CONSOLIDATED COMMISSION ON UTILITIES
Guam Power Authority | Guam Waterworks Authority
P.O. Box 2977 Hagatna, Guam 96932 | (671)649-3002 | guamccu.org

GWA RESOLUTION NO. 23-FY2022

RELATIVE TO AUTHORIZING THE MEMORANDA OF AGREEMENT FOR THE ONE-GUAM WATER RESOURCE INFORMATION PROGRAM

WHEREAS, under 12 G.C.A. § 14105, the Consolidated Commission on Utilities ("CCU") has plenary authority over financial, contractual and policy matters relative to the Guam Waterworks Authority ("GWA"); and

WHEREAS, the Guam Waterworks Authority ("GWA") is a Guam Public Corporation established and existing under the laws of Guam; and

WHEREAS the Guam Waterworks Authority (GWA), the CCU and the Department of the Defense, Department ("DoD") of the Navy executed a 2010 Memorandum of Understanding (MOU) Relative to the Military Build-up, and in 2016 updated this "One-Guam" MOU; and

WHEREAS the purpose of the updated MOU was to define the relationship between Joint Region Marianas (JRM), Naval Facilities Engineering Command Marianas (NAVFAC Marianas) as the Department of Defense (DoD) utilities provider, GWA, and the CCU, while developing the "One-Guam" vision for water and wastewater needs expected to increase as a result of military and civilian population growth; and

WHEREAS it is the desire of both GWA and DoD to facilitate changes to both systems in a manner that is mutually beneficial and maximizes the effectiveness of the overall Department of Defense (DoD) and GWA utility systems as a whole. The goal is sustainable, reliable, compliant and secure water delivery, followed with reliable and compliant wastewater removal.

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WHEREAS, subsequent to the execution of the 2016 MOU, GWA received over One Hundred Seventy-Three million dollars ($173M) in federal grant funding from the DoD Office of Local Defense Community Cooperation (OLDCC), to implement various water and wastewater improvement projects required to address impacts from the Military Build-up, including the Monitoring System Expansion and Rehabilitation Project (MSERP) which aimed to expand the means by which both DoD and GWA could effectively manage the water resources of the Northern Guam Lens Aquifer (NGLA); and

WHEREAS, the MSERP included the rehabilitation of thirteen (13) existing observation wells located on both Government of Guam and DoD property, and the installation of up to seven (7) new deep observation wells located on DoD property in sub-basins of the NGLA where very little scientific data has been obtained, all of which are intended to provide more comprehensive understanding of shared water resources and potential impacts from planned development; and

WHEREAS, as a condition of OLDCC grant funding, GWA and DoD have an obligation for the long-term maintenance, sustainment and use of these NGLA monitoring system assets, commensurate with the anticipated useful life of the capital improvements constructed with grant funding provided; and

WHEREAS, the 2016 One-Guam MOU outlines the stated objectives, roles and responsibilities of both GWA and DoD as parties to the MOU, and of the University of Guam Water and Environmental Research Institute (WERI) and U.S. Department of Interior, U.S. Geological Survey (USGS), as members of the One-Guam Technical Experts Group (TEG), specifically with respect to cooperation "to enhance monitoring and management of the NGLA in order to mitigate impacts to potable water resources" and "share access to, responsibilities for, the maintenance" of the monitoring system assets; and

WHEREAS, GWA and DoD have worked together with WERI and USGS to develop the organizational framework under which to accomplish the stated objectives of the 2016 One-Guam MOU and meet each party's responsibilities under said MOU and GWA's responsibilities under the OLDCC federal grant award; such framework is defined as the One-Guam Water Resources Information Program (OGWRIP) and documented in the attendant final GWA-

NAVFAC Memorandum of Agreement (MOA) and GWA-WERI-USGS MOA (See Exhibit A and Exhibit B respectively); and

WHEREAS, the OGWRIP MOAs have been reviewed and vetted by all parties, and confirmed as final and acceptable (subject to final legal counsel comment coordination/corrections) to all parties thereto.

NOW BE IT THEREFORE RESOLVED, the Consolidated Commission on Utilities does hereby approve and authorize the following:

Section 1. The foregoing recitals hereto are hereby ratified, confirmed, and incorporated herein by reference.

Section 2. The Consolidated Commission on Utilities supports the intent of the OGWRIP Memorandum of Agreement (MOA) between the United States Navy and the Guam Waterworks Authority (GWA) (Exhibit A), and the Memorandum of Agreement (MOA) between GWA, WERI and USGS (Exhibit B).

Section 3. The GWA General Manager is hereby authorized to execute the MOAs upon finalization of legal counsel comment coordination/correction.

RESOLVED, that the Chairman certified and the Board Secretary attests to the adoption of this Resolution.

DULY AND REGULARLY ADOPTED, this 26th day of July, 2022.

Certified by:

JOSEPH T. DUENAS
Chairperson

Attested by:

(ACTING)

MICHAEL T. LIMTIACO
Secretary

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SECRETARY'S CERTIFICATE

I, Michael T. Limtiaco, Board Secretary of the Consolidated Commission on Utilities, as evidenced by my signature above do hereby certify as follows:

The foregoing is a full, true and accurate copy of the resolution duly adopted at a regular meeting by the members of the Guam Consolidated Commission on Utilities, duly and legally held at a place properly noticed and advertised at which meeting a quorum was present and the members who were present voted as follows:

AYES: 3

NAYS: 0

ABSENT: 1

ABSTAIN: 0

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EXHIBIT A

2016 MEMORANDUM OF AGREEMENT
Exhibit D

Jun 2022

NAVAL FACILITIES ENGINEERING COMMAND MARIANAS
GUAM WATERWORKS AUTHORITY

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MEMORANDUM OF AGREEMENT
BETWEEN
GUAM WATERWORKS AUTHORITY
AND
NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND MARIANAS

Subj: MEMORANDUM OF AGREEMENT TO ADDRESS THE CO-MANAGEMENT AND PROTECTION OF THE NORTHERN GUAM LENS AQUIFER

Ref: (a) Memorandum of Understanding between Guam Waterworks Authority, Guam Consolidated Commission on Utilities, Naval Facilities Engineering Command Marianas, and Joint Region Marianas dated 7 December 2016
(b) Framework for Discussion: Strategy for an Integrated Water System for Guam, September 2018, or later

1. Purpose. Naval Facilities Engineering Systems Command Marianas (NFM), as the Department of Defense (DoD) utilities provider, and Guam Waterworks Authority (GWA) agree that the protection of Guam's sole source aquifer known as the Northern Guam Lens Aquifer (NGLA or the "Aquifer") is important to every resident of Guam.

The Parties understand the need to protect the NGLA as a critical resource for Guam's future.

The Parties understand that the data collected from the observation wells may drive some operational decisions in order to maintain the health of the NGLA.

The Parties understand that the maintenance of the observation wells is key to future ability to collect data from them.

The parties acknowledge that observation wells are located in different areas throughout the island, with some placed on DoD property, and that maintenance of the observation well system therefore requires the cooperation of the parties. The Parties

desire to protect and to co-manage the Aquifer as set forth in this Memorandum of Agreement (the "Agreement").

2. Background. Groundwater production from the NGLA is currently about 40 million gallons per day and may increase by as much as 25 percent over the next decade because of population growth that includes proposed relocation of DoD personnel to northern Guam. A 2013 United States Geological Survey (USGS) groundwater modeling study funded by the United States Marine Corps found that increased withdrawals from the NGLA will, in the long-term, result in a decline in water levels and a rise in the transition zone between freshwater and saltwater. In some cases, absent active management of the NGLA, pumping from individual wells may induce brackish water to enter wells. The groundwater model developed for this study can be updated with new hydrologic data collected and can be used to analyze new scenarios developed to address upcoming demands on the NGLA.

Reference (a) was developed to explore opportunities for partnering and integration of water and wastewater utilities to better meet the needs of the island's population including growth from the proposed military buildup.

The stated objectives under Section 5.a of Reference (a) include the following:

a. Protect the NGLA and other drinking water sources from contamination and/or saltwater intrusion;
b. Cooperate to improve the NGLA Observation Well System used to study the changes in the NGLA via expansion of the current system, rehabilitation of existing wells, and proper abandonment of wells no longer intended for production to enhance monitoring and management of the NGLA in order to mitigate impacts to potable water resources; and
c. Share access to, and responsibilities for, the maintenance of those wells.

Under the Terms of Agreement in Reference (a), the document states that all Parties will, "Cooperate in completing studies related to meeting the drinking water needs of Guam including NGLA sustainability studies. . . ."

Reference (b) was the first document developed for the One-Guam partnership. It is a living document, and protecting the NGLA as a vital resource for Guam was a driver for the development of this document.

3. Cancellation. No previous documents are superseded.

4. Applicable Laws and Regulations. This document and the objectives, goals, and processes agreed upon are subject to applicable laws, regulations, or other applicable requirements of the United States, the Government of Guam (GovGuam), and the DoD. The Parties agree that legal, regulatory, or other requirements applicable to either Party take precedence over any agreement reflected herein.

5. Objectives. It is the primary objective of the parties to sustain, further develop, and improve the NGLA observation well system meant to protect Guam's sole source aquifer which serves both DoD and GWA water systems.

6. Terms of Agreement. The Parties agree to:

a. Cooperate in the development of the NGLA observation well system to monitor the health of the Aquifer.
b. Jointly support the development of source water data for the NGLA.
c. Collectively discuss the interpretation of those data to co-manage the NGLA for the benefit of all who draw water from it.
d. Make decisions which will benefit the health of the NGLA jointly after careful interpretation of all the data.
e. Collaborate with USGS to update the model-based management tool, developed in 2013 by USGS and the Marine Corps, as increased data availability dictates.

7. Roles and Responsibilities. The responsibilities and expectations for both Parties under this agreement are outlined below.

a. DoD and GWA jointly will:

(1) Maintain the observation wells based on agreed upon standards specified below.

(2) Submit to well inspections by USGS or the University of Guam Water and Environmental Research Institute (WERI) for validation that the wells are properly maintained.

(3) Split the cost of data collection and evaluation based on the respective permitted production rates of each sub-basin, and subject to periodic review.

(4) Provide funding to WERI and USGS for monitoring and technical support services related to the One-Guam Water Resources Information Program.

(5) Review reports USGS and WERI produce by applying the data collected into the model-based management tool (see section 6.a.5 above) to guide the responsible extraction of water from the NGLA.

(6) Responsibly and cooperatively manage the NGLA.

(7) Support the growth and responsible development of northern Guam by cooperatively assessing proposed development actions to identify NGLA impacts.

(8) Work together to optimize the use of extracted water and fulfill essential needs of both parties.

(9) Prevent or mitigate adverse impacts to the NGLA.

b. GWA will:

(1) Use grant funds from the Office of Economic Adjustment (OEA) to rehabilitate existing wells determined by WERI to be appropriately placed for use in the NGLA Observation Well system.

(2) Use grant funds from the OEA to build new observation wells in locations determined by WERI.

(3) Relinquish ownership of any NGLA monitoring wells placed by GWA on DoD property.

(4) Fund or otherwise ensure completion of maintenance requirements for all NGLA monitoring wells owned by or assigned to GWA and not located on DoD property.

(5) Maintain the security at the GovGuam monitoring well facilities through intact perimeter fencing, gate locks, and wellhead housing locks. The property will not be left unsecure for any length of time.

(6) Maintain vegetation control at the GovGuam monitoring well facilities.

(7) Provide open access to the USGS and WERI to conduct monitoring operations at the GovGuam monitoring well facilities.

c. DoD will:

(1) Assist in the expansion of the NGLA observation well system by performing appropriate DoD reviews (such as required for site approvals), access to the property, or any other requirement that would be inherently a DoD process.

(2) Retain ownership of and responsibility for any NGLA monitoring wells placed on DoD property.

(3) Fund or otherwise ensure completion of maintenance requirements for all NGLA monitoring wells located on DoD property.

(4) Maintain the security at the DoD monitoring well facilities through intact perimeter fencing, gate locks, and wellhead housing locks. The property will not be left unsecure for any length of time.

(5) Maintain vegetation control at the DoD monitoring well facilities.

(6) Provide open access to the USGS and WERI to conduct monitoring operations at the DoD monitoring well facilities.

8. Other Provisions

a. Enforceability

(1) Performance. Performance under this Memorandum of Agreement (MOA) by all Parties is dependent upon lawful appropriation, availability, and allocation of funds by proper authorities. Nothing herein shall constitute nor be considered to constitute an obligation or expenditure of funds in advance of or in excess of proper appropriations for either Party (for DoD: Congress of the United States or otherwise be in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341 et seq., for GWA: Their management and/or the CCU or the PUC).

(2) Benefits. This MOA is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, by any Party against the United States or GWA, or agencies, instrumentalities, officers, employees, or agents of either.

b. Resolution of Disagreements

(1) The Parties shall consult with one another to resolve issues at the One-Guam water working group level (WG) level and elevate disputes through the respective chains-of-command to the Senior Advisory Group level only if necessary.

(2) Notification of areas of disagreement by any Party will be submitted in writing by and between the GWA General Manager and the NFM Utilities Management Product Line Director.

9. Modification. Modifications to this agreement may be made with the concurrence of all Parties. Modifications desired by any Party are to be requested in writing at least 60 days in advance of the proposed effective date and will become effective only if agreed upon in writing by all Parties.

10. Review. This MOA will be reviewed triennially and/or when there is a change in principals to evaluate its effectiveness and determine if any modifications are required.

11. Effective Date. This MOA is effective upon the date of final signature and shall remain in effect for a period of nine years. This MOA may be terminated by any of the Parties upon providing 90 days written notification to all Parties.

APPROVED:

_____ Date: _____
MIGUEL C. BORDALLO, P.E.
General Manager
Guam Waterworks Authority

_____ Date: _____
TIMOTHY LIBERATORE
Captain, U.S. Navy
Commanding Officer
Naval Facilities Engineering Command Marianas

Agreement Number: N40192-XXXXXXXX-XXX

EXHIBIT B

ONE-GUAM
WATER RESOURCES INFORMATION PROGRAM

MEMORANDUM OF AGREEMENT

30 June 2022

Agreement Number: X0000-00000000-0000

GUAM WATERWORKS AUTHORITY
UNIVERSITY OF GUAM WATER AND ENVIRONMENTAL RESEARCH INSTITUTE OF THE WESTERN PACIFIC
U.S. GEOLOGICAL SURVEY PACIFIC ISLANDS WATER SCIENCE CENTER

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MEMORANDUM OF AGREEMENT
BETWEEN
GUAM WATERWORKS AUTHORITY
AND
THE UNIVERSITY OF GUAM WATER AND ENVIRONMENTAL RESEARCH INSTITUTE OF THE WESTERN PACIFIC
AND
U.S. GEOLOGICAL SURVEY PACIFIC ISLANDS WATER SCIENCE CENTER

Subj: MEMORANDUM OF AGREEMENT TO IMPLEMENT THE ONE-GUAM WATER RESOURCES INFORMATION PROGRAM

Ref: (a) Memorandum of Understanding between Guam Waterworks Authority, Guam Consolidated Commission on Utilities, Naval Facilities Engineering Command Marianas, and Joint Region Marianas dated 7 December 2016

Encl: (1) Components of a Water Resources Information Program
(2) One-Guam Water Resources Information Program Structure
(3) WERI-PIWSC One-Guam Work Plan

1. Purpose. Guam Waterworks Authority (GWA), as the local drinking water provider; and the University of Guam (UOG) Water and Environmental Research Institute of the Western Pacific (WERI) and U.S. Geological Survey (USGS) Pacific Islands Water Science Center (PIWSC), as designated collaborating scientific advisors to GWA and Naval Facilities Engineering Command Marianas (NFM) under the provisions of Reference(a) agree to implement the OGWRIP. This document defines the agreements of the Parties and the responsibilities of each Party under the OGWRIP.

2. Background. Reference (a) was developed to explore opportunities for partnering and integration of water and wastewater utilities to better meet the needs of the island's population, including growth from the proposed military buildup.

The following information is all from Reference (a):

Paragraph 6i, Organizational Components, establishes the Technical Experts Group (TEG), including WERI and USGS, to "develop and maintain all databases and technical tools" and to "identify problems and propose solutions."

Under paragraph 6k, WERI is specifically designated as repository of all water-related data and called on to "perform technical studies related to [Guam's] water resources."

Para. 7d(1), Terms of Understanding, calls for all parties to "cooperate in determining the most cost-effective and timely source(s) of funding to facilitate solutions...."

Para. 7d(2), Terms of Understanding, calls for all parties to "cooperate in completing studies related to meeting the drinking water needs of Guam including NGLA [Northern Guam Lens Aquifer] sustainability studies."

3. Applicability. This document and the objectives, goals, and processes agreed upon are subject to applicable laws of the United States, the Government of Guam (GovGuam), and the Department of Defense (DoD). The Parties agree that legal requirements applicable to either Party take precedence over any agreement reflected in this MOA.

4. Objectives. To meet the provisions of References (a) cited above by establishing the OGWRIP organizational structure, mission, activities, and funding.

5. Mission. The One-Guam Water Resources Information Program will provide DoD and GWA with accessible and reliable data; timely analyses and reports; directed research on critical topics; expert advice for informed water-resource management, engineering, and policy decisions; and professional education, technical training, and outreach support to best manage the drinking-water resources of Guam.

The targeted data collection and investigations will enable GWA and NFM to employ adaptive-management techniques by iteratively reassessing the efficacy of management policies and the understanding of the water-resource systems.

6. Activities. The Water Resources Information Program shall consist of a hierarchy of activities that can be visualized as a pyramid as shown in Enclosure 1.

Data will be collected, processed, organized, interpreted, and applied. Information products derived from the data will be made available to users starting with raw data, up through the conclusions and recommendations of advisory papers, technical reports, and professional papers.

7. Organizational structure. The integrated One-Guam Water Resources Information Program will consist of the One-Guam Water Resources Monitoring System (OGRWMS) and the One-Guam Water Resources Analytical Program (OGWRAP) in which WERI and USGS will provide services to both NFM and GWA, as defined in section 10, Roles and Responsibilities. (See glossary of terms in Enclosure 2.)

8. The One-Guam Water Resources Monitoring System (OGWRMS). The OGWRMS will include data-collection sites for groundwater data in the north, surface-water data in the south, and rainfall data throughout the island.

9. Terms of Agreement. The Parties understand the need for close collaboration. Accordingly, the Parties agree to:

a. Cooperate in preparing annual plans and budgets for the OGWRIP.

b. Jointly support the preparation and presentation of annual plans and budgets by the service providers to the funding providers.

c. Collectively identify and discuss services and products needed by NFM or GWA and the resources on hand or needed by WERI and PIWSC for providing them.

d. Manage the OGWRIP to promote scientifically informed decision-making and best practices to ensure the health of the NGLA, and Guam's water resources as a whole, in accordance with the objectives of reference (a), and the mission of OGWRIP as stated in para. 5, above.

10. Responsibilities. The responsibilities and expectations for the parties under this agreement are outlined below.

a. UOG/WERI and USGS/PIWSC will jointly:

(1) Prepare a *WERI-PIWSC One-Guam Work Plan* (Enclosure 3), which will be the basis for the annual budget.

(2) Provide the deliverables identified in the annual work plan (Enclosure 3) based on the following topics:

a. Perennial water resources monitoring services, reports, and an archive for the data and products.

b. Perennial analytical services and products including up-to-date maps, state-of-the-art models, and expert advice.

iii. Annually selected projects to meet immediate or anticipated operational or capital improvement needs:

iv. Professional education, technical training, and outreach for engineering staff, managers, planners, and executives.

b. GWA will:

(1) Provide funding for the program and facilitating continued access to data-collection sites located on GovGuam property.

11. Annual budgeting and funding process

a. Budgeting timeline

1. During October through December of any given year, all Parties will jointly prepare the annual plan for OGWRIP services and products and the accompanying combined annual OGWRIP budget for the subsequent fiscal year.
2. By the fifteenth of February each year, WERI will submit to the Guam Legislature through the University of Guam, the requests for the GovGuam shares of their respective budget components within the OGWRIP budget. The same budget can be submitted to the Guam Legislature on the first of August to comply with CWMP and GHS enabling statutes.
3. When the legislative appropriation process is complete and UOG has been advised of the appropriations of the GovGuam shares of the CWMP and GHS carried for OGWRIP

in the UoG budget, UOG will advise GWA of the appropriations and adjust budget shares accordingly in order to balance the budget. In the event of a shortfall in the budget allotment payments from DOA, GWA will fulfill the remaining balance for the fiscal year.

b. Stipulations

1. WERI and UOG will provide a quarterly update to the other Parties documenting the status of funding from the Guam Legislature and disbursements from DOA.
2. Transfers of funds will be made in accordance with existing provisions.

12. Other Provisions

a. Enforceability

(1) Performance. Performance under this MOA by all Parties is dependent upon lawful appropriation, availability, and allocation of funds by proper authorities. Nothing herein shall constitute nor be considered to constitute an obligation or expenditure of funds in advance of or in excess of proper appropriations for either Party (for DoD: Congress of the United States or otherwise be in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341 et seq.; for GWA: Their management and/or the CCU or the Public Utilities Commission (PUC). This MOA does not create an actual or implied intention, or requirement for the USGS to enter into a contract or an assistance agreement (e.g., grant or cooperative agreement).

(2) Benefits. This MOA is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity, by any Party against the United States or GWA, or agencies, instrumentalities, officers, employees, or agents of either.

(3) Non-Exclusivity. This agreement in no way restricts DoD and USGS from participating in similar activities or arrangements with other public or private agencies, organizations, or individuals.

(4) Endorsements. Nothing in this agreement may be interpreted to imply that the United States, the Department of the Interior, or the USGS endorses any GWA or WERI product,

service, or policy. GWA and WERI will not take any action or make any statement that suggests or implies such an endorsement.

(5) Federal Advisory Committee Act. The parties will comply with the Federal Advisory Committee Act to the extent it applies.

(6) Interagency Agreements. This MOA does not commit the USGS or DoD to enter into any specific interagency agreements for the purpose(s) of this MOA. Projects involving cost sharing or reimbursable funding between the agencies must be included in follow-on interagency agreements.

b. Resolution of Disagreements

(1) The Parties shall consult with one another to resolve issues and elevate disputes through the respective chains-of-command only if necessary.

(2) Notification of areas of disagreement by any Party will be submitted in writing by and between the WERI Director or the PIWSC Director and the GWA General Manager.

13. Statutory Authorities. USGS authority to enter into the MOA is provided by The Organic Act of March 3, 1879, as amended, 43 U.S.C. 31 et seq., and 43 U.S.C. 36c.

14. Modification. Modifications to this agreement may be made with the concurrence of all Parties. Modifications desired by any Party are to be requested in writing at least 60 days in advance of the proposed effective date and will become effective only if agreed upon in writing by all Parties.

15. Review. This MOA will be reviewed triennially and/or when there is a change in principals to evaluate its effectiveness and determine if any modifications are required.

16. Effective Date. This MOA is effective upon the date of final signature and shall remain in effect for a period of nine years. This MOA may be terminated by any of the Parties upon providing 90 days written notification to all Parties.

APPROVED:

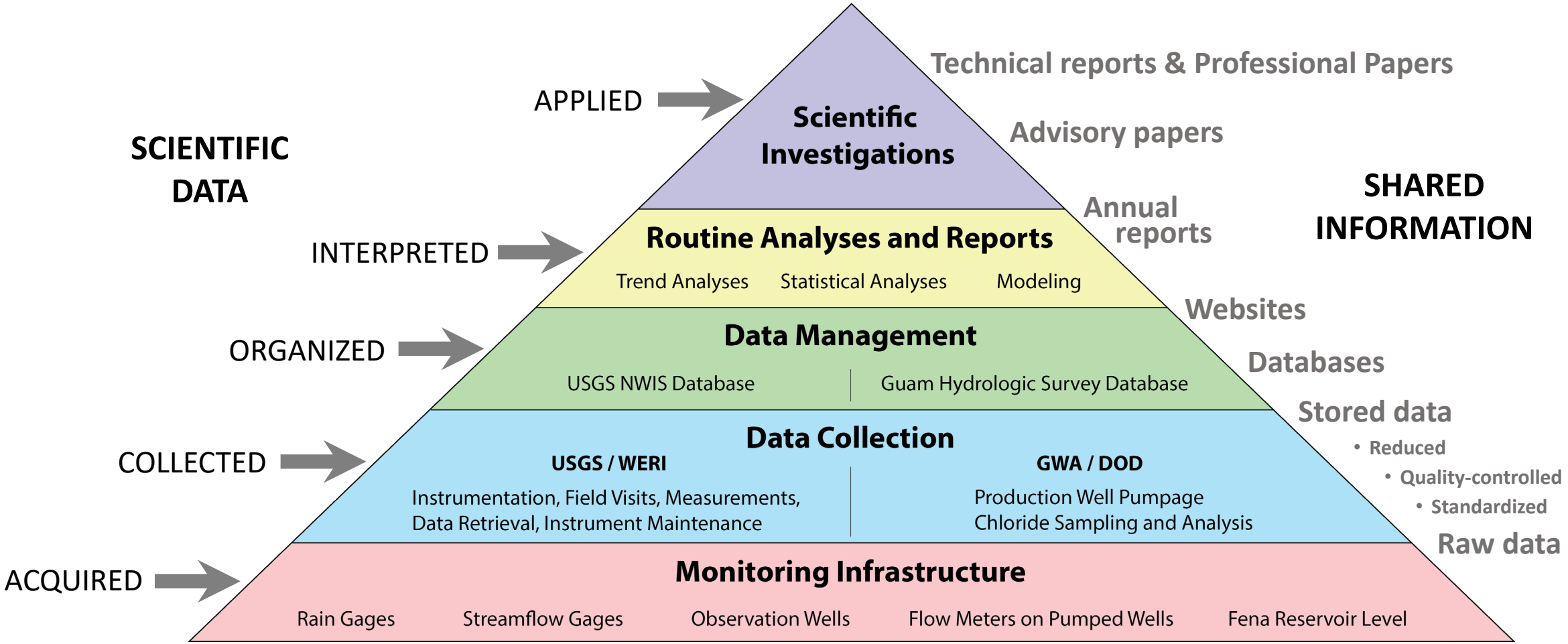
_____ Date: _____
MIGUEL C. BORDALLO, P.E.
General Manager
Guam Waterworks Authority

_____ Date: _____
John P. Hoffmann
Director, Pacific Islands
Water Science Center
U.S. Geological Survey

_____ Date: _____
Thomas W. Krise, Ph.D.
President
University of Guam

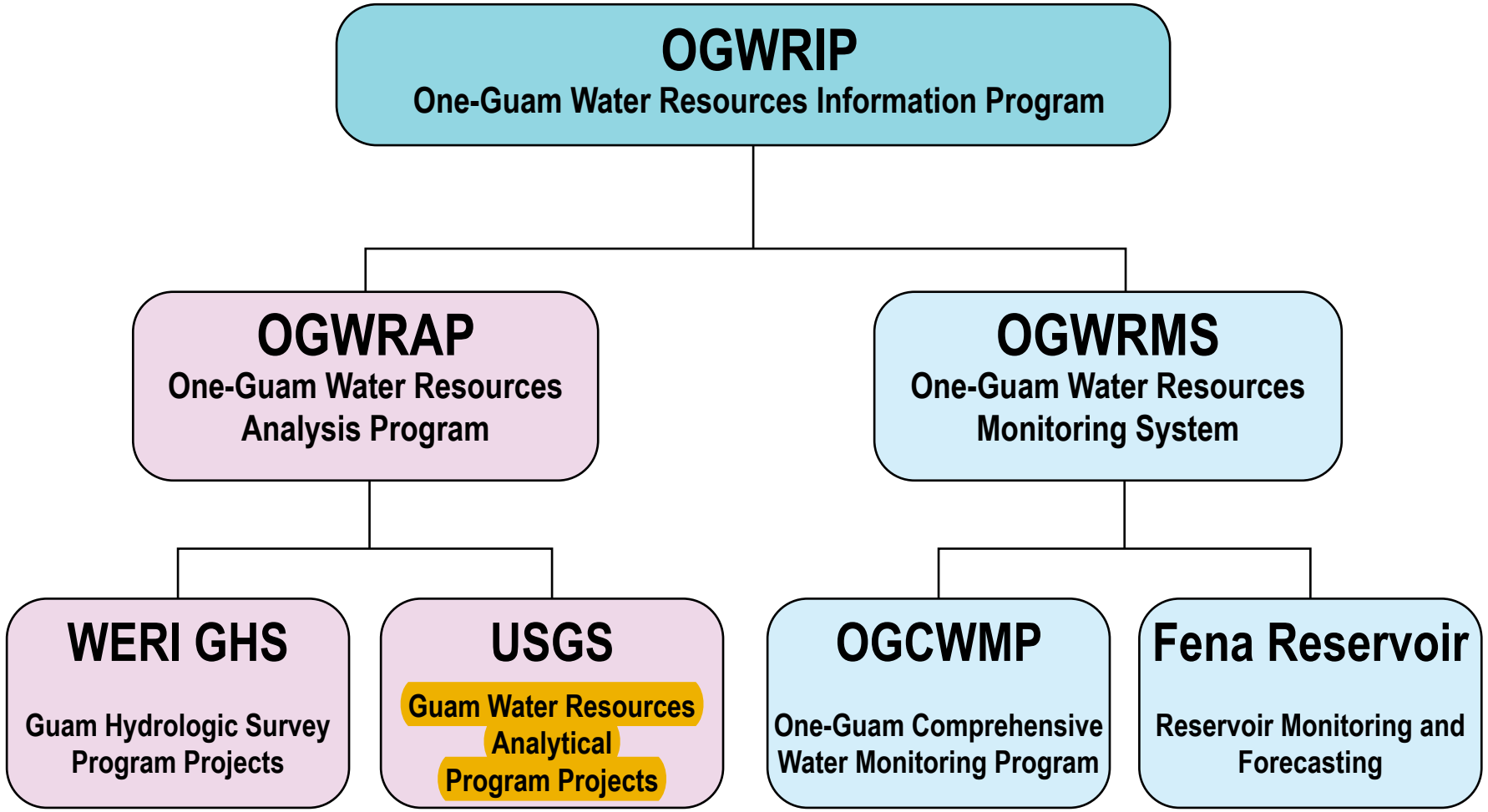
_____ Date: _____
John W. Jenson, Ph.D.
Director, WERI
University of Guam

Components of a Water Resources Information Program



Attachment 1. The essential components of a water resources information program.

One-Guam Water Resources Information Program (OGWRIP) Program Structure



Attachment 2. Organizational structure of the One-Guam Water Resources Information Program.

Glossary of terms

Fena Reservoir Monitoring A program that contains the monitoring of water level in Fena Reservoir, semi-annual vertical-datum surveys of the Fena Reservoir dam settlement markers, and quarterly reports of projected water level in the reservoir.

Guam Hydrologic Survey (GHS) A program within the Water and Environment Research Institute of the Western Pacific—established by the Guam Legislature in 1998 with Public Law No. 24-247—that archives hydrologic data from Guam and conducts research on water-related issues of local importance.

Guam Waterworks Authority (GWA) The public utility provider for Guam—established by the Guam Legislature in 1996 by Public Law No. 23-119.

Naval Facilities Engineering Command Marianas (NFM) The utility provider for military bases on Guam and Oceania.

One-Guam Comprehensive Water Monitoring Program (OGCWMP) An expansion of the original Comprehensive Water Monitoring Program (CWMP)—established by the Guam Legislature in 1998 with Public Law No. 24-161—that provides long-term hydrologic information that can be used to understand and sustainably manage Guam's water resources.

One-Guam Water Resources Analytical Program (OGWRAP) A program containing all hydrologic analyses and data interpretation, including but not limited to, statistical trend analyses, annual summary reports, groundwater modeling, groundwater-flow-direction analyses, reservoir-level forecasting, and outreach support.

One-Guam Water Resources Information Program (OGWRIP) A collaborative program between the Guam Waterworks Authority, Naval Facilities Engineering Command Marianas, Water and Environmental Research Institute of the Western Pacific, and USGS to protect the Northern Guam Lens Aquifer and other water supplies on Guam by providing water-resource managers with objective scientific information for decision making. The program includes data collection, analysis, modeling, and regular meetings with stakeholders.

One-Guam Water Resources Monitoring System (OGWRMS) A program containing all hydrologic data-collection sites and monitoring activities on Guam.

Pacific Islands Water Science Center (PIWSC) An office within the U.S. Geological Survey that conducts hydrologic monitoring and investigative studies on a wide variety of issues affecting water resources in the State of Hawai‘i and the U.S. Affiliated Pacific Islands.

U.S. Geological Survey (USGS) A scientific, non-regulatory agency of the U.S. Department of the Interior that studies the landscape, natural resources, and natural hazards of the United States.

Water and Environment Institute of the Western Pacific (WERI) A research institute within the University of Guam that provides research, education, and outreach on hydrologic resources for Guam, the Commonwealth of the Northern Mariana Islands, and the Federated States of Micronesia.

Attachment 2. Organizational structure of the One-Guam Water Resources Information Program.—Continued

Enclosure 3

Joint Annual Plan for WERI-PIWSC One-Guam Deliverables to Guam Waterworks Authority and NAVFAC Marianas

This plan will be updated each year at the start of the budget cycle for the fiscal year.

I. PERENNIAL PRODUCTS AND SERVICES

Perennial products and services are those that are steadily produced or permanently in place.

A. Products: Tools and References for Guam Water Resources Management

Products listed below are accessible on the WERI and USGS websites.[1] Selected items are published in hard copy as pamphlets or posters and are available at WERI.

1. Aquifer Map (WERI). First compiled in 1998 and updated regularly with new data and geospatial tools, WERI's *Hydrogeologic Map of the Northern Guam Lens Aquifer* is the foundation for groundwater exploration, development, modeling, and management. The map is available online at VB2018Poster1 (uog.edu). WERI Technical Report 142 contains details regarding its construction.
2. State of Aquifer Report (WERI, PIWSC). Contains up-to-date and reliable basic information for water resources professionals, policy makers, educators, students, and interested citizens. It is available online, where it is updated continually and revised annually.
3. Reports of Analyses and Modeling Results (WERI, PIWSC). Outcomes of modeling studies are documented in summary reports that provide explanations and advice in non-technical language to inform and support management decisions.
4. Databases and Websites (WERI, PIWSC). WERI and USGS databases and websites contain current and historic hydrologic data including thousands of scanned historical documents.
   - Local databases (WERI) include the GHS Borehole Database and the GHS Chloride and Production Database.
   - National databases (USGS) include the National Water Information System (NWIS) database and the GeoLog database.
5. Scientific and Technical Reports Library (WERI, PIWSC). The library contains links to downloadable copies of all of the WERI and USGS technical reports and advisory papers. It is available online.

B. Services for Guam Water Resources Management

Services listed below are delivered at meetings, presentations, and workshops for GWA employees, NFM staff, CCU members, and other policy makers and agency heads. All content is published online.

1. Comprehensive Water Monitoring Program (PIWSC, WERI). This is the premier service provided by USGS through its partnership with WERI. The program provides quarterly data collection and servicing of rain gages, stream gages, and observation wells by USGS teams supported by WERI. Uses of data by researchers, managers, regulators, students, and policy makers include:
   - Tracking the thickness and condition (water levels and salinity) of the freshwater lens and documenting trends and patterns in storage and salinity across the aquifer.
   - Calibrating groundwater and water-budget models to achieve accuracy and evaluate precision.

[1] Håfa Adai | Guam Hydrologic SurveyGuam Hydrologic Survey (uog.edu) ; USGS Current Water Data for Guam

2. Modeling Programs (PIWSC, WERI). Primary tools to simulate real-world conditions to understand, predict, and manage water resources. Are essential because experiments are not practical.

   - Groundwater (PIWSC, WERI).
     - The USGS numerical groundwater-flow and salinity model—developed 2010–2013 with support from the U.S. Marine Corps—will be used to evaluate the effects of selected aquifer-scale and long-term recharge and withdrawal scenarios on groundwater conditions and the availability of potable water. USGS and WERI models will be upgraded and recalibrated at five-year intervals using data from the CWMP observation well network.
     - WERI will use the AQUAVEO GMS advanced modeling system to separately simulate each of the aquifer's six basins at sufficiently fine scale to resolve effects of individual wells. Scenarios will explore alternatives proposed by GWA and/or NFM for optimizing production by changing pumping rates and/or relocating individual wells and wellfields.
   - Surface water. USGS provides quarterly forecasts of estimated stage (water level) in Fena Reservoir. The forecasts estimate reservoir stage for pumping scenarios using El Niño–Southern Oscillation (ENSO) rainfall projections developed by WERI/UOG.

3. Annual Professional Presentations and Workshops

   - August: *WERI Regional Advisory Meeting*. This will be held annually in conjunction with the annual American Water Works Association local chapter meeting. This meeting features:
     - *Activities Reports* on projects that are recently completed, ongoing, or recently funded
     - *Regional State of the Climate Report* modeled after the ENSO Newsletter Reports
   - November: *WERI Guam Advisory Meeting and Workshop*. This is a day-long event with up to three two-hour workshop sessions on:
     1. *Aquifer Report* (WERI-USGS *State of the Aquifer* presentation)
     2. *Aquifer model updates and developments*
     3. *Guam drought resiliency workshop and plan review*
   - March–April: *Aquifer Field Trips.* In-person tour (4–6 hours) or digital variants (2–4 hours)

4. Quarterly Technical Experts Group (TEG) meetings. The TEG is established by the MOA to (1) share data, (2) identify concerns, and (3) propose solutions to the One-Guam Water and Wastewater Working Group. WERI and USGS will present an *NGLA Status and Trends Update* at each meeting.

5. Quarterly workshops for ongoing management support. These will include 2-to-4-hour instructional sessions (which may be credited for Professional Development). They may be delivered in conjunction with the quarterly One-Guam TEG meetings. Proposed topics for now include:

   - NGLA Monitoring Workshop (1st quarter)
   - Production Management Workshop (2nd quarter)
   - Emerging Contaminants Workshop for GWA/GEPA (3rd quarter)
   - Use of WERI Tools: maps and database navigation, application (4th quarter)
   - Selected topics of interest to GWA, NFM, other agencies, policy makers upon request

II. ANNUALLY SELECTED PROJECTS

A. Technical Support / Studies on an as-needed basis

These topics will be identified for RFP to interested researchers during annual WERI Advisory Meetings and programmed into WERI-USGS research agendas for the coming fiscal year.

Topics suggested by GWA for FY2023 and the near future include:

1. Scientific support for cesspool and septic tank (C&ST) elimination (ongoing for FY22–FY23)
2. Scientific support for Production Pumping Rate optimization (proposed for FY23–FY24)
3. Well siting optimization: re-siting vs. rehabilitation of wells (proposed for FY23–FY24)
4. Study of correlation between vadose zone thickness and nitrate concentrations
5. Studies of stormwater impacts on NGLA and other infrastructure

PROPOSED/ANTICIPATED SCHEDULE

September 2022

- Thu-Fri, 1-2 Sep: *AWWA Meeting*, Hybrid.
    - Annual meeting with presentations, business session, field trips
- Thu, 1 Sep: *WERI Regional Advisory Meeting*, Online w/Guam, CNMI, FSM advisory groups
    - Held in conjunction with the AWWA meeting
    - WERI faculty and students present reports on projects, solicit suggestions
- Thu, 15 Sep: WERI on-site/in-person advisory meeting/workshop in CNMI, Saipan

October 2022

- WERI faculty begin proposals for One-Guam cycle, in consultation with GWA, NFM, others
- Thu, 20 Oct: WERI on-site/in-person advisory meeting/workshop in FSM, Pohnpei
- Technical Experts Group Mtg, 1st Quarter FY2023: NGLA Monitoring Workshop

November 2022

- Thu, 10 Nov: *WERI Guam Advisory Meeting and Annual Workshops*, Tumon, hybrid:
    1. *WERI Mission: Who We Are and What We Do*, 20 min.
    2. *State of the Aquifer Workshop:* WERI & USGS SOTA presentations, discussion, instruction, 2 hrs
    3. *Aquifer Model Update/Developments Workshop:* WERI, USGS, 1 hr. each)
    4. *Guam Drought Resiliency Workshop / Plan Review for Northern Aquifer and Southern Watersheds* (WERI, USGS, 1 hr. each)
- WERI faculty prepare proposals for coming One-Guam funding period, with GWA, NFM.

December 2022

- WERI faculty submit One-Guam (GHS) proposals to WERI directorate to prepare One-Guam Budget in coordination with USGS for inclusion in UOG budget
- WERI faculty submit USGS 104b proposals to WERI director for forwarding to USGS.

January 2023

- WERI directorate submits One-Guam Budget to UOG, which submits budget requests to Legislature/GWA and NFM
- TEG Mtg, 2nd Quarter FY2023: Production Management Workshop

February 2023

- WERI faculty submit One-Guam (GHS) proposals to WERI directorate to prepare One-Guam Budget in coordination with USGS for inclusion in UOG budget

March-April 2023

- WERI Aquifer Field Trips: Senior Executives, Professionals
- UOG Budget Hearing at Legislature
- TEG Mtg: Emerging Contaminants Workshop (GWA/GEPA, 3rd Quarter, FY2023)

May 2023-June 2023

- Summer fieldwork, laboratory work, travel, training gets underway for funded projects
- UOG budget approved by Legislature's committees, allocations made, budgets finalized

July 2023

- TEG Mtg: Use of WERI Tools (maps and database navigation, application, 4th Quarter, FY2023)

August 2023

- Legislature acts on GovGuam FY2023 budget
- Final CWMP and GHS plans/budget presented to Legislature per PL 24-161, 247