Kagman Watershed Project

Project Sponsors: Saipan & Northern Islands Soil & Water Conservation District CNMI Dept. of Land and Natural Resources





Natural Resources Conservation Service



Kagman Commercial Farm Plots Expansion Area 2

(Palacios Pasture)



Kagman Commercia Farm Plots LaoLao Bay Golf Course

Kagman Village Homestead

Kagman AG Station

Supplemental Well

Irrigated Farmland

CONTRACTOR OF

Quarry

Waterway

Kagman watershed, a 3,750-acre peninsula on the eastern shore of Saipan, Commonwealth of Northern Mariana Islands (CNMI), is the largest watershed project in the Pacific Basin. The Kagman watershed contains the largest and most important crop farming area on Saipan. The average size of farms is 2.5 acres, with some farms as large as 10 acres.



Marianas Climate



Watershed project will reduce rainy season flooding and alleviate dry season irrigation water shortages by capturing flood waters for use as irrigation.















Tank Beach



Project Area

Kagman Watershed Project Area is 3,750 acres incl. 1,100 acres of privately owned land and 2,650 acres of public land.

- 40 acres vegetable cropland
- 60 acres pasture land
- 500 acres urban land
- 570 acres residential
- 1600 acres conservation (natural areas incl. shoreline)
- 1,600 acres of open land (undesignated & undeveloped)

Project Area



Б

Landuse in the Project Area



NRCS Involvement

- The USDA Natural Resources Conservation Service (NRCS) provides technical and financial assistance through programs authorized by Congress.
- The USDA NRCS provides planning, design, and installation assistance for conservation practices that address natural resource concerns on private lands or government controlled lands through local Soil and Water Conservation Districts and local project sponsors.
- Conservation practices can be agronomic, management, or engineering.
- Conservation approach is science-based, voluntary, and incentive-based.

NRCS Involvement

- Congress has authorized the NRCS to conduct watershed-scale activities through the PL-566
 Watershed Protection and Flood Prevention Act.
- Local CNMI sponsors applied for assistance under the PL-566 for works of improvement to the Kagman Watershed in 1987.
- NRCS completed a detailed planning process, a public information process, and completed a Watershed Plan/EIS in 1993.
- Congressional funding under PL-566 for design and construction dollars to the States varies year-to-year.

NRCS Involvement NRCS Nine Step Planning Process:

1. Identify Problems

- 2. Determine Objectives
- **3. Inventory Resources**
- 4. Analyze Resource Data
- 5. Formulate Alternatives
- 6. Evaluate Alternatives
- 7. Make Decisions
- 8. Implement Plan
- 9. Evaluate Plan

NRCS Involvement NRCS Resource Analysis

Holistic approach incorporating resource specialists in planning, engineering, agronomy, hydrology, geology, economics, biology, cultural resources, soil conservation

SWAPA + HE

1. Soil

2. Water

3. Air

4. Plants

5. Animals

6. Humans

7. Energy

PROBLEMS/OPPORTUNITIES Identified in the EIS:

- * Flooding of Agricultural fields & public roads
- Inadequate Agricultural Water Supply
- Soil Erosion
- Sedimentation Tank Beach
- Biological Habitat
 - Reef health
 - Sea turtle habitat

The EIS also evaluated **33** other **CONCERNS** from affected federal and local agencies and other interested groups. These were prioritized and categorized into the following categories and addressed:

- Economic
- Social
- Environmental
- Cultural Concerns

- The EIS presented alternatives to solve the natural resource problems.
- The sponsors selected Alternative 2 (National Economic Development Plan):
- Maximizes net economic benefits (B/C ratio =1.3:1)
- Reduces agricultural flood damage
- Provides adequate & dependable irrigation water
- Increases self-sufficiency in agricultural production
- Provides for Wetland Mitigation



Figure 1. Completed and pending components of Kagman Watershed Project (adapted from 2005 NRCS Report to Congress).

PL-566 Small Watershed Program Project Roles: (as outlined in a Project Agreement for each phase):

Sponsors

- obtain landrights
- obtain permits
- meet cost-share arrangements
- operate and maintain works-of-improvement

NRCS

- prepare designs
- provide inspection and construction management
- provide contracting services
- meet cost-share arrangements

Planned Project Measures (in sequence of installation)

Completion of the Kagman Watershed Project is estimated to yield an average annual savings of \$160,300 in flood prevention and \$487,200 for irrigation water supply (see Table 6, page 81 of the watershed plan / environmental impact statement).

Table 1. Project components

Project Component	Status	Date
Wetland Mitigation (50% Federal, 50% Sponsor construction funding)	Completed	1998
Irrigation Distribution System and Supplemental Wells (50% Federal, 50% Sponsor construction funding)	Completed	1999
Irrigation Regulating Reservoir (100,000 Gallon) (50% Federal, 50% Sponsor construction funding)	Completed	1999
Waterway D and Sediment Basin (100% Federal construction funding)	Completed	2001
Box Culverts, Water Control Structure, Waterway B, and Waterway A (100% Federal construction funding)	Completed	2007
Completion of Waterways (A, B, C) (100% Federal construction funding)	Completed	2012
Reservoir (70 Million Gallon) and Sediment Basin #1 Pumping Plant & Water Transfer Lines from Wells to 70 Million Gallon Reservoir & Reservoir to 100,000 Gallon Irrigation Regulating Reservoir (50% Federal, 50% Sponsor construction funding)	Pending ¹	TBD

¹ Pending availability of funds

USD.4-NRCS Pacific Islands Area



Floodwater Prevention – Waterway D & Sediment Basin 2 (SB2)



Figure 4. Waterway D (top) and sediment basin #2 functioning. Current discharge of the watershed is to Tank

WWD drains adjacent farmplots through a series of culvert pipes and conveys water from the water control structure to SB2.

Sediment Basin 2 provides some temporary stormwater storage and some desilting before outletting to the natural channel to Tank Beach.

Installed Phases:

Sediment Basin #2 Outlet



Installed Phases:

Sediment Basin #2 Spillway

Waterway D, Flood Control Sediment Basin #2

Waterway D, looking downstream

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Waterway D, Flood Control Sediment Basin **#** 2

SAMSUNG

Design & Construction Costs:

NRCS Technical Assistance = \$224,000 NRCS Financial Assistance = \$784,000 Sponsor's Contribution = \$95,000 cash

255 Waterway D, Drop #1, viewed looking upstream

Completion Ceremony for Waterway D and Sediment Basin #2



Wetland Mitigation

WELCOME TO KAGMAN EDUCATION ISLAND

Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources

Supar and Nurthern Island Sol. & Water Conservation Destrict

1555666666677772

USBA Natural Resources Conservation Service



Wetland Mitigation



This Wildlife Observation Blind, a concrete structure made to look like natural wood, has a 50 year life.

Wetland Mitigation

Design & Construction Costs: (3 Phases) Total NRCS Technical Assistance for Design = \$116,000 Total NRCS Construction Financial Assistance = \$203,000 Project Construction 50% Cost Shared Sponsor's Contribution to Construction = \$116,000 cash and In-Kind

Irrigation Distribution System and Supplemental Wells

Irrigation Distribution System Risers



Irrigation Distribution System and Supplemental Wells

Design & Construction Costs: Estimated NRCS Staff Design Cost = \$210,000 NRCS Financial Assistance = \$249,500 Project Construction 50% Cost Shared Sponsor's Contribution to Construction \$249,500 cash 24

Groundbreaking for Water Control Structure





Floodwater Prevention – Waterway A

Waterway A begins here with collection of storm water into the box culvert

Kagman Road flooded in 2002. Viewed looking north.

 Waterway A - inlet features in place, September 2012. Overland stormwater no longer floods Kagman Road

Flow into box culvert.

Figure 2. Kagman Road before (top) and after installation of Waterway A

WWA intercepts runoff water coming down Kagman road and routes it through an underground concrete channel to the Water Control Structure to WWD to Tank Beach.

After KWP completion this water will be conveyed thru WWC and into the reservoir and stored for irrigation water.

Floodwater Prevention – Waterway B

ewed looking southwest from allel to waterway B before stallation. The storm water flows the road and through the far #1 its on its way to the guarry. Multi-plearm plots were frequently inundated. laterway E diversi these floors so the ad is not over topped and the farms. e not flooded. Until the project is completed the system will empty to ank Beach. When finished the runoff ill become intration weller for the dry. season. At project completion it will travel waterway 8. to waterway C trough sediment basin #1 and into th arry i 70 million gallon reservoir



WWB now intercepts damaging surface runoff which frequently inundated farm plots and routes it to WWD which outlets to Tank Beach.

After KWP completion, runoff water from WWB will be stored in the 70 million gall. reservoir for irrigation purposes.

Figure 3. Flood water from northwest quadrant formerly through the farm land (top) and now down waterway 8.

Irrigation Regulating Reservoir

100,000-Gallon Irrigation Regulating Reservoir (Viewed looking east)

Design & Construction Costs:

NRCS Technical Assistance = \$113,000 NRCS Financial Assistance = \$114,000 Project Construction 50% Cost Shared Sponsor's Contribution to Construction = \$114,000

Waterway Construction

Waterway B, looking downstream





Flood Prevention – Waterway C

Waterways A, B, and C **Total Construction Costs = \$1.7 Million**

Planned Project Measures (in sequence of installation)

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USD.4-NRCS Pacific Islands Area

Summary of Federal Technical and Financial Assistance

Total Sponsor's Contribution = \$621,000 Cash & In-Kind (Excludes Technical Resources, Land Rights, and Operation and Maintenance Expenditures)

Total NRCS Technical Assistance = \$1.50 Million

Total NRCS Financial Assistance = \$4.15 Million

Total Invested in Kagman Watershed Project to Date by USDA-NRCS, CNMI DLNR, and S&NI SWCD is \$6.3 Million

Remaining Projects Pending Completion:

- Sediment Basin #1 & Spillway
- 70 Million Gallon Reservoir
- Pump Station & Supply Pipeline
- Supply Pipeline from Wells to Reservoir
- No design or construction funds under PL-566 Small Watershed Program currently authorized from Congress to the States.



Figure 1. Completed and pending components of Kagman Watershed Project (adapted from 2005 NRCS Report to Congress).

Remaining Projects Pending Completion:

Sediment basin #1 location as outlet to waterway C

> Location of chute from sediment basin #1 into quarry / 70 million gallon reservoir

Kagman quarry during active mining 1994. Viewed looking east. The quarry is currently covered with thick vegetation. Actual ground elevations are very similar to what is seen here. Mining ended in 1995. Survey sufficiently accurate to support construction exists. Design engineers visited the site in 2010.

Remaining Projects Pending Completion:



The End Questions?

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Sources Conservation Service

United States Department of Agriculture