

MEMORANDUM OF AGREEMENT BETWEEN

University of Guam and Guam Waterworks Authority

This Agreement is made this 21st day of August, 2017 by and between the **University of Guam (UOG)** whose address is 303 University Drive, Mangilao, Guam, 96923, and the **Guam Waterworks Authority (GWA)** whose mailing address is PO Box 3010 Hagåtña, GU 96932.

In this Agreement, the party who will be providing the services shall be referred to as: **“University of Guam” or “UOG”** and the party who will be receiving the services shall be referred to as: **“Guam Waterworks Authority” or “GWA”**.

Whereas, GWA is the recipient of a Federal grant from Department of Defense Office of Economic Adjustment (OEA), Federal Award Identification Number # HQ00051610212, dated August 26, 2016;

Whereas, the purpose of this award is to expand the Northern Guam Lens Aquifer (NGLA) Monitoring System through a program to construct and test up to seven new deep-monitor wells and to rehabilitate up to twelve existing monitoring wells in the NGLA.

Whereas, The University of Guam Water and Environmental Research Institute of the Western Pacific (WERI) and U.S. Geological Survey (USGS) have a long-standing collaborative relationship that leverages the local expertise at WERI with nationwide scientific resources available from the USGS to study water-resource issues critical to managing the Northern Guam Lens Aquifer; and

Whereas, this Agreement designates UOG, EIN # 98-0032933, as a special technical consultant and subject matter expert for the execution of the work required under this grant. The work covered under this Agreement is for the research and development related to the construction of new and rehabilitation of existing monitoring wells;

Whereas, The Research Corporation of the University of Guam (RCUOG) was established to provide an efficient and effective environment for grants management in compliance with Federal regulations;

Whereas, through this Agreement, GWA and UOG will utilize the services of WERI, USGS and RCUOG to accomplish tasks set forth in the Scope of Work, attached as Exhibit 1 to this Agreement.

NOW, THEREFORE, be it known that all parties agree, as applicable, to the following:

WITNESSETH, the University of Guam and the Guam Waterworks Authority in consideration of the mutual covenants hereinafter set out to agree as follows:

SECTION I. DESCRIPTION OF SERVICES

A. University of Guam Shall:

For the sum of \$531,300, utilize the expertise of WERI, USGS and RCUOG to deliver the tasks detailed in the attached Scope of Work. The scope of work is divided into two tasks. Task 1 consists of (1) developing well-construction specifications for seven new deep-monitor wells and rehabilitating 12 existing monitor wells; and (2) defining sustainment requirements for the OEA-funded *NGLA Monitoring System Expansion Project* and associated expansion of the *Guam Comprehensive Water Monitoring Program*. Task 2 consists of geophysical logging of the seven new deep-monitor wells to evaluate aquifer properties, especially the characteristics of the water-bearing zones penetrated by the wells. A timeline and budget breakdown is provided in the attached Exhibit 1 Scope of Work for each task. **The timeline and budget is based on the assumption that drilling of the new deep-monitor wells and rehabilitation of existing wells will be completed by December 31, 2019.**

B. Guam Waterworks Authority Shall:

- 1) Upon satisfactory delivery of tasks, pay within 30 days of receipt of invoice for services as detailed in the attached Scope of Work.

SECTION II. TERMS AND CONDITIONS

Upon termination of this Agreement, payments under this paragraph shall cease, provided, however, that UOG shall be entitled to payments for services delivered in periods or partial periods that occurred prior to the date of termination and for which UOG has not yet been paid.

1. This MOA may be terminated mutually by a written notice between the parties or unilaterally by either party given the ninety (90) days written notice.
2. This MOA shall be in force from the date of signing by both parties, Guam Waterworks Authority General Manager and the UOG President.
3. The period of performance for this agreement is August 1, 2017 to December 31, 2020.
4. UOG agrees to permit GWA auditors access to records relating to this sub-award as necessary to meet the requirements of CFR 200.300 through 200.309 and Sub Part F, Audit Requirements and 2 CFR 200.331 (a)(5).
5. Under 2 CFR § 200.343, UOG must submit no later than 90 calendar days after the end date of the period of performance all financial, performance and other reports as required by the terms and conditions of the award. Extensions may be requested by UOG and approved by GWA. GWA will close out the award when all applicable administrative actions and all required work of the award has been completed by UOG, no later than one year after receipt and acceptance of all required final reports.

SECTION III. RELATIONSHIP OF PARTIES

It is understood by the parties that University of Guam is a public corporation with respect to the Government of Guam. It is understood by the parties that Guam Waterworks Authority is an autonomous public corporation with respect to the Government of Guam.

SECTION IV. PROCUREMENT OF RECOVERED MATERIALS

GWA agrees to comply with and require each of its contractors and subcontractors employed in the completion of the project to comply with 2 CFR §200.322, "Procurement of Recovered Materials," and Section 6002 of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act; to include procuring only items designated in guidelines of the Environmental Protection Agency (EPA) at 40 CFR Part 247 that contain the highest percentage of recovered materials practicable, consistent with maintaining a satisfactory level of competition, where the purchase price of the item exceeds \$10,000 or the value of the quantity acquired during the preceding fiscal year exceeded \$10,000; procuring solid waste management services in a manner that maximizes energy and resource recovery; and establishing an affirmative procurement program for procurement of recovered materials identified in the EPA guidelines.

SECTION V. RESTRICTION AGAINST SEX OFFENDERS

The service providers warrants that no person in its employment who has been convicted of a sex offense under the provisions of Chapter 25 of Title 9 of the Guam Code Annotated, or of an offense defined in Article 2 of Chapter 28 of Title 9 of the Guam Code Annotated, or who has been convicted of an offense with the same elements as heretofore defined in any other jurisdiction, or who is listed on the Sex Offender Registry shall provide services on behalf of the service provider while on government of Guam property, with the exception of public highways. If an employee of the service provider is providing services on government property and is convicted subsequent to an award of a contract, and then the service provider warrants that it will notify the GWA of the conviction within twenty-four hours of the conviction, and will remove immediately such convicted person, and will remove immediately such convicted person from providing services on government property.

If the service provider is found to be in violation of any of the provision of this paragraph, then the GWA will give notice to the service provider to take corrective action. The service provider shall take corrective action within twenty-four hours of notice from the GWA; the service provider shall notify the GWA when action has been taken. If the service provider fails to take corrective steps within twenty-four hours of notice from the GWA, then the GWA in its sole discretion may suspend temporarily any contract for services until corrective action has been taken.

SECTION VI. NOTICES

All notices required or permitted under this Agreement shall be in writing and shall be deemed delivered when delivered in person or when deposited in the United States Mail, postage prepaid, utilizing certified mail, return receipt requested, addressed as follows:

Robert A. Underwood
President
University of Guam
303 University Drive
Mangilao, Guam 96923

Miguel C. Bordallo
General Manager
Guam Waterworks Authority
PO Box 3010
Hagåtña, Guam 96932

Parties may change such addresses from time to time by providing written notice to the other in the manner set forth above.

SECTION VII. AMENDMENT

This Agreement may be modified or amended if the amendment is made in writing and is signed by both parties with 30-day notice.

SECTION VIII. SEVERABILITY

If any provision of this Agreement shall be deemed by a court of competent jurisdiction to be invalid, then such provision shall be deemed stricken from the Agreement and the Agreement shall be enforced according to its valid and subsisting terms and provisions.

SECTION IX. WAIVER OF AGREEMENT RIGHT

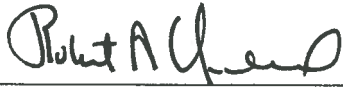
The failure of either party to enforce any provision of this Agreement shall not be construed as a waiver or limitation of that party's right to subsequently enforce and compel strict compliances with every other provision of the Agreement.

SECTION X. APPLICABLE LAW

The validity of this Agreement and of any of its terms or provisions, as well as the rights and duties of the parties to this Agreement, shall be governed by the laws of Guam.

IN WITNESS WHEREOF, the parties have executed this Agreement on the dates indicated by their respective names.

UNIVERSITY OF GUAM:



DR. ROBERT A. UNDERWOOD
President, University of Guam

Date: 8/21/17

GUAM WATERWORKS AUTHORITY:



MIGUEL C. BORDALLO
General Manager, Guam Waterworks Authority

Date: 8-11-17

APPROVED AS TO LEGALITY AND FORM



VICTORINA RENACIA
UOG Legal Counsel

Date: 8/15/17

APPROVED AS TO LEGALITY AND FORM



KELLY O. CLARK
GWA Legal Counsel

Date: 8-11-2017



Fol **RANDALL WIEGAND**
Vice President Administration & Finance

Date: 8/18/17

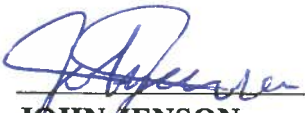
CERTIFIED FUNDS AVAILABLE



GREG P. CRUZ, CFO
Certifying Officer, GWA

Date: 8-11-17

PA 08/11/17



JOHN JENSON
Director, WERI

Date: 8-11-17

Amount Certified: \$531,300.00 ↗

Fund Source: OEA Grant OCON676-16-03

Exhibit 1
Scope of Work

SCOPE OF WORK

TECHNICAL ASSISTANCE FOR CONSTRUCTING AND TESTING NEW DEEP-MONITOR WELLS AND REHABILITATING EXISTING MONITOR WELLS IN THE NORTHERN GUAM LENS AQUIFER

PREPARED BY THE
U.S. GEOLOGICAL SURVEY PACIFIC ISLANDS WATER SCIENCE CENTER
IN COLLABORATION WITH THE
UNIVERSITY OF GUAM WATER AND ENVIRONMENTAL RESEARCH INSTITUTE
OF THE WESTERN PACIFIC

JUNE 2017

INTRODUCTION

The Department of Defense Office of Economic Adjustment (OEA) has granted \$3.7 million to the Guam Waterworks Authority (GWA) for constructing and testing seven new deep-monitor wells and rehabilitating 12 existing monitor wells in the Northern Guam Lens Aquifer (NGLA). In January 2017, the GWA selected the engineering consulting firm Brown & Caldwell to lead the Program Management Office (PMO) for execution of the grant. The OEA grant will provide critical infrastructure improvements needed to expand the *Guam Comprehensive Water Monitoring Program* as described in the December 2014 proposal prepared by the U.S. Geological Survey Pacific Islands Water Science Center (USGS) in cooperation with the University of Guam Water and Environmental Research Institute of the Western Pacific (WERI).

The USGS and WERI have a long-standing collaborative relationship that has supported the *Guam Comprehensive Water Monitoring Program* since it was established in 1998 by Guam Public Law 24-161. This collaborative relationship leverages local expertise at WERI with nation-wide scientific resources available from the USGS to study water-resource issues critical to managing the NGLA. In support of the OEA-funded *NGLA Monitoring System Expansion Project*, WERI and USGS will expand and deepen their collaborative work to analyze and interpret new data from the expanded monitoring system and thus provide GWA, GEPA, DoD, and other stakeholders—through an interagency framework—with independent, objective scientific information needed to make informed water-resource management decisions.

This scope of work describes how the USGS and WERI will provide GWA and its contractors with technical assistance for constructing and testing new deep-monitor wells, rehabilitating existing monitor wells, and for defining sustainment requirements for the OEA-funded *NGLA Monitoring System Expansion Project* and the associated expansion of the *Guam Comprehensive Water Monitoring Program*.

SCOPE OF WORK

This scope of work is thus divided into two tasks. Task 1 consists of (1) developing well-construction specifications for seven new deep-monitor wells and rehabilitating 12 existing monitor wells; and (2) defining sustainment requirements for the OEA-funded *NGLA Monitoring System Expansion Project* and

associated expansion of the *Guam Comprehensive Water Monitoring Program*. Task 2 consists of geophysical logging of the seven new deep-monitor wells to evaluate aquifer properties, especially the characteristics of the water-bearing zones penetrated by the wells.

Task 1: Well construction, rehabilitation, and sustainment specifications

The USGS and WERI will provide technical support for the construction of seven new deep-monitor wells and rehabilitation of 12 existing wells in the NGLA. General specifications for the construction of new deep-monitor wells and rehabilitation of existing wells have been prepared and forwarded to GWA's PMO for planning purposes.

New deep-monitor well construction specifications and technical support: The USGS and WERI will work with GWA's PMO to refine well-construction specifications for seven new deep-monitor wells. WERI will provide technical support, including on-site support, before, during, and after construction of the new deep-monitor wells. The PMO will be responsible for ensuring that the driller constructs the wells as designed in the specifications and that the required timelines are met.

Existing-well rehabilitation specifications and technical support: The USGS and WERI will work with GWA's PMO to refine well-rehabilitation specifications for 12 existing monitor wells. WERI will provide technical support, including on-site support, before, during, and after rehabilitation of the existing monitor wells. The PMO will be responsible for ensuring that the driller rehabilitates the wells as designed in the specifications and that the required timelines are met. The USGS will remove and reinstall water-level recording equipment before and after rehabilitation of existing monitor wells.

Sustainment requirements for the NGLA monitoring program: The USGS and WERI will work together to define permanent ongoing (post-construction) sustainment requirements for the OEA-funded *NGLA Monitoring System Expansion Project* and associated expansion of the *Guam Comprehensive Water Monitoring Program*. This will include identifying monitoring parameters and frequencies, scheduling and implementing maintenance and recapitalization of the wells, and providing scientific support to include data collection and management, data interpretation, trend analyses, and periodic groundwater modeling updates. These actions are needed to ensure that the OEA-funded infrastructure investments are operated and maintained such that the infrastructure will continually yield high-quality data to support informed water-resource management decisions.

Task 2: Geophysical logging and reporting

Each of the seven new deep-monitor wells will be surveyed with a set of geophysical tools to define the hydraulic properties of the aquifer and the occurrence and characteristics of specific water-bearing zones or discrete features supporting focused flow. Geophysical logging is needed to make reliable interpretations of salinity profiles, which are the primary tools for evaluating the response of the freshwater lens to changes in recharge and pumping, and for testing and re-calibration of groundwater models. The geophysical logging effort will be conducted by the USGS with logistical and field support from WERI. The USGS will provide the logging tools, two weeks of field support, interpretation of geophysical logs, and data archiving. In addition, the USGS will be responsible for the preparation of an interpretive report. WERI will provide support with field activities, including down-hole video logging

before the installation of well casing, and contributing to the interpretive report. The geophysical logging will occur after installation of casing in each well. Timing of the drilling, logging, and final installation will require close coordination between the USGS, WERI, and drillers.

The geophysical logging will be conducted to determine the rock type, fractures, and hydraulic properties in the wells. A brief description of data acquisition and analysis for each log is listed below.

1. Fluid electrical conductivity and temperature logs will be collected to measure the electrical properties and temperature of the fluid in the well. These logs provide insights into where water enters the well under ambient conditions.
2. Electromagnetic induction and gamma logs will be collected to provide information on the electrical conductivity of the formation and fluids surrounding the well. Gamma logs will help identify and characterize the rock units.
3. Electromagnetic flowmeter logs will be collected to identify inflow and outflow zones and intraborehole flow under ambient conditions.

PRODUCTS AND TIMELINE

For Task 1, the USGS and WERI will provide (1) specifications for constructing new deep-monitor wells and rehabilitating existing monitor wells, and (2) requirements for permanent ongoing (post-construction) sustainment of the OEA-funded *NGLA Monitoring System Expansion Project* and associated expansion of the *Guam Comprehensive Water Monitoring Program*. For Task 2, the methods and results of the geophysical logging will be published in a USGS Scientific Investigations Report, which will describe. USGS and WERI scientists will coauthor this report. The major tasks and periods of activity are described in table 1.

Table 1. Major tasks and periods of activity

Tasks	2017		2018				2019				2020			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Task 1:														
Well specifications														
Sustainment requirements														
Technical support for well construction														
Water-level equipment removal and reinstall														
Task 2:														
Logistics and planning														
Geophysical logging and interpretation														
Report preparation and publication														

BUDGET

The total cost for this work is estimated to be \$531,300. This estimate is based on the assumption that drilling of the new deep-monitor wells will be completed by December 31, 2019. The total cost includes the administrative fee for the Research Corporation-University of Guam (RCUOG) (\$48,300, 10% of total costs), under which the project work will be administered. Breakdowns of USGS costs (\$362,000, table 2) and WERI costs (\$121,000, table 3) exclusive of the RCUOG Administrative Fee are provided below. USGS science support includes project management, technical services, and report processing fees. Total costs, including the RCUOG administrative fee, are shown in table 4.

Table 2. USGS costs for each task

Category	Task 1	Task 2	Total
Labor	35,080	129,540	164,620
Travel	37,480	14,590	52,070
Supplies	0	2,640	2,640
Shipping	0	8,780	8,780
Geophysical services	0	72,700	72,700
Science Support	14,440	46,750	61,190
Total cost	87,000	275,000	362,000

Table 3. WERI costs for each task

Category	Task 1	Task 2	Total
Labor	84,000	11,000	95,000
Travel	5,000	1,000	6,000
Supplies	12,000	8,000	20,000
Total cost	101,000	20,000	121,000

Table 4. Total costs for each task

Category	Task 1	Task 2	Total
USGS	87,000	275,000	362,000
WERI	101,000	20,000	121,000
RCUOG Admin. Fee	18,800	29,500	48,300
Total cost	206,800	324,500	531,300