 **ASPA**	HazMit tools and Training for Wastewater Division	Training on disaster planning and emergency response, procurement of septic pumper truck, sewer cleaner truck complete with safety equipment, and procurement of data collection hardware. Evaluation of existing pump stations re: capacity and improvement of GIS data base.	$ 375,000 $20,000,000
31 **ASPA**	Aunu'u Sewer System/Outfall Improvement	Replacement of PE manhole covers, hardening of outfall pipe.	$ 75,000 $1,200,000
32 **ASPA**	Satala Power Plant Capacity Increase	Installation of two generators in Tafuna complete with auxiliary equipment and electrical switchgear.	$6,600,000 $22,000,000
33 **ASPA**	Tafuna Power Plant Wall Upgrading	Replacement of vertical wall tubes. Upgrading of all wall panels.	$ 500,000 $ 14,000,000
34 **ASPA**	Tafuna Power Plant Distribution Switch Replacement	Replacement of pole mounted paralleling and transfer switches with pad mounted equivalents.	$ 155,000 $35,000,000
35 **ASPA**	Matafao Transmission Line Retaining Wall	Design and construction of retaining walls to protect the 12 inch diameter C.I. Transmission lines	$ 100,000 $2,000,000
36 **DOC**	Subdivision Ordinance	Preparation of land division system, criteria for lot creation and utility easements and process of filing official maps and record keeping.	$ 30,000
37 **DPW**	Center for Disaster Information	Procurement of various equipment, data collection, consultancy services and training.	$ 300,000
38 **DPW**	Enhancement of American Samoa Vertical Control	Field surveys of the islands. Checking of vertical controls.	$ 100,000
39 **DPW**	Relocation of Government Gas Station in Tafuna	Construction of concrete platform, security fence, shelter and storage house. Installation of security alarms.	$ 200,000 $ 100,000
40 **DPW**	MNO Building Facility Upgrade (Tutuila)	Installation of reinforcement to the ceiling and walls. Construction of perimeter security fence.	$ 200,000 $ 200,000
41 **DPW**	Upgrading MNO Building in Tau and Ofu	Installation of reinforcement to the ceiling and walls. Construction of perimeter security fence.	$ 100,000 $ 100,000
42 **DPW**	Alternate Road Routing	FS/Design preparation.	$3,000,000
43 **DPW**	Evacuation Shelters	Design and construction of shelters. Construction of access roads.	$ 2,000,000 $2,000,000

Project	Project Name	Project Components	Estimated
44 **DPW**	Road Marking and Striping	Painting of roads with reflective paints, installation of speed limit and warning signs, installation of four traffic lights.	$ 500,000