



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

February 17, 2010
Honolulu, Hawaii

Request to Authorize the Chairperson to Enter Into
Planning Assistance to States Agreements with the
U.S. Army Corps of Engineers for
Hawaii Water Resources Management

SUMMARY OF REQUEST

Staff is requesting that the Commission authorize the Chairperson to enter into agreements with the U.S. Army Corps of Engineers, (USACE) under its Planning Assistance to States program. The purpose of these agreements is to provide cost share funding for planning activities and studies for Hawaii water resources management, subject to available funding.

BACKGROUND

The Energy and Water Development and Related Agencies Appropriations Act, 2010 (Public Law 111-90) appropriates \$270,000 for Hawaii Water Resources Management under the USACE Planning Assistance to States (PAS) program. USACE approached the Commission and requested that the Commission be the local sponsor for this appropriation. Under PAS, there is a 1:1 cost share requirement.

Based on discussion with USACE project managers, the Commission has several project options that would qualify under the broad project title Hawaii Water Resources Management. Commission Deputy and staff met internally to discuss program priorities and to identify potential projects that could help staff meet their objectives while meeting the intent and purpose of the appropriation – Hawaii Water Resources Management.

Commission staff identified high priority projects that investigate climate change and its possible impacts to Hawaii's water resources. Global climate change may have profound impacts to Hawaii's fresh water resources. Recent studies show declining rainfall and stream flow trends in Hawaii; however, the causes of these trends are unclear. Scientists hypothesize that climate change would produce more extreme weather events (e.g., more intense floods and prolonged droughts). Warmer air temperatures would cause increased evaporation and higher water demands in many sectors of the population. There are many

uncertainties about how Hawaii's fresh water supplies will be affected and resource managers can no longer plan for the future assuming that Hawaii's climate will remain unchanged. Effective long-range planning can only be achieved with a better understanding of how climate change impacts Hawaii's aquifers and streams.

Two important ways to address climate change are increased hydrologic monitoring and analysis and climate change adaptation strategies. First, careful monitoring and analysis of different elements of the hydrologic cycle will give resource managers a greater understanding of how climate is changing and how this may affect our water resources. One important component of the hydrologic cycle is evapotranspiration (ET, the combined loss of water by transpiration and evaporation), which is a key factor in estimating ground water recharge and stream base flows. A comprehensive investigation into the spatial ET patterns in Hawaii is necessary to establish baseline data and (combined with improved rainfall estimates) would allow for more accurate estimates of sustainable yields and surface water availability.

Second, the development of adaptation strategies to deal with the likely impacts of climate change will help preserve our water resources and build more resilient communities. One of the most effective strategies to deal with the possibility of uncertain water supplies is to conserve water by becoming more efficient in the delivery and use of water. While the municipal water departments have some form of water conservation program, these programs vary in magnitude and scope. There is a need for a coordinated statewide water conservation planning strategy and policy framework which would involve water purveyors and industry stakeholders.

The two projects described below are consistent with the Commission's overall program objectives and the recommendations in the Commission's Water Resource Protection Plan, June 2008. Staff has met with various agencies and organizations to discuss climate change, water conservation, and other water resource needs and challenges across the State. These projects are also consistent with the respective goals and objectives of these agencies and organizations, including the U.S. Geological Survey, the Hawaii Conservation Alliance Pacific/U.S. Fish and Wildlife Service Islands Climate Change Cooperative (PICCC), and the University of Hawaii Center for Island Climate Adaptation and Policy (ICAP).

These projects would also benefit the respective County municipal water departments in developing their water use and development plans, long-range capital improvement plans, and water conservation programs.

This Federal appropriation for Hawaii Water Resources Management is an exceptional opportunity for the Commission to leverage Federal funding to maximize the State's limited financial resources. Successful completion of these projects could lead to further opportunities to request additional federal funding for Commission program objectives.

PROPOSED PROJECTS

The following priority projects were identified. Project cost estimates are preliminary. Project descriptions are attached to this submittal as Exhibit 1 and Exhibit 2, respectively.

1. *Evapotranspiration in Hawaii* (estimated cost: \$340,000). In order to accurately estimate ground water availability (sustainable yield) and surface water availability, there needs to be a comprehensive assessment of evapotranspiration (ET) in Hawaii. This project would utilize a wide range of data and technologies to estimate the spatial distribution of ET and amount and causes of seasonal and interannual variability of ET.

2. *Statewide Water Conservation Planning* (estimated cost: \$200,000). Competition for fresh water, increasing population and development pressures, the sustainability movement, and the impacts of global climate change require that Hawaii become as efficient as possible in its uses of fresh water. This project would develop a statewide water conservation planning strategy and policy framework in Hawaii to help us reach this goal.

The combined project funding could amount to \$540,000 based on \$270,000 of USACE federal funding and another \$270,000 in matching cost share. The scopes of work for these projects may change depending on the availability of funding and more accurate project cost estimates. USACE is the contracting agency under the PAS program and will retain qualified contractors to complete these projects. It is possible that a single PAS agreement could be executed to complete both projects collectively, or there could be a PAS agreement for each of the two proposed projects.

Staff is asking that the Commission approve these projects for implementation, provided there is available Commission funding. Final scope of services and project cost is contingent on further discussion with USACE and final fee proposals from prospective contractors. Commission staff will brief the Commission from time to time on the progress of the contracting and project completion. Projects are expected to be completed within 18 to 24 months of notice to proceed.

FUNDING

Staff is asking the Commission to approve the cost share expenditure, not to exceed \$270,000, to match the USACE PAS funding of \$270,000. Commission funding would be from general funds or special funds or a combination of both, based on availability of funding.

The completion of the projects above would also benefit the County water departments in their operations and long-range planning. Deputy Kawahara will be soliciting the County municipal water departments to participate in the appropriate projects through cost share contribution and collaboration. Deputy Kawahara is also soliciting other federal partners to determine if costs from their respective programs or projects could be used as in-kind cost share for the projects listed above. County and other agency cash cost-share contributions, which could be accepted into a temporary trust fund, would reduce the Commission's funding commitment for these projects.

AGREEMENT

Provisions of Section 22 of the Water Resources Development Act of 1974, as amended, provide authority for the USACE to assist states in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources. This assistance is provided on a 1:1 cost share basis.

Under the PAS program, USACE would act as the contracting agency. The Commission would be the funding partner and would enter into Planning Assistance to States agreements to complete these projects. For each project, Commission staff would work closely with USACE to develop a final scope of services, fee proposal, and completion schedule, which will be made part of the agreements.

The terms of these agreements will be subject to the approval of the Chairperson and the Department's Deputy Attorney General. A sample agreement is attached to this submittal as Exhibit 3.

RECOMMENDATIONS

1. Staff recommends that the Commission authorize the Chairperson to enter into Planning Assistance to States agreements with the USACE to provide cost-share funding not to exceed \$270,000 to complete the projects listed below. Commission funding would be from general funds or special funds or a

combination of both, subject to the availability of funding. Funding may also be provided from other government agencies through a temporary trust fund or in-kind services.

- *Evapotranspiration in Hawaii*
- *Statewide Water Conservation Planning*

2. Staff also recommends that the Commission authorize the Chairperson to further amend or modify these agreements provided that such amendment or modification does not include any additional funding.

The terms of these agreements will be subject to the approval of the Chairperson and the Department's Deputy Attorney General.

Respectfully submitted,



KEN C. KAWAHARA, P.E.
Deputy Director

- Exhibits:
1. *Evapotranspiration in Hawaii*
 2. *Statewide Water Conservation Planning*
 3. Planning Assistance to States Agreement

APPROVED FOR SUBMITTAL:



LAURA H. THIELEN

EVAPOTRANSPIRATION IN HAWAI'I

A Preliminary Prospectus for Proposed Research

Thomas Giambelluca

22 January 2010

Problem: The hydrological cycle in Hawai'i determines the amount and timing of water flows that affect aquatic and near-shore marine ecosystems, and that provide for our water resources. Rainfall and fog interception are the principal water sources, while evaporation and transpiration reduce the amount available for streamflow and groundwater recharge. Evapotranspiration (ET, the combined loss of water by transpiration and evaporation) is controlled by climate, vegetation, soil, and water availability, and hence is highly variable in space and time. Understanding of the magnitude and variability of ET is essential for protecting Hawai'i's ecosystems and planning for water resource development and utilization. However, information about ET rates and variability is sparse, and no comprehensive analysis of ET in Hawai'i has been done.

Objectives: The purpose of the proposed study is to develop an estimate of the spatial distribution of ET for Hawai'i and to examine the amount and causes of seasonal and interannual variability of ET.

Approach: To estimate ET, we will utilize a wide range of available data and employ the most appropriate technologies. The strategy can be divided into the following parts:

1. Cloud cover pattern. Utilize satellite remote sensing data from the MODIS sensors to develop mean cloud cover patterns for the State. Because these sensors have only two overpasses per day, data from the GOES geostationary platform will be used to estimate the diurnal cycle of cloudiness.
2. Solar radiation pattern. Based on the mean cloud pattern and modeled clear-day radiation, estimate the spatial pattern of solar radiation. Estimates will be calibrated and validated by comparing results with measured solar radiation at stations in a range of different environments.
3. Net radiation pattern. Using estimated solar radiation, the mean cloud pattern, the vegetation pattern, and satellite-derived surface temperature, estimate the spatial pattern of net radiation (the difference between incoming and outgoing radiation at all wavelengths). Estimates will be calibrated and validated by comparing results with measured net radiation at stations in a range of different environments.
4. PE pattern. Based on estimated net radiation, and the spatial patterns of temperature and humidity (already available), use the Priestley-Taylor (1972) method to estimate the pattern of potential evapotranspiration (PE, the rate of ET when water is not limiting the process). PE estimates will be calibrated and validated by comparing results with PE at stations in a range of different environments.
5. ET pattern. Use the modeling approach of Fisher et al. (2008), involving the estimated PE pattern, normalized difference vegetation index (NDVI, derived

from MODIS data), soil adjusted vegetation index (SAVI, derived from MODIS data), maximum air temperature, and humidity to estimate the spatial pattern of ET.

6. ET variability. Analyze the spatial patterns and temporal variations in ET to determine the sensitivity of ET to changes in radiation, temperature, rainfall, and vegetation. This information will be useful in predicting how future change in climate and land cover will affect ET and influence hydrological processes in Hawai'i.

Station data for calibration and validation of estimates will mainly come from the HaleNet system, a network of microclimate stations which we have been operating across elevation gradients on the leeward and windward sites of Haleakalā, Maui.

Expected Products: Each of items 2 through 5 above will result in a highly valuable product in the form of a high-resolution digital map. Solar radiation is a fundamentally important variable that influences ecological, agricultural, and hydrological processes. Additionally the resulting map will be useful for solar energy planning and development. Net radiation is the principal driving variable controlling the surface energy distribution. Knowledge of the spatial net radiation pattern will facilitate a wide range of climatological, hydrological, and ecological studies. PE can be equated with the atmospheric demand for water. This value is highly sensitive to climate and strongly influences plants and the water cycle. ET is highly important, but very difficult to estimate. Developing a map of ET is the main focus of the proposed study and will provide a key element necessary in a wide range of hydrological and ecological analyses. This product will greatly advance our ability to estimate groundwater recharge and, therefore, to effectively manage our water resources. Analysis of ET variability (item 6) will result in statistical relationships which can be used to answer what-if questions about the impacts of global warming on Hawai'i's natural environment.

References Cited

- Fisher, J.B., Tu, K.P., and Baldocchi, D.D. 2008. Global estimates of the land-atmosphere water flux based on monthly AVHRR and ISLSCP-II data, validated at 16 FLUXNET sites. *Remote Sensing of the Environment* 112: 901-919.
- Priestley, C.H.B. and Taylor, R.J. 1972. On the assessment of surface heat flux and evaporation using large-scale parameters. *Monthly Weather Review* 100: 81-92.

Statewide Water Conservation Planning Project Preliminary Scope of Work

Introduction

Competition for fresh water, increasing population and development pressures, the sustainability movement, and the impacts of global climate change require that Hawaii become as efficient as possible in its uses of fresh water. There is a need for a statewide water conservation planning and policy framework in Hawaii to help us reach this goal.

Large water purveyors present an opportunity to implement water conservation programs and could have a substantial impact on water savings due to the volume of water delivered and their large customer base. Several water purveyors/utilities have some sort of water conservation program. The idea is not to supplant or recreate any existing water conservation programs, but to support and assist with improving these programs. Where there are no existing water conservation programs, the Commission could assist with developing one.

In large water utility and water purveyor systems, water efficiency can be achieved in both the collection and delivery side (supply-side/internal) and the end user or customer side (demand-side/external). There are proven programs and measures that can succeed in increasing water efficiency and reducing water waste for the internal and external segments of the system.

Project Objectives

1. Develop a coordinated statewide water conservation planning strategy and policy framework.
2. Develop a statewide water conservation program to implement the planning and policy framework.
3. Work collaboratively with water conservation stakeholders to achieve Commission objectives.

Program Elements

The statewide water conservation planning program should include but not be limited to the following elements and requirements:

1. Goals and Objectives – realistic goals and objectives should be identified along with a strategy for achieving success
2. Policy Development – water conservation policies should be developed to help achieve the program goals and objectives
3. Planning Strategy – a strategy should be devised to plan for and achieve the desired program outcomes
4. Water Use Sectors – program should address all water use sectors in the State, including potable and non-potable uses

5. Technical Working Group – a technical working group of experts should be established to assist in policy and program development
6. Building Partnerships – program should be developed collaboratively with water purveyors, industry contractors, government regulators, and the military
7. Public Outreach – education and awareness are important elements of a successful water conservation program and should be thoroughly evaluated
8. Incentive Programs – rebate programs and other incentives should be evaluated
9. Uses from both ground water and surface water should be considered
10. Both supply-side and demand-side water conservation measures should be evaluated
11. Funding and Implementation Plan – identifying sources of funding is essential to financing incentive and outreach programs; an implementation plan is necessary for systematic program implementation

Functionality

The statewide water conservation program shall be developed for applicability in all jurisdictions in the State of Hawaii and should have goals and recommendations that are practical and achievable.

Expected Outcome

The expected outcome is a comprehensive report detailing a statewide water conservation program. This document should outline, at a minimum, State water conservation policies, goals, strategies, plans, programs, practices, and recommendations for implementing water conservation across the state. A funding and implementation plan would also be included in this report.

Estimated Project Cost and Timeframe

This project is estimated to cost \$200,000 and should be completed in 24 months.

PLANNING ASSISTANCE TO STATES AGREEMENT

BETWEEN

THE DEPARTMENT OF THE ARMY

AND

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

FOR THE

RAINFALL ATLAS OF HAWAII
SECTION 22 STUDY

THIS AGREEMENT is entered into this 26th day, of June, 2007, by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the State of Hawaii, Department of Land and Natural Resources (DLNR) (hereinafter the "Sponsor"),

WITNESSETH, that

WHEREAS, Section 22 of the Water Resources Development Act (WRDA) of 1974 (Public Law 93-251), as amended, authorizes the Secretary of the Army, acting through the Chief of Engineers, to cooperate with any State, as therein defined, in the preparation of comprehensive plans for the development, utilization and conservation of water and related resources of drainage basins, watersheds, or ecosystems located within the boundaries of such State and to submit to Congress reports and recommendation with respect to appropriate Federal participation in carrying out such plans;

WHEREAS, Section 319 of the Water Resources Development Act of 1990 (Public Law 101-640) authorizes the Secretary of the Army to collect from non-Federal entities fees for the purpose of recovering 50 percent of the cost of the program established by Section 22 of the 1974 WRDA;

WHEREAS, Section 208(1) of WRDA 1992, Public Law 102-580 (codified at 42 U.S.C. Section 1962d-16(b)(2)), authorizes the Sponsor to contribute up to on-half (1/2) of the non-Federal contribution for preparation of the Scope of Work incorporated into this Agreement by the provision of services, materials, supplies or other in-kind-services necessary to prepare the Scope of Work.

WHEREAS, the Sponsor has reviewed the State's comprehensive water plans and identified the need for planning assistance as described in the Scope of Work incorporated into this agreement; and

WHEREAS, State general fund money in the amount of one hundred thirty eight thousand dollars (\$138,000) and State special fund money is the amount of thirty nine

thousand five hundred ten dollars (\$39,510) are available to fund this Agreement pursuant to Act 213, Session Laws of Hawaii, 2007, item D.5.

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in the study cost-sharing and financing in accordance with the terms of this Agreement;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "Study Costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor and all negotiated costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "estimated Study Costs" shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers, Honolulu District of initial Federal funds following the execution of this Agreement and ending when the Honolulu District provides the planning report to the Sponsor.

D. The terms "SOW" and "Scope of Work" shall mean the Preliminary Proposal to Revise the Rainfall Atlas of Hawai'i, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government, in consultation with and approval by the Sponsor.

E. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the SOW.

ARTICLE II - OBLIGATIONS OF PARTIES

A. Subject to the availability of funds appropriated by the Congress of the United States (Congress), the Government, using funds and in-kind services provided by the Sponsor and Congressionally appropriated funds, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III. of this Agreement, and subject to appropriation by the Hawaii State Legislature and allocation by the State executive budget process, the Sponsor shall contribute cash or in-kind services equal to fifty (50) percent of Study Costs. If agreeable to all parties, in-kind services may comprise fifty (50) percent of the Sponsor's contributions or twenty five (25) percent of Study Costs. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and estimated schedule under which those services are to be prepared are specified in the Scope of Work. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability and allowability.

C. The Sponsor understands that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning payment specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

D. If, upon the award of any contract or the performance of any in-house work for the Study by the Government, cumulative financial obligations of the Government and the Sponsor would exceed \$355,020, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed. Should the Government and the Sponsor require time to arrive at a decision, the Agreement will be suspended in accordance with Article X., for a period of not to exceed six months. In the event the Government and the Sponsor have not reached an agreement to proceed by the end of their 6-month period, the Agreement may be subject to termination in accordance with Article X.

E. No Federal funds may be expended or obligated by the Sponsor to meet the Sponsor's share of Study costs under this Agreement unless the expenditure or obligation of such funds is expressly authorized by statute for such purposes and the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

F. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of the Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

G. Notwithstanding any provision of this Agreement, this Agreement and the Government's obligations hereunder shall not be effective and will not commence until Federal funds have been appropriated and allocated to the District Engineer, U.S. Army Corps of Engineers Honolulu District for the implementation of this study. In the event that Federal funds are allocated to the District Engineer for this study after the date that the parties hereto execute this Agreement, the effective date of this Agreement shall be the date that funding approval is provided to the District Engineer.

H. In the event that any one or more of the provisions of this Agreement is found to be invalid, illegal, or unenforceable, by a court of competent jurisdiction, the validity of the remaining provisions shall not in any way be affected or impaired and shall continue in effect until the Agreement is completed.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this information. As of the effective date of this Agreement, estimated Study Costs are \$355,020 and the Sponsor's share of estimated Study Costs is \$177,510. In order to meet the Sponsor's cash payment requirements for its share of estimated Study Costs, the Sponsor must provide a cash contribution currently estimated to be \$177,510. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the SOW, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. No later than 30 days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its share of Study Costs. No later than 15 days thereafter, the Sponsor shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED, Honolulu District" to the District Engineer or an Electronic Funds Transfer in accordance with procedures established by the Government.

2. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house financial obligations attributable to the Study as they are incurred.

3. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 days after receipt of such notice, the Sponsor shall provide the Government with a check or an Electronic Funds Transfer for the full amount of the additional required funds.

C. Within 90 days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor and credits for the negotiated costs of the Sponsor's in-kind services, and shall furnish the Sponsor with the results of this accounting. Within 30 days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required

share of Study Costs.

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

To provide for consistent and effective communication, the Government's Project Manager for the Study and the Sponsor's designated representative shall communicate regularly until the end of the Study Period.

ARTICLE V - DISPUTES

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VI - MAINTENANCE OF RECORDS AND AUDIT

A. Within 60 days of the effective date of this Agreement, the Government and the Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 C.F.R. Section 33.20. The Government and the Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures and for a minimum of three years after the period of design and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal and State laws and regulations, the Government and the Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsor is required to conduct under the Single Audit Act. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in total Study Costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsor act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsor's rights and obligations under this Agreement, the Sponsor agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army."

ARTICLE X - TERMINATION OR SUSPENSION

A. This Agreement shall terminate at the conclusion of the Study Period, and neither the Government nor the Sponsor shall have any further obligations hereunder, except as provided in Article III.C.; provided, that prior to such time and upon 30 days written notice, either party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon the failure of the parties to extend the study under Article II.D. of the Agreement, or upon failure of the Sponsor to fulfill its obligation under Article III. of this Agreement. In the event that either party elects to terminate this Agreement, both parties shall conclude their activities relating to the Study and proceed to a final accounting in accordance with Article III.C. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to both parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out or transferring any existing contracts.

ARTICLE XI – LIMITATION ON GOVERNMENT EXPENDITURE

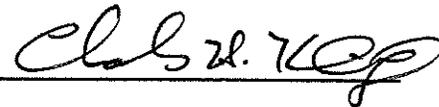
In accordance with Section 22 of WRDA 1974, as amended, Government financial participation in the cooperative preparation of comprehensive plans for development, utilization, and conservation of water and related resources pursuant to said authority shall be limited to the expenditure of not more than \$500,000 in any one year in any one State.

IN WITNESS WHEREOF, the parties hereto shall have executed this Agreement upon the date it is signed by both the parties. It shall become effective pursuant to the provisions of Article II. G. of the Agreement.

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

BY:  DATE: JUN 25 2008
for LAURA H. THIELEN
Chairperson

DEPARTMENT OF THE ARMY

BY:  DATE: 26 June 08
CHARLES H. KLINGE
Lieutenant Colonel, Corps of Engineers
District Engineer

APPROVED AS TO FORM:

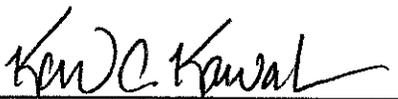
 DATE: JUNE 25, 2008
Deputy Attorney General
State of Hawaii

Attachment - Scope of Work, Budget Estimate

**NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR AGREEMENTS**

I, Ken C. Kawahara, do hereby certify that I am the Deputy Director of the State of Hawaii, Department of Land and Natural Resources ("Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the Rainfall Atlas of Hawaii, Section 22 Study; and that the Non-Federal Sponsor has the financial capability to satisfy the Non-Federal Sponsor's obligations under the Rainfall Atlas of Hawaii, Section 22 Study, Cost Sharing Agreement.

IN WITNESS WHEREOF, I have made and executed this certification this ____ day of
JUN 25 2008, 20__.

BY: 

TYPED NAME: Ken C. Kawahara

TITLE: Deputy Director

DATE: JUN 25 2008