APPENDIX 1N:

COMMENTS AND RESPONSES
(Edition 01, May 11, 2007)

SPECIAL NOTICE

To be sure that interested persons have the most recent edition of this Appendix to the Water Resources Master Plan 2007 (WRMP 2007) Please check the GWA web site:

< http://www.guamwaterworks.org >

Look under the master plan Volume 1:
Appendix 1N Comments and Responses

Part I

REVIEWER COMMENTS

(This section will be revised and expanded
whenever reviewer comments are received by GWA)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

January 17, 2007

David Craddick
General Manager
Guam Waterworks Authority
P.O. Box 3010
Hagatna, Guam 96932

Re: EPA Comments on GWA's Draft Water Resources Master Plan

Dear Mr. Craddick:

The Environmental Protection Agency, Region IX ("EPA") has completed its review of the Draft Guam Waterworks Authority's (GWA) Water Resources Master Plan (WRMP) Report, dated October 30, 2006. The GWA Draft WRMP Report lays out a comprehensive financial program, recommended capital improvement projects and schedule to move GWA toward compliance with Clean Water Act and Safe Drinking Water Act requirements. The Draft WRMP Report addresses EPA's minimum requirements of developing the key tasks specified in our Stipulated Order including, but not limited to, a financial plan, assessments, hydraulic model, GIS, and identification of needed improvements, etc.

Although a significant effort has been made to gather, assess and recommend needed improvements, EPA strongly believes that the GIS and hydraulic model are not to a point to clearly recommend and identify critical capital improvement projects, especially with respect to GWA drinking water system. The GIS and the hydraulic model need to be further developed and ground truthed/validated to an acceptable level prior to formalizing recommendations and identifying specific drinking water system capital improvement projects. EPA believes that the recommended drinking water improvement projects need to be more generalized at this time until the GIS and hydraulic model is at a more acceptable level. The capital improvement cost estimates for these projects are still good figures and should be used for financial planning purposes.

Attached are our detailed comments on GWA's Draft WRMP Report. GWA must provide a revised final master plan, which incorporates our comments, for EPA's review and approval. GWA must provide a response to comments with the submittal of a revised final WRMP to ensure that our comments have been adequately addressed.

If you have any questions, please contact me at (415) 972-3769 or Barry Pollock at 415-972-3563.

Sincerely,

//S//Michael J. Lee
Guam Water Program Lead
Pacific Islands Office

Enclosure
cc: Consolidated Commission on Utilities
P. Kemp, GWA
D. Antrobus, GWA
Administrator, GEPA
J. Jocson, GEPA

USEPA Region 9 Review Comments **January 17, 2007**

Guam Waterworks Authority
Water Resources Master Plan (WRMP)
Draft GWA WRMP Report (October 30, 2006)

VOLUME 1 - BACKGROUND

General Comments:

1. Chapter 14 – Financial Program, Projected Expenditures and Revenue Findings (14.12.1): The WRMP proposes two alternatives to the pace of construction which are described as the "Base Case" and "Minimum Pace" CIP. The WRMP recommends that GWA implement the "Minimum Pace" CIP to limit the short-term rate-based revenue requirements to six percent per year and that a higher percentage year rate would be unacceptable to the Guam Community. While it is understandable to keep yearly rates to a minimum, implementing the "Minimum Pace" CIP will significantly delay compliance in certain situations, especially with respect to wastewater treatment plant improvements (Agat and Baza Gardens Sewage Treatment Plants). The CIP budget schedule should be adjusted to accommodate wastewater treatment plant improvements as per the "Base Case" CIP with respect to the Agat and Baza Gardens facilities.

Prioritization of the recommended water system CIP projects should be reassessed given EPA's concerns regarding the need for the GIS and hydraulic model to be further developed before making specific CIP project recommendations (see Volume 1 – Water System, General Comment 1. below). The GIS and the hydraulic model need to be further developed and ground truthed/validated to an acceptable level to confirm currently recommended or the recommendation of new water system CIPs. This should be a high priority project to be completed within the next year.

2. Annual Debt Service - Please show the calculations for determining the annual debt service for the expected bonds. How does the payment on a 6%, 30 year, $88M bond equal $7.1M?

3. Power Costs - Do the power costs reflect increases due to expected upgrades of water and wastewater treatment processes or is a unit rate per gallon always assumed?

4. Production Needs and Navy Water – If overall production needs drop in future years, why are there still purchases from the Navy?

VOLUME 2 - WATER SYSTEM

Note - In some cases, comments made by EPA, on the 4/7/06 Draft WRMP (comments sent to GWA in July 06) have not been completely addressed. Those comments are referred to using the numbering system provided in the "Response to comments" which was provided by GWA's contractor to EPA, via their November 30, 2006 "Draft GWA WRMP (4/7/06 submittal) USEPA/SAIC/GWA/GEPA Comments" document.

General Comments:

1. It is not clear that the water system GIS and hydraulic model has been sufficiently developed, ground truthed, nor calibrated to make detailed, specific distribution system recommendations. It

is not clear that the data in the GIS, which the hydraulic model is based upon, has been sufficiently ground truthed and includes sufficient data to consider the model adequately developed and calibrated at this point to recommend specific water system capital improvement projects as presented in the WRMP.

The water system hydraulic model as currently configured has been used to generate numerous capital improvement projects, in particular, specific water distribution, transmission, storage and pressure system upgrade projects. In general, the model, based on information available and as currently configured, correctly indicates that a significant number of water distribution, transmission, and storage system improvements are necessary, EPA believes it is only sufficient for conceptual planning and project development at this time. Further, EPA believes that until the GIS and the hydraulic model are further ground truthed, calibrated and tested, that it should not be used as a basis for recommending specific CIP improvements and prioritization for the water system.

2. **Water System Reservoir (Storage Tanks) – Current status, and current and future needs (locations and capacities) are still not clearly described, and appear to be understated.** EPA believes that there are likely more immediate/ critical storage tank issues, needs and CIPs that are not clearly identified, that should be included in the WRMP as proposed CIP projects. The report mentions that there are at least several areas in the distribution system that as currently configured, there are no storage tanks serving those areas (i.e. areas served only by direct pumping from wells or booster pumps), but the CIP projects do not appear to clearly address those areas. There appear to be other parts of the distribution system / pressure zones that are currently underserved by storage, or where existing storage is "out of service" – these areas are also not clearly addressed in the WRMP. A very small number of "Current Need" CIPS for Water Tanks are proposed. In addition, although there is some scattered discussion throught the document, there is not one location where there is a clear, concise, summary of the long term storage needs in terms of capacity and location of storage tanks

See more detailed comments in the chapter specific comments.

3. The identification and need to replace 2" and 4" water pipelines has still not been clearly addressed. As noted in EPA's comments on previous drafts, we believe that replacement of existing 2" and 4" pipe will likely yield far greater benefits than many of the proposed projects which are incremental upgrades (for example upgrading 6" to 8", 8" to 10") and are designed primarily to meet minimum fireflow standards. Although meeting fireflow standards is important, we believe that the grossly undersized pipes represent significant fireflow and pressure problems, and that more effort needs to be made in identifying and developing projects to replace the severely undersized water lines, as these are likely higher priority for life and safety. This has not yet been accomplished.

<u>Chapter Specific Comments</u>:

Water System Summary

1. Page 2S-1 – Pump capacities should be stated in GPM, not HP. Last paragraph - "pump capacities range from 50 to 755 hp". HP is not capacity, HP is motor size. Pump capacity is usually stated in GPM. Restate well capacities range in GPM

2. Page 2S-2 – Areas of the distribution system where there is no reservoir storage provided for are not adequately identified and addressed. "Pressure Control"- This section mentions "…booster stations *where a reservoir does not exist"*. … This is an important point which is not adequately discussed in the WRMP. There are areas of the water distribution systems that do not have any

distribution reservoir/storage tanks. This is not adequately described in greater detail in Ch. 8, the more detailed description of water system facilities.

Areas with no storage should be discussed, as all these areas should be provided with adequate storage. This does not seem to be reflected in the current list of proposed CIP projects. This should be corrected.

3. Page 2S-3 – Number of Reservoirs in/out of Service is not clear (Summary of Reservoirs). This section is unclear - it states "….total of 36 reservoirs……Seven are out of service…. 1 abandoned".

Does this mean there are 28, or 29 reservoirs in service, or 43 reservoirs, 35 or 36 of which are in service? This should be clarified and should be in agreement with other summaries of reservoirs in other parts of the WRMP.

EPA notes that this section states that approximately 20% of the tanks are out of service or abandoned, but the report does not address any of the obvious questions - why are these tanks out of service? Does "out of service" imply that they can be rehabilitated and brought back into service, or are they permanently out of service? Do these tanks need to be replaced or rehabilitated, i.e., are they important for the current and future proposed system hydraulics – pressure and flow?

This does not appear to be addressed anywhere in the WRMP. Are these out of service tanks included in the storage summaries included in Tables 6.3(a) through (c)? What are the implications of their being out of service (i.e., do they need to be rehabilitated and/or replaced with new CIP tanks?).

As noted elsewhere in these comments, summary of all the Storage Tank status and issues is not clearly covered in the WRMP in any one place, although there is a lot of information scattered throughout the document. A full and complete discussion of current storage reservoir situation, immediate needs, and long term storage needs should be provided and summarized in one place (could be in Chapter 1.6, or Ch 7). (Note other related comments 4, 10,11, 12, 15, 17 below)

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Chapter 1

4. Page 1-1 - GWA Facilities – Storage capacity. It would be helpful to also list the storage capacity (in Millions of Gallons) as a column in this table, in addition to the number of storage tanks. The number of tanks does not provide much information, while the total capacity is the critical parameter. (Note – if this information is presented elsewhere, it could be cross referenced here).

5. Pages 1-7 through 1-19, Section 1.2 - GWA Water Sources - Wells 1.2.1, **Page 1-8**.
No down-the-well assessment was performed and this should be so noted. As per previous comments, (WIP comment #117, 212 and 213), no down-the-well assessment was performed. There may be significant costs associated over the next 20 years due to deteriorating down the-well assets, including casings, drop pipes, screens, etc. It should be stated in the Final WRMP that the down the hole assets were not assessed and that they should be.

6. Table 1-3 GWA Wells. Discussion of "Wellhead buildings" is not complete. This table does not differentiate those well head buildings owned by GPA (generator buildings) vs. those owned by GWA (built only to house chlorinators and associated appurtenances). In some cases, the chlorination set up (gas cylinders, booster pump, etc.) is in a separate facility (wellhead buildings) owned by GWA – typically a separate, small CMU building with just the chlorinator cylinders, booster pumps, etc. In other cases, wellhead buildings are owned by GPA and chlorinators are housed in a separate room in a larger

CMU building which also houses a GPA generator in a separate room. Many of the buildings owned by GWA are in serious disrepair and either require complete replacement or major upgrades. Some wellheads do not have buildings at all – i.e., chlorinators, booster pumps and associated appurtenances are outside, posing a safety threat. This may be a significant CIP and the numbers, conditions, and costs of upgrading/rehabilitating should be described. The cost needed to bring all the chlorination systems up to required levels is not discussed.

This comment is similar to comments #120 and #121 from EPA comments on the 4/7/06 submittal, and has not been adequately addressed in the latest Draft. The response says "information about the general condition of the buildings is provided in the condition assessment in the appendix", and "additional information about chlorination systems is in the asset inventory". Referencing the asset inventory does not provide sufficient information on the asset condition, need for replacement or repair, nor costs associated with any CIPs needed to upgrade/rehabilitate the chlorination facilities. Summaries of the assessment and costs should be included in the main text of the Report. If there are already projects in place to address these concerns (chlorination systems and chlorination equipment buildings), they should be described.

7. Page 1-20 – Chloride levels – balancing water quantity needs with chloride levels - discussion should be clarified. Discussion of chloride levels. The 250 mg/ chloride MCL is a secondary ("aesthetic") drinking water standard, not a primary ("health-based:) standard, is based on taste concerns, not health, is not an enforceable standard. Although rising chlorides is an important concern and ideally the water system should be operated to minimize excessive or rising chloride levels, it should also be noted in the text that the need for adequate water supply must also be considered when balancing pumping rates vs. the desire to minimize rising chloride levels.

8. Pages 1-25 through 1-30 - Discussion of Ugum WTP solids processing and disposal not included.
As per EPA"s previously submitted comment #125 on the 4/7/06 draft WRMP, there is still no discussion of solids processing and backwash water CIP's needed for Ugum WTP. This should be included as it may be a significant cost. If it is already covered under an existing or proposed project, that should be included.

9. Page 1-31 - Transmission and Distribution – Inadequate/unclear description of, and conclusions on 2" and 4" water line – current situation and needs to replace.
The paragraph describing the estimated number of feet of pipe less than six inches is confusing. It is stated that one inventory indicated there was approximately 55,000 feet of pipe of less than six inches; while another survey stated that there is approximately 540,000 feet of pipe less than six inches, with 400,000 of two-inch diameter.

This is an order of magnitude difference and needs to be clarified. If there is 400,000 feet of two-inch pipe, or close to it, ultimate replacement of this pipe (as would presumably be required for minimum flows) will be a very large, significant additional CIP cost. Even replacement of 55,000 feet will be a significant cost, and is not currently listed as a priority CIP project.

GWA must provide its best estimate of the true footage of inadequately sized (sub 6") pipe in the system and replacement costs, and add as appropriate to list of CIP projects.

EPA continues to believe that 2" and 4" pipe replacement may be a significant and critical project, is likely a higher priority in some areas than replacement of larger size pipe just to meet fireflow, and has not been adequately addressed nor prioritized high enough in the draft WRMP.

10. Page 1-58 - Reservoirs. Storage status and needs (immediate and long term) need to be clearly described Table 1-14. Reservoirs. This is similar to previous Comment #130 and related to General Comment #2 above. Comment #130 is still not adequately addressed. The WRMP still does not clearly explain and define existing and future needs for storage, including locations (by pressure zone) and tank sizes (capacity) required. This section would be a good place to clearly indicate the conclusions as to where there are current storage needs, by pressure zones, and long term storage needs.

The large number of currently out of service storage tanks, as indicated in this table, seems to imply that there may be an existing, serious, storage deficit for all three water systems.

11. Page 1-60 – Conclusions on Storage Reservoirs incomplete. Section 1.8 Conclusions. There is no conclusion drawn related to the adequacy of the existing storage reservoirs, there is only a conclusion that "reservoirs show significant corrosion".

As per previous comments and based on our review of the Draft WRMP, EPA believes that due to current system design concerns (including capacities, condition and locations of tanks, tanks currently out of service and/or abandoned, etc.) that there are likely additional, significant, immediate (2005) water storage needs. This should be clarified in the Final WRMP. In addition, the long term storage needs should be clearly laid out in one place.

12. Page 1-61 - 1.10 - CIP Projects –Storage tanks and Distribution lines left out. Two major areas are left out – need to add bullets for **Distribution System Storage Tank needs** and **Distribution system line replacements or additions**, as these both are significant parts of the proposed CIPs.

Chapter 2- Regulatory Issues

13. DBP compliance issues not correctly characterized. Section 2.5.4, Page 2-21 - Discussion of DBP's. Previous comment #160 - Regarding DBP compliance. In the latest draft WRMP it is stated that "*The Ugum WTP's planned upgrade to membrane……. will …improve the removal of precursors that can lead to DBP formation*". In fact, the opposite is likely the case - membrane (micro) filtration is typically less effective at DBP precursor removal than conventional treatment (which it will be replacing) which includes enhanced coagulation, flocculation, sedimentation and filtration. The pilot studies for the proposed membrane plant at Ugum indicated the potential for future problems with increased DBP formation, potentially resulting in exceedances in the distribution system. That study should be referenced.

At this time, there may not be sufficient information and data to indicate whether S2 standards will be exceeded and what sort of additional treatment would be necessary if S2DBP standards are exceeded. However it should be mentioned that this is a possibility and that additional treatment may be necessary in the future. This should also be clearly reflected in Section 2.7, Recommendations.

Chapter 6 – Water System Hydraulic Model

14. Conceptual Hydraulic Model - Section 6.8, Conceptual Model Calibration, notes the model is not the typical or standard method of calibrating a hydraulic model and results are surprisingly encouraging given limitations of GIS data which it is based on.
Section 6.8.2 (Preliminary Calibration) and Table 6-5 (Preliminary Pressure Calibration Data from Key Locations) notes +/- 20% of field measurement okay but overall 6/14 of field sites had anomalies. What

does this mean or how does this impact the model, its assumptions and the specific CIP recommendations derived from it? How accurate are the pressure zone boundaries given the model limitations?

Chapter 7 - Water System Assessment

15. Storage Tanks not adequately assessed - As previously noted, this chapter (and Chapters 1 and 8), do not adequately describe or assess Storage Tanks - number of tanks, capacity, issues associated with pressure zone areas not provided with adequate storage. This is a significant gap in the draft WRMP. Storage tanks are a significant capital asset for GWA. It is known that many of the tanks which are still in service are in very poor condition - for example, there are several tanks which were built at the same time, with a similar or same design, and likely in similar condition as the Barrigada tank that failed catastrophically in 2005. Even if these tanks have not yet been thoroughly inspected and assessed, it can be reasonably assumed that most of these tanks will require replacement at some point over the next 20 years.

16. Wells, booster stations, chlorine treatment plant assessments not adequately summarized in assessment chapter. This chapter only provides very general summaries of those assets that were "assessed". It does not specify estimated repair and replacement dollar amounts for these assets (wells, booster stations, chlorine treatment plants, etc.). If there are significant CIP costs associated with this assessment, they should be listed. If they are found in other parts of the document, including appendices, they should be summarized /listed here, not just refer to appendices (especially as some of the appendices are included as CD's and not hard copy text and are difficult to access).

Chapter 8 - Water System Facilities

17. Overall water system Storage/Reservoir needs are still not clearly summarized, described, and assessede; and CIP needs may be seriously understated (Chapters 8 and 9). In Chapter 8 there is no Section titled "Reservoirs", which in text, clearly and succinctly summarizes all aspects of the current status of distribution system storage reservoirs - including the total # of reservoirs and storage capacity by pressure zone; a general summary of their condition (and how that may impact CIP's), and a clear summary of the adequacy of storage tanks in terms of storage capacity (taking into consideration all the criteria listed in 8.3.1.3, which lists the criteria for sizing reservoirs, but does not summarize nor make conclusions about the current reservoir size and capacities).

There is a Table (8-9) with 2005 CPM Recommended reservoirs, but there is no text in this chapter, clearly describing how this table (i.e. how these particular projects, of all storage tank needs) were selected. This table implies that there is only a current (2005) need for **0.3 MG** of additional storage at this time (not including the replacement of the 2.0 MG Barrigada tank which failed catastrophically, and is also listed as an immediate 2005 need). This seems to be in conflict with other parts of the WRMP. For example Vol. 2, Chapter 6, Hydraulic Model, Tables 6.3 a. through c., which list water supply parameters (including existing storage) by pressure zone for the 3 systems, list **3 existing pressure zones** and **2 proposed pressure zones (i.e., 5 pressure zones),** which currently have **0** Storage Capacity. Based on these tables, the combined demand of the areas served by these areas is approximately 2 MGD. This would seem to imply that at a minimum, there is a current need for at least an additional **2 MG** of storage (assuming a de mimimus one day storage capacity, which is similar to the rest of the system). This would be far greater than the 0.3 MG of storage laid out in the WRMP CIP and would increase the current, immediate CIP needs by an estimate $5-$10 Million dollars, based on the other cost estimates in the WRMP. Why is storage for these areas not included in the immediate (2005 CMP) needs?

Chapter 9 – Recommended Water System CIP

18. The Northern System Water Distribution System 2005 Improvements (Table 9-11) lists 43 separate CIP projects. Are these projects priority ranked? If not, what are the highest priority projects? Or should the No. Dist System CIP's be broken into 2 or 3 parts based on priorities? Or should this be dealt with after the finalization of the WRMP?

19. Southern and Central Recommended CIP - Does the Central Distribution System cover/impact more customers than the Southern Distribution System? If so, should the Central be a higher priority because it will have the most impact customer wise and cost less to completer? Which is the higher priority and the most impact? The Southern Distribution system's estimated costs is $23 million and Central is $6 million.

20. Northern Water Trans Lines (raw water) CIP – Targeted budget period is in 2011 but distribution improvements (2025) don't start until 2021. Wouldn't the WTL and Distribution projects need to be schedule closer together so that as the transmission lines come on line they will not adversely impact the distribution system or will the 2005 distribution improvement CIPs mitigate the affects of the transmission line improvements?

VOLUME 3 – WASTEWATER SYSTEM

Chapter 9 - Recommended Wastewater System CIP

1. Table 9-10 Hagatna STP Pump Station Improvements: The Hagatna STP Pump Station Improvement CIP projectr covers improvements to the Hagatna Main, Asan and Tegungan Sewer Pump Stations. Recommend that the CIP heading be changed to Central District Pump Station Improvements to more clearly describe project area. EPA recommends that the Asan and Tegungan SPS improvements be moved forward in the budget year schedule if the pump station deficiencies are currently causing sewer system overflows.

2. Table 9-16 NDSTP and Hagatna STP Unsewered Properties – Sewer Hookups:
The schedule for this CIP project should be scaled back or delayed further in the budget schedule for few years. As an interim measure GWA should implement the Sewer Hookup SRF program. Deferring implementation of this project would help allow for funding of other projects such as the Agat and Baza Gardens treatment plant facility planning/designs and replacements.

3. Table 9-17 NDSTP and Hagatna STP Unsewered Properties – New Sewers:
These projects should be pushed back further on the budget schedule for several years to allow other project to be completed sooner such as the Agat and Baza Gardens treatment plant facility planning/designs and replacements.

4. Table 9-18 NDSTP and Hagatna STP - Additional Sewer Hookups: See comments No. 2 and 3 above.

5. Table 9-24 Agat STP Fac Plan and Table 9-25 Agat STP Replacement:
Move budget schedule up as per Base Case CIP schedule. Under the "Minimum Case" CIP schedule compliance would not take place until after 2015. Under the "Base Case" CIP schedule compliance is already delayed to sometime after 2012. The Agat STP has been in chronic non-compliance for many years already and needs to be addressed in a more reasonable time frame.

6. Table 9-26 Baza Gardens STP Fac Plan/Design and Table 9-27 Baza Gardens STP Replacement: Move budget schedule up as per "Base Case" CIP schedule. Under the "Minimum Case" CIP schedule compliance would not take place until after 2013. Under the "Base Case" CIP schedule compliance is delayed to sometime after 2011. The Baza Gardens STP has been in chronic non-compliance for many years already and needs to be addressed in a more reasonable time frame.

GUAM ENVIRONMENTAL PROTECTION AGENCY

AHENSIAN PRUTEKSION LINA'LA GUAHAN

P.O. Box 22439 GMF • BARRIGADA, GUAM 96921 • TEL: 475-1658/9 • FAX: 477-9402

FEB 12 2007

MEMORANDUM

TO: Mr. David Craddick, General Manager
Guam Water works Authority

FROM: Administrator

SUBJECT: **GWA's October 2006 Draft Water Resources Master Plan**

Buenas Yan Saluda,

In addition to Guam EPA's comments on the subject master plan that was submitted to your office on January 17, 2007, the attached comprehensive review of the October 2006 Draft Master Plan by Water and Environmental Research Institute (WERI) is being submitted as an additional Guam EPA comments and recommendations. It is crucial that GWA incorporate them in the Master Plan. It is our intention to collaborate with GWA by providing essential information in order to refine the Master Plan which will serve as a road map to improving your facilities.

WERI in coordination with the staff of Guam EPA is working towards running the hydraulic modeling used in the Master Plan. Upon the acquisition of the water map software from WERI, Guam EPA is requesting for any updated data for the model that GWA may have at that time. We will provide your Agency all findings and recommendations that will be generated from the model and it will also be a part of our review/comments of the Master Plan.

The Safe Drinking Water (SDW) Program of Guam EPA has records of comprehensive Sanitary Surveys of GWA/PUAG water systems from 1979 to 2000. The staff of the SDW Program has 20 years experience in conducting water line disinfection with your contractors and the former employees of PUAG (GWA). It is our hope that with SDW Program's information and experience and the application of WERI's expertise in computer modeling, that the GEPA/WERI team will be able to lessen the 28% of missing data and thus, provide a more accurate picture of GWA's water system. In light of this, your cooperation to work collectively with GEPA/WERI in this endeavor is being requested.

Should you have questions and need additional information please contact Mr. Angel Marquez, SDW Program Director at (671) 475-1638 or Mr. Benny Cruz, Acting Chief Engineer at (671) 475-1641.

Dangkulo na Si Yu'us Maase.

JOHN M.U. JOCSON
Acting

Attachment
CC: Mr. Michael Wolfram, US EPA Region IX

Guam EPA's Comments to the
GWA's October/2006 Draft Water Resources Master Plan

Comment No. 93: **A section of Route 17 (Cross-Island Road) still does not fall under any water system. Figure 1-2, Vol. 2 Chapter 1 indicates that the area may receive southern or northern water. The area should reflect which water system it primarily falls under in Figure Es-1, Vol. 1, Executive Summary and Figure 1-1, Vol. 2 Chapter 1.**

Comment Nos. 179 & 180: **Guam EPA has verifiable data on the Togcha wells and the Windward Hills Golf Course well.**

Comment No. 285: **The lack of information that Guam EPA was referring on section 4.5.2.2 of Volume 3 is data such as spill reports, etc.**

Comment No. 348: **Guam Water Quality Standards can be obtained Guam EPA in order to generate a comparative cost analyses of the alternative wastewater treatment disposal systems.**

Comment No. 380: **The Guam Construction Grant Project Priority List should be reflected in the wastewater CIP since it is a CIP list funded via USEPA/GEPA.**

General Safe Drinking Water Comments:

1. **Although Guam EPA acknowledges the difficulty and extensive efforts expended developing the water system's hydraulic model, Guam EPA believes the model has not been refined to a level of reliability for the following reasons:**

    a. **The existing 4-inch, 2-inch and other 6-inch or bigger water distribution system were not accurately accounted and identified in the 2005 water system map. These are crucial in prioritizing the improvement of water pressure in the distribution system and the replacement of existing and/or inadequate water piping sizes.**

    b. **The water distribution system and its appurtenances shown in the 2005 water system map do not reflect the actual condition of the existing water distribution system and consequently the model will produce an inaccurate hydraulic analysis and inconclusive results. Thus, more extensive field investigation is needed.**

    c. **The required water storage capacity and transmission line systems were not properly evaluated to provide accurate data to be used in the hydraulic analysis of the distribution system.**

    d. **The delineation of pressure zone boundaries must include accurate sizes of the existing water distribution lines, transmission lines and booster pumps and other appurtenances to properly identify the size and location of recommended PRVs.**

As a result, Guam EPA can not make proper recommendations pertaining to the following:

i. **Water pressure at the distribution and transmission system,**
ii. **Sizes of needed water distribution and transmission system,**
iii. **Size of pumps, capacity of storage tanks, wellhead pump, etc.**
iv. **Determination of CIP projects and their prioritization,**
v. **Direction of flow, rate of outflow and inflow at the storage tanks,**
vi. **Adequacy of the delineated pressure zone, to ensure consistency and reliability of water supply,**
vii. **Verification of the proper elevation and capacity of the proposed water storage tanks, booster pumps, etc., and**
viii. **Degree of accuracy of assumed data in the model and validation of the results of the hydraulic analysis.**

2. **The needed fire protection demand (flow rate and duration) must be derived from a national standard or methods (i.e. AWWA and ISO). Land use classification must conform to those establish in the land use plan. The Hawaii standard used in the determination of fire protection requirements does not reflect the actual condition of local building codes and land use.**

3. **The quality of untreated water at the sources and treated water delivered to the consumers must be given priority over the fire protection demand when public health protection is considered in prioritizing CIP projects.**

General Note: **Guam EPA retained WERI as the contractor to review the GWA WRMP documents including the hydraulic analysis and provide comprehensive comments and recommendations as to the adequacy and reliability of the plan. Guam EPA will be submitting additional comments and recommendations to GWA when WERI completes its review/comments.**

A COMPREHENSIVE REVIEW OF GUAM WATERWORKS AUTHORITY WATER RESOURCES MASTER PLAN

By

Dr. Leroy F. Heitz P.E.
Dr. Shahram Khosrowpanah P.E.

January 2007

WATER AND ENVIRONMENTAL RESEARCH INSTITUTE
OF THE WESTERN PACIFIC
UNIVERSITY OF GUAM

INTRODUCTION

In June of 2003 Guam Water Works Authority (GWA) entered into a stipulated order for preliminary relief under agreement with the Government of the United States. The order provided for a long list of compliance items that GWA must complete in order to satisfy the stipulated order. One major item stated that GWA must prepare a Master Plan for their water supply and waste water systems. GWA hired the consulting firm of Brown and Caldwell to carry out the development of this Master Plan. The final draft has been submitted to GWA by their consultant and the Master Plan is now open for public review. The Guam Environmental Protection Agency (GEPA) contracted with the Water and Environmental Research Institute of the Western Pacific (WERI) at the University of Guam to prepare of a review of the Master Plan. The results of this review are provided in the remaining pages of this report.

MAJOR COMMENTS

1. We commend the authors of the Master Plan on the overall quality and completeness of the plan. We feel that is the most comprehensive document ever amassed that describes the water supply and waste water systems of the island. The data contained in the report itself and in the many digital data files that accompany the report will be a valuable asset to the island for years to come. It is essential that the Government of Guam and especially GWA take advantage of this landmark collection of resource data that has been accomplished by the study.

2. We are greatly concerned that GWA will be unable to find and retain technical staff to carry out the many computer automated planning and engineering evaluation programs that the Master Plan presents as essential to successful moving ahead and meeting the many stipulated order concerns. Finding and retaining competent, qualified, and licensed technical people have been an age old problem in Guam's agencies. Even with the separation of GWA from the Government there are still problems finding and retaining competent individuals. Until this problem is solved we feel it will be nearly impossible for GWA to carry out the programs presented in the Master Plan, and the consultants will have to remain on retainer forever.

3. In general we feel that the entire document is filled with too many acronyms. While this might make the document easier to prepare and may be easily understood by those developing the document, it is somewhat hard to read for someone, even a technically oriented person, not familiar with the acronyms. In order to read the document it is almost necessary to have a sheet of terms available to decode the mass of acronyms. We suggest that acronyms should in most cases be written out completely to make the document clearer and less tedious to read.

4. The population projections that were provided were made with data that were available at the time of report preparation. The recent announcements by the Department of Defense of relocation of Marines from Okinawa and realignment of new Air Force activities to Guam will present a sever perturbation in the population trends of the island and make the population projections in the Master Plan suspect. The remainder of the plan including the financial plan, resource availability plan, and the water and waste water systems capital improvements plans all depend on these population projections being correct. It is vital that these projections be updated if the plan is to have any validity.

5. The financial plan presents a means to pay for the proposed system improvements. Basically these improvements will be paid for by increases of water use rates to the customers of GWA. Most of the rate-justification calculations are based on what is termed the "Typical Customer". This typical customer supposedly has an average monthly GWA billing of $55. There is no mention as to how the typical customer was determined and how the value of $55 for his billing was obtained. A few quick calculations using the GWA billing schedule reveal that the water delivered to the "Typical" customer amounts to about 8,500 gals/month. If the typical customer has a typical household size of 3.89 (Guam census data) then the average daily use per person is only 73 gallons. While this is a wonderfully low number, the national average is in the range of 125 gal/person/day and in other parts of the Master Plan the daily rate is stated to be much higher (see comments below). The questions are: Who is this "Typical" customer? and How is his or her use rate and billing derived? The GWA customer billing rates are also compared to those in Hawaii. It is interesting to note that Hawaii's typical customer also is charged $55/ month.

6. The justification of the increased rate schedule was made using the AWWA standard that water utility billing should not exceed 2% of median income. In the Master Plan, computation of a reasonable rate was done using Guam's median family income as their basis. The difference between Guam's median household income ($30,755) and Guam's mean family income which is $41,229 is sizable. We believe the median household income should be the one used for any rate computation/comparison. We feel that one should use household instead of family income in this computation. GWA billing is based on residences or households. If one multiplies the median household income by the 2% AWWA value, we get a reasonable monthly billing rate of $51per month which is even less than the "Typical" customer who they presented as being billed at $55 per month. By these computations GWA customers are already paying a reasonable rate.

7. Various scenarios are presented to come up with what kind of rate increases will be required to fund the capital improvement program requirements. While the incremental annual rate increases proposed sound fairly low, because of the compounding factor the final rates are as much as 60 to 70 percent higher than the present rates. These high increases are dismissed lightly in the text by saying that Guam customer should easily be able to pay 4-6% of their income (2 to 3 times the AWWA recommended rate). We are not sure the rate payers will stand for this.

8. The fire flow analyses on the water system were done very thoroughly and presented some very interesting outcomes. According to the consultant, they were not able to obtain Guam's requirements for fire flows to use in there studies. They used Hawaii's criteria in all of their analyses. The results is that a large share of the required high priority capital improvement projects are for fire flow reasons (since adequate fire flow are a pubic safety issue). GWA needs to work closely with other Guam agencies such as the Guam Fire Department, the Guam Insurance Commission, and other interested parties to determine what are reasonable and applicable fire flow standards for Guam. This needs to be done immediately as it has a serious impact on the entire Master Plan.

9. The effect of decreasing the water losses in the GWA system on the health of the Northern Guam Lens was discussed in the Master Plan. The consultants felt that if the calculated 50% water loss rate could be lowered to a more reasonable value then the recovered water will be more than enough to meet future needs. One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this "artificial recharge". If this recharge were removed from the water budget with leak repairs and septic tank

reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat short sighted and that new well developments and or surface water developments in the south may still be needed to be considered.

10. To accomplish the many activities defined as essential in the Master Plan, there is a need to set up a well defined set of time oriented goals that are to be accomplished and a way of measuring if these goals are completed. We have to assume that the various software packages described in the Master Plan will accomplish this. We hope that GWA will be able to apply these programs successfully and pass along to the CCU, PUC, and their customers the necessary information so that everyone know how GWA is doing in completing the many Master Plan assignments. If GWA is unable to apply these programs then this may be another case where the consultant will have to remain on retainer indefinitely.

SPECIFIC COMMENTS

VOLUME 1 BACKGROUND

Chapter 2

2.4 We feel that the statement that Guam's average income of $50,000, although true, might be somewhat misleading. In the report referenced in this section a more reasonable rate provided is Guam's median family income. The difference between Guam's median household income ($30,755) and the $50,000 figure provided is sizable. We believe the median household income should be the one used for any rate calculation/ comparison studies. We recommend that one should use household instead of family because GWA billing is applied to residences or households. We feel that a median household income value should be used to avoid the high-side skewness that is presented when using a straight mean or average value.

2.6 We are greatly concerned that GWA will be unable to find and retain technical staff to carry out the many computer automated planning and engineering evaluation programs that the Master Plan presents as essential to successful moving ahead and meeting the many stipulated order concerns. This problem also occurs in the operation of the water and waste water systems. Finding and keeping competent, qualified and licensed technical people have been an age old problem in Guam's agencies. Even with the partial separation of GWA from the Government of Guam there are still problems finding and retaining competent individuals. Until this problem is solved we feel it will be nearly impossible for GWA to carry out the programs presented in the Master Plan and the consultants will have to remain on retainer forever. Privatization and out sourcing options may be one means of coming to grips with the dilemma.

Chapter 3

3.2 Figure 3-1 Where does the PUC fit into the picture? They are part of the rate setting process, therefore they are very important to the success of all of the Master Plan programs.

3.8 What proof is there that there has been a reduction in complaints? It is very important that GWA continues to become more responsive to its customers. If one listens to the local talk shows it appears that many complaints go ignored or unanswered. The lack of major typhoon activity is one important consideration that needs to be considered when discussing

improvements from 2003 forward. The last major typhoon that occurred on Guam was in December of 2002. Typhoons are major stressors to all of the utility systems in Guam. They lead to power and water outages pumps system failures, sewage overflows etc. One must be careful in attributing all improvements during this period merely to administrative efforts. These improvements may well be partially because the systems weren't stressed as severely during that time period.

3.10.1 We have examined the waste water system GIS files and have found locational discrepancies through out the island when compared to satellite imagery. These discrepancies are not all due to the difference in projections used. These discrepancies will need correction if the data is to be useful in locating resources.

3.14 It is vital that salaries offered to employees reflect the certification level achieved. These salaries need to be competitive with those offered in the US mainland for similar positions or we will never be able to attract new qualified individuals or retain those who have worked hard to become qualified.

Exhibit 3A- The GWA organization chart shows 7 engineering positions including the Chief Engineer. In the past it has been extremely difficulty to recruit and retain qualified people in these positions. The civil service salary structure for these positions has presented an almost insurmountable obstacle for GWA and other Guam agencies to fill these highly technical positions. If the Master Plan is to be carried out successfully all of these positions need to be filled with well qualified people. Government of Guam agencies should make a concerted effort to get the civil service engineering salary schedule in line with salaries offered in the US mainland. All engineers should be urged to gain engineering intern and eventually professional engineer status with pay increases commensurate with there licensing level. Presently and in the past the Chief Engineer at GWA has been a temporary assignee from the public health service. While these people have provided valuable expertise and have provided great service to the utility, their coming and going has failed to maintain a good institutional memory at the top engineering level of the utility. We would suggest that all efforts should be made to recruit a utility experienced chief engineer who is a licensed professional engineer in the Territory of Guam who can also be expected a long term commitment to the utility.

Chapter 4

Figure 4-1 We do not understand the significance and the use of this figure.

4.3.1 Reduction in boiled water notices may be due to lack of typhoons since December 2002. See 3.8 above.

4.3.2 Where does the 10% figure for intermittent water outages and low pressure come from? Needs further study.

4.3.4 May be same reason as 4.3.1 above.

4.4 Need more details about how recording and maintaining performance measures will be accomplished. This is very important for improvements in service.

4.4 step 6 This sounds great, but we are not sure whether we understand what it really means and whether it will ever be carried out.

Chapter 5

5.7 We attended one of the public hearings for the Master Plan. We noticed that the presentation was poor and unorganized. There were no handouts and the Master Plan costs and rate increases were not discussed.

5.9 Should this list have customers first?

5.10.1 Does this end after the Master Plan is completed or will the consultant be involved indefitely.

Chapter 6

6.3.3 and the remaining of chapter 6. The population projections that were provided were made based on available data at the time of report preparation. The recent announcements by the Department of Defense of relocation of Marines from Okinawa and realignment of new Air Force activities to Guam will present a sever perturbation in the population trends of the island and make the population projections in the Master Plan suspect. The remainder of the plan including the financial plan, resource availability plan, and the water and waste water systems capital improvements plans all depend on these population projections being correct. It is vital that these projections be updated if the plan is to have any validity.

Chapter 8

8.4.8 How large and how well trained will the IT group need to be to handle this?

Chapter 10

Not sure if GWA will be able to handle the CAPE software. This software might require extensive training and new staff. If GWA staff can't handle, it may require retention of consultant indefinitely. Is this what GWA has in mind?

Chapter 11

Well Done.

Chapter 12

12.1 Besides those listed as factors affecting GWA services, other items that could impact the GWA service are storm damage and vandalism should be included.

Chapter 13

SCADA is wonderful as long as it is maintained and not sabotaged because it is seen as a replacement for employees. SCADA was tried and failed miserably in the past.

Chapter 14

Table 14-1 The table indicates that the annual household income will increases 2.5% annually over the next six years. The compounding affect means that it is expected that household incomes will rise by 16% over the next 6 years. What data is used to support these increases? There have been no sizable increases to Government of Guam wages in the last 10 years.

14.3.1 There is very little information on the actual calculations that went into developing the costs of the Capital Improvement Projects. It is hard to comment on assumptions made in this section.

14.9.1 There is no mention as to how the "typical" customer was determined and how the value of $55 (which is shown on several tables) for his billing was obtained. A few quick calculations using the GWA billing schedule reveals that the water delivered to the typical customer amounts to about 8,500 gal/month rather than the 8,000 gallons shown in table 14-35. If the typical customer has a typical household size of 3.89 (Guam census data) then the average daily use per person is only 73 gallons. While this is a wonderfully low number, the national average is in the range of 125 gal/person/day and in other parts of the Master Plan the daily use rate is stated to be much higher. The questions are: Who is this <u>typical</u> customer? and How is his or her use rate and billing derived? The GWA customer billing rates are also compared to those in Hawaii. It is interesting to note that Hawaii's typical customer is also charged $55 per month (table 14-46). If we assume the typical household on Guam has 3.89 individuals (Guam census information) and multiply this rate by a typical US accepted rate of 125 gal/person/day, we get a monthly use rate of 14,709 gal/month. If we run this consumption through the GWA billing schedule we would get a typical bill of $76.97 rather than the $55 amount which is shown on the tables.

Because of the compounding effect, the eight percent (8%) rate increase scenarios presented

in Table 14-35 result in a total of 65% increase (($90-$54.58)/$54.58= 65%) in rates in the six year study period. We are not sure the CCU, PUC, or rate payers will stand for these kinds of increases.

14.10 and 11 Various scenarios are presented to come up with what kind of rate increases will be required to fund the capital improvement program required. While the incremental rate increase sound fairly low, because of the compounding factor the end rates are as much as 60 to 70 percent higher than present rates. These high increases are dismissed lightly in the text by saying that Guam customer should easily be able to pay 4-6% of their income (2 to 3 times the AWWA recommended rate). Again, we are not sure the CCU, PUC and rate payers will stand for this. Table 14-44 presents a comparison of household incomes against affordable billing at the 2% percent rate. The right side of the table compares the percent of income if all customers had the "typical" bill of $55. This is ludicrous first since the $55 dollar per month billing is low and secondly assuming those who's household incomes are over $93,000 have the same water demands (and thus billing) as those who's income is $8000. It is difficult for us to understand the reasoning behind this computation. Another factor that was left out of the computation is that those customers on septic tanks are not paying sewer charges as part of their billing. The Master Plans advocates and aggressive campaign to get the non-sewered households on sewers. This increased revenue do these improvements must be fitted into the calculations.

The justification of the increased rate schedules is made using the AWWA standard that water utility billing should not exceed 2% of median income. In making their computation of a reasonable rate they use Guam's median family income as their basis. The difference between Guam's median household income ($30,755) and Guam's median family income which is $41,229 is sizable. We feel that one should use household instead of family because GWA billing is based on residences or households. If one multiplies the median household income by the 2% AWWA values we get a reasonable monthly billing rate of $51 per month which is even less than the "typical" customer who they presented as being billed at $55 per month. By these computations GWA customers are already paying a reasonable rate. Any future increase will push GWA's rates far above the AWWA recommended levels. In addition, increases in the commercial sector will cause additional inflationary pressures on Guam's fragile economy.

14. 11 There needs to be some setting of annual goals for the Master Plan. This should include:

- What improvements are expected and how these improvements will be measured and reported.
- Which Capital Improvement Program projects will be completed and how will the successful completion be measured and reported.

VOLUME 2 WATER SYSTEM

Chapter 1

1.2.1 Table 1-3 It appears that many wells are pumping at rates greater than those allowed in the EPA permit for the well. Is this a problem? Also there should be a clarification between the the difference between secured an in-active on this table.

1.2.1 The chlorinator descriptions reveal that the injectors are non-pacing. Are these adequate assuming some variability of pump discharge occurs? Also the locations of many of the chlorine stations are next to schools and residential areas. This presents a real safety problem especially when other parts of the Master Plan reveal that the safety equipment at the chlorination sites is not working properly. Also in Table 1.4 and 1.5, Chloride levels

seem to be a problem in some of the wells. Pumping rates should be adjusted to maintain acceptable levels even if it means pumping at rates lower that the EPA permitted values.

1.2.3 One must be very careful in planning on the increased flows from improvements to the Ugum Treatment Plant. The Ugum River water supply has two problems that can limit production. The first is during low flows there is a requirement that at least 2 cfs must pass the diversion structure for downstream conservation purposes. Secondly at high flow rates the turbidity might be so high as to render treatment impossible. Rather than just use the duration curves approach presented, it might be good to run actual flow values and estimated turbidities through a simulation model of the diversion and treatment plant operation. This could provide a more accurate estimate of long term water availability to the plant. It's quite likely that this kind of study would illustrate the importance of some kind of raw water storage facility at the site.

Chapter 2

2.4 The statement that there is a lack of turbidity reading that parallel rainfall events is a bit misleading. We feel that there is not sufficient data available at this time to establish whether or not there is a significant relationship between rainfall and turbidity in the aquifer. That is a topic for future study.

2.5.1.1 The reduced number of coliform hits during the period 2003-2005 could be a result of a lack of typhoons during that period. There has been no typhoon activity in Guam since December 2002. Typhoons with their accompanying high rainfall and winds wreak havoc on the utility systems of the islands causing power failures and island wide pumping problems. These failures can cause sewage backups and spills. The depressurization of portions of the water system after typhoons has also cause contamination problems in the past.

2.5.8 The Master Plan states that scores improved on the operator certification exams. More importantly, how many people actually passed the exam?

Chapter 3

3.1 The second line makes a reference to Hawaii that really has no place in this section of the report. We do not feel that any Ground Water Under the Direct Influence (GWUDI) of Surface Water ruling will limit the availability of fresh water from the aquifer. It is quite likely that a GWUDI ruling may severely affect the costs of water delivered from the aquifer and the costs of the Capital Improvement Program outlined in the Master Plan. Guam is not two separate island sutured together along the Pago-Adelup fault. That is far too simplistic of a representation of the islands geology.

3.3.2 There is a problem in using South Guam evapotranspiration rates for Northern Guam. The soils in the north are different, and the soil depths are much shallower. Also the types of vegetative cover are quite different.

3.4.1 One must be careful in counting on water well development near the coastline. The freshwater lens tends to become less thick in these areas and geologic faulting and other discontinuities can greatly affect the availability of fresh water in these zones. The larger areas (which include the areas beyond the groundwater protection zone) used in the computation have an affect of increasing the assumed sustainable yield calculations beyond what might be safely extracted.

3.4.2.2 The statement that new surface water storage reservoir development in South Guam will be "very destructive to the environment" is probably not true. Fena Lake has been operational for many years on Guam and is not viewed as an environmental blight on the island. Life cycle economics must be evaluated to compare the relative advantages of South

Guam storage projects as compared to North Guam groundwater development should North Guam's aquifer be declared under the direct influence of surface water.

3.5 One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this "artificial recharge". If this recharge were removed from the water budget with leak repairs and septic tank reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat short sited and that new well developments and or surface water developments in the south may still be needed to be considered.

3.5.1 Table 3-6 Are these estimates based on the 30% extraction rate applied to the larger recharge areas discussed in 3.4.1 above? See comments above for 3.4.1.

3.5.2.2 In South Guam we may want to consider individual wells for remote houses or small subdivisions as is common in the U.S. Even the low pumping rates available in the south can provide a substantial and dependable supply of water to singly family residences or small subdivision groups.

3.6 Many GWA wells are pumping over the limits of their EPA permits. Should the EPA permitted rates be used when evaluating the resource available today?

3.7.2 Don't know what the significance is of the capture zone computation provided in this section. Because water in the aquifer is moving at a very fast pace down gradient any contaminants introduced up gradient of the well may find their way into water pumped by that well. In reality the entire aquifer should be considered as a well head protection zone.

3.9 We don't feel that Ground Water Under the Influence of surface water rulings will limit the availability of water, but they could quite possibly affect the economic feasibility of developing that water in comparison to other sources. Planning on using all the water that will be saved due to leakage reduction may be overly optimistic. One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this "artificial recharge". If this recharge were removed from the water budget with leak repairs and septic tank reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat shortsighted and that new well developments and or surface water developments in the south may still be needed to be considered. In addition when all of the new more accurate reading water meters are installed, we might find that people are using more water than preciously believed. This could indicate that losses may be less than anticipated, therefore there may be less water available for future use from existing sources.

3.10 See 3.5 above

Exhibit 3-b The calculations in this exhibit assume an average daily demand of 125 gal/person/day. This is not in line with the demands that would be computed using the "typical" billing value of $55 that was used earlier in the plan. It seems like there is no consistency in coming up with a common use rate which is so important in determining the resource used and determining correct revenue projections. It seems like old residential water billing records could have been used to determine at least an approximation of use rate even if the meter reading were somewhat in error. These predictions could be updated by comparisons with use rates for residences which have the newly installed radio-read meters. These numbers are too important to just pull them from Hawaii or what is typical in the US. Guam is <u>not</u> Hawaii or the US mainland.

Chapter 4

4.1 same as Exhibit 3-b above.

4.2 Leak survey on the customer side will not create more revenue for GWA, but could help to enhance the overall water supply.

4.2.1 May want to evaluate all storage tanks for leakage. Also check that all connections shown in the billing data base are unsewered are really unsewered and not in error. In previous studies it has been found that there were mistakes in the database where some customers are connected to the sewer and not being charged. Also GWA must concentrate on it's own water system leakage problems before enforcing controls on the customer side of the meter. Remember the customers are paying for there leaks water plus indirectly they are paying for the water pumped and leaked in the system. Also does a leak detection team of 12 people agree to what is identified in the projected costs earlier in the plan.

Chapter 5

Guam has an average of over 8 feet of rainfall per year, but the conservation program does not include any direct catchment of rain water as part of the plan. Our neighbor islands and other areas of high rainfall in the world use direct rainfall catchment extensively. This could include direct rainfall catchment to supplement rural residential supplies, large commercial split systems to provide water for non-potable uses, and combined system for residential housing where GWA water is used only when rain water supply is inadequate. All sources and means of enhancing our water supplies should be examined.

Chapter 6

6.4 We are somewhat confused about how the head vs. discharge relationships were set for the pumping wells in the model. It appears that the design flow was chosen as the EPA permitted flow value and the design head was adjusted until the pump was actually pumping at or near the EPA approved values. If only design head and design flow are provided to the model, the model creates its own pump curve. If this method is used, we are not sure that the actual pumps perform in the manner as predicted by the model. The curves developed by the model should be compared with manufacturers' pumps curves or measured pump curves from field testing.

6.6.1 The 0.17 gpm/person = 245 gpd assumed for unaccounted for water is spread evenly across the system in the same way as population. Is this a good assumption?

6.6.4 What are the fire flow regulations for Guam? The fire flow analyses that were made on the water system were very thoroughly done and presented some very interesting outcomes. According to the consultant they were not able to obtain Guam's requirements for fire flows to use in their analysis. They used Hawaii's criteria in all cases. The results is that a large share of the required high priority capital improvement projects are for fire flow reasons (since adequate fire flow are a pubic safety issue). GWA needs to work closely with other Guam agencies such as the Guam Fire Department, the Guam Insurance Commission, and other interested parties to determine what are reasonable and applicable fire flow standards for Guam. This needs to be done immediately as it has a serious impact on the entire Master Plan.

6.7 This section states that once leak detection is completed a whole new set of pumping rates , usages and usage patterns must be applied. The results of these must serve as input to the development scenarios that are used in other portions of the Master Plan. (revenue projections, capital improvement projects needed, etc) Will GWA staff be able to handle this task.

6.8.3 Same comment as 6.4 above

6.9.2 Model well pumps may not have accurate pump curves and therefore will not respond accurately to changes in hydraulic grade lines that are presented to them in the model. See 6.4 above.

6.9.3 Figure 6-10,19,25and 27 show that nearly the entire system is at velocities greater than 6 ft/sec. Is that true or is there an error in labeling.

6.10 The plan suggested that the consultant and MWHSoft may be able to provide training for GWA employees. A local source of training (WERI) was not mentioned. WERI has over the years carried out several different intensive training programs on water system hydraulics and water system modeling including the use of the MWHSoft Water program. Also GWA will have to come to grips with its salary structure and its ability to attract and retain qualified individuals if it is going to be able to operate and update this model. Having qualified people is the key if in fact we really want GWA to operate, update and use the model in the operation and planning activities of the agency.

6.11.1 The addition population (38,000) demand is to be computed using 150 gpm (page 6-59). Where does this 150 gpm rate come from? Also the 38,000 increase probably is not enough to account for normal growth plus increases from recently announced from Marine and Air force re-deployments to Guam. Adjustments as to the increased numbers and where these increases will occur will need to be made.

6.11.2- The consultant states that well discharges change with head. In their technique of providing design head and design flow the program calculates an assumed pump curve. This may or may not be the same as the actual pump curve exhibited by the pump. The curves developed by the model should be compared with manufacturers' pumps curves or measured pump curves from field testing. Also there is a need to be sure that the pumping rates shown in the model will not cause salt water intrusion problems.

6.11.6 Should be careful in lowering low pressure criteria values below 40 psi. This may cause problems in upper floors of 2-3 story apartment buildings as the pressure values computed are based on ground elevations not actual delivery elevations to the residences.

Chapter 7

7.5 Well chlorination systems are often located in areas near schools and residential areas. This presents an appreciable hazard since in many cases the warning devices on these systems are not working adequately.

Chapter 8

8.2 A portion of the leaked water serves as recharge to the aquifer. So all water saved by leak detection might not be available for use. See 3.5 above.

8.3 We wonder if Hawaii's fire code is applicable to Guam. In Guam nearly all structures are concrete and fire resistant. Was contacts were made with the Guam Fire Department and the Guam's Insurance Commission concerning the fire flows values used. (see 6.6.4 above)

8.6 Even if the Ugum Treatment plant capacity is increased to 4.0 mgd an appreciable part of the capacity will not be available at certain times. This is because of low flow in the stream and high turbidity levels during high flow times. This needs to be considered when evaluating the Ugum treatment plant's contribution to the fresh water resources.

Chapter 9

No way to evaluate the costs that were computed for the Capital Improvement Projects. Need more detail on these computations in order to comment.

Part II

RESPONSES TO COMMENTS

(This section will continue to be revised, expanded and updated,
as new information becomes available.)

RESPONSES TO COMMENTS

For the initial GWA and CCU review and adoption of the WRMP 2007 and the initial summary responses to comments received on the completed document; see the preamble and CCU resolution at the beginning of this volume:

Volume 1, Background:

(***0-0 Preamble and CCU Resolution of Approval . pdf***).

On the following 31 pages are the current work in progress responses; item by item; referencing the preceding section (Part I).

GWA WRMP Submittal - October 2006 Adopted by GWA and the CCU as GWA Water Resources Master Plan 2007 (WRMP 2007) on January 31, 2007

Comment No.			USEPA/GEPA/WERI/Public Comments	Response
USEPA Volume 1 - Background General Comments				
1	USEPA 1	1. Chapter 14 - Financial Program, Projected Expenditures and Revenue Findings (14.12.1)	The WRMP proposes two alternatives to the pace of construction which are described as the "Base Case" and "Minimum Pace" CIP. The WRMP recommends that GWA implement the "Minimum Pace" CIP to limit the short-term rate-based revenue requirements to six percent per year and that a higher percentage year rate would be unacceptable to the Guam Community. While it is understandable to keep yearly rates to a minimum, implementing the "Minimum Pace" CIP will significantly delay compliance in certain situations, especially with respect to wastewater treatment plant improvements (Agat and Baza Gardens Sewage Treatment Plants). The CIP budget schedule should be adjusted to accommodate wastewater treatment plant improvements as per the "Base Case" CIP with respect to the Agat and Baza Gardens facilities.	We understand there would be benefits of constructing the Agat and Baza Gardens facilities earlier, but suggest that has to be balanced with what is practical and achievable. In the "Minimum Pace" CIP, Baza Gardens construction ($18M) is programmed to start in 2013 and Agat construction ($30M) in 2014 (a deferral of 2 years for each project compared to the "Base Case" CIP). The deferral makes the annual CIP ramp up and utility rate increases for GWA more reasonable (but still aggressive) compared to the recent past.
2	USEPA 1a		Prioritization of the recommended water system CIP projects should be reassessed given EPA's concerns regarding the need for the GIS and hydraulic model to be further developed before making specific CIP project recommendations (see Volume 1 - Water System, General Comment 1. below). The GIS and the hydraulic model need to be further developed and ground truthed/validated to an acceptable level to confirm currently recommended or the recommendation of new water system CIPs. This should be a high priority project to be completed within the next year.	The recommended water CIP program elements are based on the best information available at the time of the WRMP development. The specific project recommendations were derived from planning level analyses including a conceptual water hydraulic model. This model will continue to be refined as GWA collects and incorporates better infrastructure and water usage information. Further infrastructure system assessments and modeling will be needed to finalize other CIP recommendations and the prioritization of those projects. Design studies will typically be needed to further refine design parameters before proceeding with construction. It is important to note also that the WRMP represents a snapshot in time with respect to project needs and priorities. The WRMP provides a solid foundation and reasonable estimate of the magnitude of investment needed to substantially improve utility service and reliability and to attain regulatory compliance. GWA will need to continue to update the WRMP as more information becomes available and basic assumptions change.
3	USEPA 2	2. Annual Debt Service	Please show the calculations for determining the annual debt service for the expected bonds. How does the payment on a 6%, 30 year, $88M bond equal $7.1M?	In addition to principal, interest rates and repayment term, the annual debt service is determined by cost of issuance and by capitalization of interest for several years. See Volume 1, Table 14-1.
4	USEPA 3	3. Power Costs	Do the power costs reflect increases due to expected upgrades of water and wastewater treatment processes or is a unit rate per gallon always assumed?	Yes to both. See Volume 1, Table 14-1.

Comment No.			USEPA/GEPA/WERI/Public Comments	Response
5	USEPA 4	4. Production Needs and Navy Water	If overall production needs drop in future years, why are there still purchases from the Navy?	The overall production level is irrelevant; as GWA water supply & demand must be balanced in the independent service area of the southern region. See Volume 1, Table 14-1.
USEPA Volume 2 - Water System General Comments				
Comment No.			USEPA/GEPA/WERI/Public Comments	Response
6	USEPA 5	Note	In some cases, comments made by EPA, on the 4/7/06 Draft WRMP (comments sent to GWA in July 06) have not been completely addressed. Those comments are referred to using the numbering system provided in the "Response to comments" which was provided by GWA's contractor to EPA, via their November 30, 2006 "Draft GWA WRMP (4/7/06 submittal) USEPA/SAIC/GWA/GEPA Comments" document.	No response needed.
7	USEPA 6	1. It is not clear that the water system GIS and hydraulic model has been sufficiently developed, ground truthed, nor calibrated to make detailed, specific distribution system recommendations.	It is not clear that the data in the GIS, which the hydraulic model is based upon, has been sufficiently ground truthed and includes sufficient data to consider the model adequately developed and calibrated at this point to recommend specific water system capital improvement projects as presented in the WRMP.	Comment noted. The hydraulic model was built upon the GIS coverage available at the time, which was incomplete and not been fully field validated. After the creation of the hydraulic model, discrepancies were discovered and they were resolved to the extent possible based on available information (the USGS or GWA/GEPA maps). Most of the missing information was obtained through interviews with GWA staff and limited field investigations.
8	USEPA 6a		The water system hydraulic model as currently configured has been used to generate numerous capital improvement projects, in particular, specific water distribution, transmission, storage and pressure system upgrade projects. In general, the model, based on information available and as currently configured, correctly indicates that a significant number of water distribution, transmission, and storage system improvements are necessary, EPA believes it is only sufficient for conceptual planning and project development at this time. Further, EPA believes that until the GIS and the hydraulic model are further ground truthed, calibrated and tested, that it should not be used as a basis for recommending specific CIP improvements and prioritization for the water system.	We concur with the comment. Although the hydraulic model has been through preliminary calibration and the results were encouraging, it should not be considered to be completely field verified, nor fully calibrated. Volume 2, Chapter 6, Section 6.8.3 states what needs to be done before the model can be fully calibrated. The CIP improvements provided are a planning tool for identifying and budgeting for improvements based upon the best available information at this time and should be updated as additional information becomes available and allows further refinement of the hydraulic model.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
9	USEPA 7	2. Water System Reservoir (Storage Tanks) - Current status, and current and future needs (locations and capacities) are still not clearly described, and appear to be understated.	EPA believes that there are likely more immediate/ critical storage tank issues, needs and CIPs that are not clearly identified, that should be included in the WRMP as proposed CIP projects. The report mentions that there are at least several areas in the distribution system that as currently configured, there are no storage tanks serving those areas (i.e. areas served only by direct pumping from wells or booster pumps), but the CIP projects do not appear to clearly address those areas. There appear to be other parts of the distribution system / pressure zones that are currently underserved by storage, or where existing storage is "out of service" - these areas are also not clearly addressed in the WRMP. A very small number of "Current Need" CIPS for Water Tanks are proposed. In addition, although there is some scattered discussion throught the document, there is not one location where there is a clear, concise, summary of the long term storage needs in terms of capacity and location of storage tanks. See more detailed comments in the chapter specific comments.	Comment noted. Final report has been expanded and updated with additional discussions on the storage reservoir issues (see revised Sections 6.7 and 6.9.4). Also see responses to comments 12 to 19 below.
10	USEPA 8	3. The identification and need to replace 2" and 4" water pipelines has still not been clearly addressed.	As noted in EPA's comments on previous drafts, we believe that replacement of existing 2" and 4" pipe will likely yield far greater benefits than many of the proposed projects which are incremental upgrades (for example upgrading 6" to 8", 8" to 10") and are designed primarily to meet minimum fireflow standards. Although meeting fireflow standards is important, we believe that the grossly undersized pipes represent significant fireflow and pressure problems, and that more effort needs to be made in identifying and developing projects to replace the severely undersized water lines, as these are likely higher priority for life and safety. This has not yet been accomplished.	We have endeavored to include as much information as available. Note that in addition to the specific distribution improvements we identified with the 2005 CIP model (and 2025 CIM model), we included an allowance of $5M per year for the first 9 years and $740K/yr after that for pipeline replacement. The intent of that replacement was to focus on the "best bang for the buck", which would include replacement of leaky pipes and undersized lines not identified specifically in the 2005 or 2025 distribution system improvements programs. We understand from GWA's anecdotal information that 2" and 4" lines are significant (if not the main) source of leaks. We again strongly recommend the need to aggressively address distribution system leaks. In conclusion, we think the WRMP adequately addresses 2" and 4" lines from a CIP perspective.
USEPA Volume 2 - Water System Water System Summary				
Water System Summary page numbered "S"				
11	USEPA 9	1. Page 2S-1 - Pump capacities should be stated in GPM, not HP.	Last paragraph - "pump capacities range from 50 to 755 hp". HP is not capacity, HP is motor size. Pump capacity is usually stated in GPM. Restate well capacities range in GPM	Text revised to "EPA permitted pump capacities range from 50 to 755 gpm, with the majority of the capacities in the 150 to 400 gpm range".

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
12	USEPA 10	2. Page 2S-2 - Areas of the distribution system where there is no reservoir storage provided for are not adequately identified and addressed.	"Pressure Control"- This section mentions "…booster stations where a reservoir does not exist". … This is an important point which is not adequately discussed in the WRMP. There are areas of the water distribution systems that do not have any distribution reservoir/storage tanks. This is not adequately described in greater detail in Ch. 8, the more detailed description of water system facilities.	A discussion of the Pressure Zone Boundaries is provided in Chapter 1, Section 1.4, and identified on Figures 1-11a to 1-11e. In cases where there is a pressure zone boundary, but no reservoir to serve it, it is illustrated on these figures (i.e. Mataguac 740 Zone on Figure 1-11a). Associated recommendations to provide reservoirs for water storage are discussed in Chapter 8, Section 8.3.2 and Table 8-9 (i.e. provide 0.1 MG elevated tank for Mataguac Zone).
13	USEPA 10a		Areas with no storage should be discussed, as all these areas should be provided with adequate storage. This does not seem to be reflected in the current list of proposed CIP projects. This should be corrected.	Analysis of the water storage requirements is provided in Chapter 6. The list of recommended reservoirs is provided in Tables 8-9 and 8-18. Final report Section 6.7 has been expanded and updated with additional discussions on the storage reservoir issues.
14	USEPA 11	3. Page 2S-3 - Number of Reservoirs in/out of Service is not clear (Summary of Reservoirs).	This section is unclear - it states "….total of 36 reservoirs……Seven are out of service…. 1 abandoned".	Additional information is provided in Tables 1-1 and 1-14.
15	USEPA 11a		Does this mean there are 28, or 29 reservoirs in service, or 43 reservoirs, 35 or 36 of which are in service? This should be clarified and should be in agreement with other summaries of reservoirs in other parts of the WRMP.	As noted in the referenced summary page and Tables 1-1 and 1-14, there are a total of 36 reservoirs, with seven of those reservoirs out of service and one reservoir abandoned.
16	USEPA 11b		EPA notes that this section states that approximately 20% of the tanks are out of service or abandoned, but the report does not address any of the obvious questions - why are these tanks out of service? Does "out of service" imply that they can be rehabilitated and brought back into service, or are they permanently out of service? Do these tanks need to be replaced or rehabilitated, i.e., are they important for the current and future proposed system hydraulics - pressure and flow?	There are multiple reasons for the tanks being out of service: 1) maintenance, 2) typhoon damage, and 3) age or deterioration. Some of the tanks are temporarily out of service, while others are permanently out. Some of the tanks are needed to be put back into service. For some, they must be replaced like Barrigada 2 and Lasafua (which are programmed for replacement). Others such as Mangilao 1 and Agana Heights have either been or will be placed back into service. Some smaller, older tanks (e.g. Asan Springs and Agat-Umatac) are assumed to be abandoned and not included in the hydraulic model.
17	USEPA 11c		This does not appear to be addressed anywhere in the WRMP. Are these out of service tanks included in the storage summaries included in Tables 6.3(a) through (c)? What are the implications of their being out of service (i.e., do they need to be rehabilitated and/or replaced with new CIP tanks?).	Final report Section 6.7 has been expanded and updated with additional discussions on the storage reservoir issues. Unless a condition assessment of the specific reservoir is done, it is difficult to tell the status of a particular reservoir. BC was informed that certain tanks were taken out of service for repair and maintenance. However, GWA was uncertain when the tanks taken out of service for maintenance would be put back into service. The Nissan Tank was thought to be in service but it actually was not in service for more than 5 years. BC was able to determine that the Nissan Tank was out of service based on the hydraulic model results.

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18	USEPA 11d		As noted elsewhere in these comments, summary of all the Storage Tank status and issues is not clearly covered in the WRMP in any one place, although there is a lot of information scattered throughout the document. A full and complete discussion of current storage reservoir situation, immediate needs, and long term storage needs should be provided and summarized in one place (could be in Chapter 1.6, or Ch 7). (Note other related comments 4, 10,11, 12, 15, 17 below)	Recommended storage requirements for the 2005 CPM are provided in Table 8-9, and the requirements for the 2025 CIM are provided in Table 8-18. Supporting hydraulic analysis for the recommended storage tanks is provided in Chapter 6. The final report (Sections 6.7 and 6.9.4) has been expanded and updated with additional discussions on the storage reservoir issues.
USEPA Volume 2 - Water System Chapter 1 - Water System Description				
Comment No.			USEPA/GEPA Comments	Response
19	USEPA 12	4. Page 1-1 - GWA Facilities - Storage capacity.	It would be helpful to also list the storage capacity (in Millions of Gallons) as a column in this table, in addition to the number of storage tanks. The number of tanks does not provide much information, while the total capacity is the critical parameter. (Note - if this information is presented elsewhere, it could be cross referenced here).	The capacity of each reservoir is presented in Table 1-14.
20	USEPA 13	5. Pages 1-7 through 1-19, Section 1.2 - GWA Water Sources - Wells 1.2.1, Page 1-8. No down-the-well assessment was performed and this should be so noted.	As per previous comments, (WIP comment #117, 212 and 213), no down-the-well assessment was performed. There may be significant costs associated over the next 20 years due to deteriorating down the-well assets, including casings, drop pipes, screens, etc. It should be stated in the Final WRMP that the down the hole assets were not assessed and that they should be.	Chapter 7 lists the aspects of the water system that were assessed. Down-the-well assessments were not conducted. We will add a sentence in Chapter 7 stating this.
21	USEPA 14	6. Table 1-3 GWA Wells. Discussion of "Wellhead buildings" is not complete.	This table does not differentiate those well head buildings owned by GPA (generator buildings) vs. those owned by GWA (built only to house chlorinators and associated appurtenances). In some cases, the chlorination set up (gas cylinders, booster pump, etc.) is in a separate facility (wellhead buildings) owned by GWA - typically a separate, small CMU building with just the chlorinator cylinders, booster pumps, etc. In other cases, wellhead buildings are owned by GPA and chlorinators are housed in a separate room in a larger CMU building which also houses a GPA generator in a separate room. Many of the buildings owned by GWA are in serious disrepair and either require complete replacement or major upgrades. Some wellheads do not have buildings at all - i.e., chlorinators, booster pumps and associated appurtenances are outside, posing a safety threat. This may be a significant CIP and the numbers, conditions, and costs of upgrading/rehabilitating should be described. The cost needed to bring all the chlorination systems up to required levels is not discussed.	In general, the owner of the building is the same as the owner of the generator. We will add a footnote to Table 1-3 to this effect. Though many of GWA's buildings are in need of maintenance (i.e., window/door replacement, painting, and fence repair) they are not in a state of disrepair that the building cannot be used. The CIP includes $930K per year for electrical/mechanical replacement, which can be used to perform necesary maintenance on the buildings GWA owns.

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22	USEPA 14a		This comment is similar to comments #120 and #121 from EPA comments on the 4/7/06 submittal, and has not been adequately addressed in the latest Draft. The response says "information about the general condition of the buildings is provided in the condition assessment in the appendix", and "additional information about chlorination systems is in the asset inventory". Referencing the asset inventory does not provide sufficient information on the asset condition, need for replacement or repair, nor costs associated with any CIPs needed to upgrade/rehabilitate the chlorination facilities. Summaries of the assessment and costs should be included in the main text of the Report. If there are already projects in place to address these concerns (chlorination systems and chlorination equipment buildings), they should be described.	During the condition assessement we visited each of their facilities and assessed the condition of buildings and equipment (including chlorination systems). Apprendix 2A and 2B contain this information in Excel spreadsheets. The information assessed for each facility are presented in Chapter 7 as well as summaries of the condition of facility types. To describe the condition of each facility would uneccesarily encumber the Master Plan document.
23	USEPA 15	7. Page 1-20 - Chloride levels - balancing water quantity needs with chloride levels - discussion should be clarified.	Discussion of chloride levels. The 250 mg/ chloride MCL is a secondary ("aesthetic") drinking water standard, not a primary ("health-based:) standard, is based on taste concerns, not health, is not an enforceable standard. Although rising chlorides is an important concern and ideally the water system should be operated to minimize excessive or rising chloride levels, it should also be noted in the text that the need for adequate water supply must also be considered when balancing pumping rates vs. the desire to minimize rising chloride levels.	We are not sure what the issue is here. The text states that chloride is a secondary drinking water standards, as does Section 2.2.13. We will add a statement about balancing water needs with efforts to minimize chloride levels.
24	USEPA 16	8. Pages 1-25 through 1-30 - Discussion of Ugum WTP solids processing and disposal not included.	As per EPA"s previously submitted comment #125 on the 4/7/06 draft WRMP, there is still no discussion of solids processing and backwash water CIP's needed for Ugum WTP. This should be included as it may be a significant cost. If it is already covered under an existing or proposed project, that should be included.	We will discuss the current status with GWA and address in Section 1.2.3.
25	USEPA 17	9. Page 1-31 - Transmission and Distribution - Inadequate/unclear description of, and conclusions on 2" and 4" water line - current situation and needs to replace.	The paragraph describing the estimated number of feet of pipe less than six inches is confusing. It is stated that one inventory indicated there was approximately 55,000 feet of pipe of less than six inches; while another survey stated that there is approximately 540,000 feet of pipe less than six inches, with 400,000 of two-inch diameter.	GWA estimates that there are approximately 200,000 feet of 2-inch pipe in the system, but has no records to support location of the pipe. We will confirm the estimate with GWA and revise the text. The CIP includes $5.0 million per year for 9 years, and $740K per year thereafter to address pipe replacement. Prioritization of this pipe replacement will be determine based on other replacement or improvements in the area of the pipe, as well as the leak detection program.
26	USEPA 17a		This is an order of magnitude difference and needs to be clarified. If there is 400,000 feet of two-inch pipe, or close to it, ultimate replacement of this pipe (as would presumably be required for minimum flows) will be a very large, significant additional CIP cost. Even replacement of 55,000 feet will be a significant cost, and is not currently listed as a priority CIP project.	

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27	USEPA 17b		GWA must provide its best estimate of the true footage of inadequately sized (sub 6") pipe in the system and replacement costs, and add as appropriate to list of CIP projects.	
28	USEPA 17c		EPA continues to believe that 2" and 4" pipe replacement may be a significant and critical project, is likely a higher priority in some areas than replacement of larger size pipe just to meet fireflow, and has not been adequately addressed nor prioritized high enough in the draft WRMP.	
29	USEPA 18	10. Page 1-58 - Reservoirs. Storage status and needs (immediate and long term) need to be clearly described	Table 1-14. Reservoirs. This is similar to previous Comment #130 and related to General Comment #2 above. Comment #130 is still not adequately addressed. The WRMP still does not clearly explain and define existing and future needs for storage, including locations (by pressure zone) and tank sizes (capacity) required. This section would be a good place to clearly indicate the conclusions as to where there are current storage needs, by pressure zones, and long term storage needs. The large number of currently out of service storage tanks, as indicated in this table, seems to imply that there may be an existing, serious, storage deficit for all three water systems.	Recommended storage requirements for the 2005 CPM are provided in Table 8-9, and the requirements for the 2025 CIM are provided in Table 8-18. Supporting hydraulic analysis for the recommended storage tanks is provided in Chapter 6. Final report Sections 6.7 and 6.9.4 have been expanded and updated with additional discussions on the storage reservoir issues.
30	USEPA 19	11. Page 1-60 - Conclusions on Storage Reservoirs incomplete.	Section 1.8 Conclusions. There is no conclusion drawn related to the adequacy of the existing storage reservoirs, there is only a conclusion that "reservoirs show significant corrosion".	A limited condition assessment was provided for selected reservoirs, which are identified in Volume 1, Chapter 11, Corrosion Assessment.
31	USEPA 19a		As per previous comments and based on our review of the Draft WRMP, EPA believes that due to current system design concerns (including capacities, condition and locations of tanks, tanks currently out of service and/or abandoned, etc.) that there are likely additional, significant, immediate (2005) water storage needs. This should be clarified in the Final WRMP. In addition, the long term storage needs should be clearly laid out in one place.	Recommended storage requirements for the 2005 CPM are provided in Table 8-9, and the requirements for the 2025 CIM are provided in Table 8-18. Supporting hydraulic analysis for the recommended storage tanks is provided in Chapter 6. Final report Sections 6.7 and 6.9.4 have been expanded and updated with additional discussions on the storage reservoir issues.
32	USEPA 20	12. Page 1-61 - 1.10 - CIP Projects -Storage tanks and Distribution lines left out.	Two major areas are left out - need to add bullets for Distribution System Storage Tank needs and Distribution system line replacements or additions, as these both are significant parts of the proposed CIPs.	Section has been revised to include bullets for: 1) Distribution system line replacement or additions; and 2) Storage tank construction.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
33	USEPA 21	13. DBP compliance issues not correctly characterized.	Section 2.5.4, Page 2-21 - Discussion of DBP's. Previous comment #160 - Regarding DBP compliance. In the latest draft WRMP it is stated that "The Ugum WTP's planned upgrade to membrane……. will …improve the removal of precursors that can lead to DBP formation". In fact, the opposite is likely the case - membrane (micro) filtration is typically less effective at DBP precursor removal than conventional treatment (which it will be replacing) which includes enhanced coagulation, flocculation, sedimentation and filtration. The pilot studies for the proposed membrane plant at Ugum indicated the potential for future problems with increased DBP formation, potentially resulting in exceedances in the distribution system. That study should be referenced.	We will revise and reference the studies.
34	USEPA 21a		At this time, there may not be sufficient information and data to indicate whether S2 standards will be exceeded and what sort of additional treatment would be necessary if S2DBP standards are exceeded. However it should be mentioned that this is a possibility and that additional treatment may be necessary in the future. This should also be clearly reflected in Section 2.7, Recommendations.	We will make this reference and recommendation.
USEPA Volume 2 - Water System Chapter 6 - Water System Hydraulic Model				
Comment No.			USEPA/GEPA Comments	Response
35	USEPA 22	14. Conceptual Hydraulic Model	Section 6.8, Conceptual Model Calibration, notes the model is not the typical or standard method of calibrating a hydraulic model and results are surprisingly encouraging given limitations of GIS data which it is based on. Section 6.8.2 (Preliminary Calibration) and Table 6-5 (Preliminary Pressure Calibration Data from Key Locations) notes +/- 20% of field measurement okay but overall 6/14 of field sites had anomalies. What does this mean or how does this impact the model, its assumptions and the specific CIP recommendations derived from it? How accurate are the pressure zone boundaries given the model limitations?	See responses to comments #7 and #8. Also note the pressure zone boundaries and PRV settings will need to be verified and/or adjusted as the hydraulic model is refined.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
USEPA Volume 2 - Water System Chapter 7 - Water System Assessment				
Comment No.			USEPA/GEPA Comments	Response
36	USEPA 23	15. Storage Tanks not adequately assessed	As previously noted, this chapter (and Chapters 1 and 8), do not adequately describe or assess Storage Tanks - number of tanks, capacity, issues associated with pressure zone areas not provided with adequate storage. This is a significant gap in the draft WRMP. Storage tanks are a significant capital asset for GWA. It is known that many of the tanks which are still in service are in very poor condition - for example, there are several tanks which were built at the same time, with a similar or same design, and likely in similar condition as the Barrigada tank that failed catastrophically in 2005. Even if these tanks have not yet been thoroughly inspected and assessed, it can be reasonably assumed that most of these tanks will require replacement at some point over the next 20 years.	See responses to comments #13 to 18 above.
37	USEPA 24	16. Wells, booster stations, chlorine treatment plant assessments not adequately summarized in assessment chapter	This chapter only provides very general summaries of those assets that were "assessed". It does not specify estimated repair and replacement dollar amounts for these assets (wells, booster stations, chlorine treatment plants, etc.). If there are significant CIP costs associated with this assessment, they should be listed. If they are found in other parts of the document, including appendices, they should be summarized /listed here, not just refer to appendices (especially as some of the appendices are included as CD's and not hard copy text and are difficult to access).	The Water System CIP includes $930,000 per year for Mechanical/Electrical Equipment Replacement, which should include costs of chlorinators, booster pumps, etc.
USEPA Volume 2 - Water System Chapter 8 - Water System Facilities				
Comment No.			USEPA/GEPA Comments	Response
38	USEPA 25	17. Overall water system Storage/Reservoir needs are still not clearly summarized, described, and assessede; and CIP needs may be seriously understated (Chapters 8 and 9).	In Chapter 8 there is no Section titled "Reservoirs", which in text, clearly and succinctly summarizes all aspects of the current status of distribution system storage reservoirs - including the total # of reservoirs and storage capacity by pressure zone; a general summary of their condition (and how that may impact CIP's), and a clear summary of the adequacy of storage tanks in terms of storage capacity (taking into consideration all the criteria listed in 8.3.1.3, which lists the criteria for sizing reservoirs, but does not summarize nor make conclusions about the current reservoir size and capacities).	Refer to Volume 2, Chapter 1 for the current status of the reservoirs (Tables 1-1 & 1-14), and total no. of reservoirs and storage capacity by pressure zones (Figure 1-11a to 1-11e and Table 1-14). A corrosion assessment of selected reservoirs is provided in Volume 1, Chapter 11, Sections 11.3.7 to 11.3.9. An evaluation of the adequacy of storage capacity is provided in Volume 2, Chapter 6, Sections 6.7, 6.9, and 6.11; Tables 6-3a to 6-3d, 6-6a to 6-6c; and Figures 6-12 to 6-17, 6-21 to 6-25, 6-29 to 6-35.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
39	USEPA 25a		There is a Table (8-9) with 2005 CPM Recommended reservoirs, but there is no text in this chapter, clearly describing how this table (i.e. how these particular projects, of all storage tank needs) were selected. This table implies that there is only a current (2005) need for 0.3 MG of additional storage at this time (not including the replacement of the 2.0 MG Barrigada tank which failed catastrophically, and is also listed as an immediate 2005 need). This seems to be in conflict with other parts of the WRMP. For example Vol. 2, Chapter 6, Hydraulic Model, Tables 6.3 a. through c., which list water supply parameters (including existing storage) by pressure zone for the 3 systems, list 3 existing pressure zones and 2 proposed pressure zones (i.e., 5 pressure zones), which currently have 0 Storage Capacity. Based on these tables, the combined demand of the areas served by these areas is approximately 2 MGD. This would seem to imply that at a minimum, there is a current need for at least an additional 2 MG of storage (assuming a de mimimus one day storage capacity, which is similar to the rest of the system).	As noted on Page 8-5, the recommended reservoirs to improve water storage for fire protection or adequate service pressures for the 2005 CPM, is based upon the hydraulic model of the water system, as discussed in Volume 2, Chapter 6, Water System Hydraulic Modeling. The 2005 CPM assumed that the out of service reservoirs (1.0 MG Mangilao #1 and 1.0 MG Nissan (Tumon #2)) will be repaired and put back into service. Short term additional reservoir needs (2.3 MG) for the 2005 CPM is listed in Table 8-9.
40	USEPA 26	18. The Northern System Water Distribution System 2005 Improvements (Table 9-11) lists 43 separate CIP projects.	Are these projects priority ranked? If not, what are the highest priority projects? Or should the No. Dist System CIP's be broken into 2 or 3 parts based on priorities? Or should this be dealt with after the finalization of the WRMP?	The projects within this category are not ranked by priority. As noted in Volume 2, Chapter 8, Section 8.2, the first priority of pipeline improvements should seek to decrease the high level of water loss in the system. A system-wide leak detection program will aid in determining areas in the water system that have significant leaks that requires replacement of water lines. The prioritization of pipeline replacement should also consider other factors such as ease of access, cost of repair, age and condition of line, cost effectiveness of replacement vs. repair of line and/or valves, upgrades required to support existing or future development, impact to public and proximity to other repair or replacement work required.
41	USEPA 27	19. Southern and Central Recommended CIP	Does the Central Distribution System cover/impact more customers than the Southern Distribution System? If so, should the Central be a higher priority because it will have the most impact customer wise and cost less to completer? Which is the higher priority and the most impact? The Southern Distribution system's estimated costs is $23 million and Central is $6 million.	See the response to the previous comment #40.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
42	USEPA 28	20. Northern Water Trans Lines (raw water) CIP	Targeted budget period is in 2011 but distribution improvements (2025) don't start until 2021. Wouldn't the WTL and Distribution projects need to be schedule closer together so that as the transmission lines come on line they will not adversely impact the distribution system or will the 2005 distribution improvement CIPs mitigate the affects of the transmission line improvements?	Section 6.11 indicated that the GWA water system will need to undergo a complete transformation in order to restructure the Northern water system, so that all of the existing wells pump directly into water reservoirs. As such, the 2005 distribution improvement CIPs will not mitigate the effects of the transmission line improvements. The USEPA comment is correct and the timing of some 2025 Northern Distribution System CIP projects will need to be adjusted.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
43	USEPA 29	1. Table 9-10 Hagatna STP Pump Station Improvements	The Hagatna STP Pump Station Improvement CIP projectr covers improvements to the Hagatna Main, Asan and Tegungan Sewer Pump Stations. Recommend that the CIP heading be changed to Central District Pump Station Improvements to more clearly describe project area. EPA recommends that the Asan and Tegungan SPS improvements be moved forward in the budget year schedule if the pump station deficiencies are currently causing sewer system overflows.	CIP heading change is OK. Asan and Tegungan improvements should be subject to confirmation of modeling results by additional monitoring and confirmation of service areas.
44	USEPA 30	2. Table 9-16 NDSTP and Hagatna STP Unsewered Properties - Sewer Hookups	The schedule for this CIP project should be scaled back or delayed further in the budget schedule for few years. As an interim measure GWA should implement the Sewer Hookup SRF program. Deferring implementation of this project would help allow for funding of other projects such as the Agat and Baza Gardens treatment plant facility planning/designs and replacements.	Table 9-16 describes a project to follow the Sewer Hookup SRF program to provide service to homes within 200-ft of existing sewers prioritized by nearness to wells as described in Chapter 3-6. The speed at which these hookups are provided can be spread over time.
45	USEPA 31	3. Table 9-17 NDSTP and Hagatna STP Unsewered Properties - New Sewers	These projects should be pushed back further on the budget schedule for several years to allow other project to be completed sooner such as the Agat and Baza Gardens treatment plant facility planning/designs and replacements.	Table 9-17 describes a project to provide new sewers to properties outside the reach of the SRF but within 1000-ft of supply wells. We agree these could be delayed.
46	USEPA 32	4. Table 9-18 NDSTP and Hagatna STP - Additional Sewer Hookups	See comments No. 2 and 3 above.	See response to comment #44
47	USEPA 33	5. Table 9-24 Agat STP Fac Plan and Table 9-25 Agat STP Replacement	Move budget schedule up as per Base Case CIP schedule. Under the "Minimum Case" CIP schedule compliance would not take place until after 2015. Under the "Base Case" CIP schedule compliance is already delayed to sometime after 2012. The Agat STP has been in chronic non-compliance for many years already and needs to be addressed in a more reasonable time frame.	See response to comment #1.
48	USEPA 34	6. Table 9-26 Baza Gardens STP Fac Plan/Design and Table 9-27 Baza Gardens STP Replacement	Move budget schedule up as per "Base Case" CIP schedule. Under the "Minimum Case" CIP schedule compliance would not take place until after 2013. Under the "Base Case" CIP schedule compliance is delayed to sometime after 2011. The Baza Gardens STP has been in chronic non-compliance for many years already and needs to be addressed in a more reasonable time frame.	See response to comment #1.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
GEPA General Comments to October 2006 WRMP				
Comment No.			USEPA/GEPA Comments	Response
49	GEPA 1	Comment No. 93	A section of Route 17 (Cross-Island Road) still does not fall under any water system. Figure 1-2, Vol. 2 Chapter 1 indicates that the area may receive southern or northern water. The area should reflect which water system it primarily falls under in Figure Es-1, Vol. 1, Executive Summary and Figure 1 1, Vol. 2 Chapter 1.	This map was originally provided to us by GEPA, including the overlap. We will describe in the text of 2-1. Changing the figure is unnecessary.
50	GEPA 2	Comment Nos. 179 & 180	Guam EPA has verifiable data on the Togcha wells and the Windward Hills Golf Course well.	We are not sure of the intent of this comment or what change is requested.
51	GEPA 3	Comment No. 285	The lack of information that Guam EPA was referring on section 4.5.2.2 of Volume 3 is data such as spill reports, etc.	We reviewed all available spill records and included the results in section 4.5.2.2.
52	GEPA 4	Comment No. 348	Guam Water Quality Standards can be obtained Guam EPA in order to generate a comparative cost analyses of the alternative wastewater treatment disposal systems.	We are not sure of the intent of this comment or what change is requested.
53	GEPA 5	Comment No. 380	The Guam Construction Grant Project Priority List should be reflected in the wastewater CIP since it is a CIP list funded via USEPA/GEPA.	We are not sure of the intent of this comment or what change is requested. Funding sources (to the extent they are known) are included in the project descriptions in Chapter 9 of Volumes 2 and 3.
GEPA General Safe Drinking Water Comments				
Comment No.			USEPA/GEPA/Comments	Response
54	GEPA 6	1	Although Guam EPA acknowledges the difficulty and extensive efforts expended developing the water system=s hydraulic model, Guam EPA believes the model has not been refined to a level of reliability for the following reasons:	We have repeatedly asked for information from GEPA and for the most part we received nothing. We proceeded with the best information we had to develop the planning level model included in the WRMP. With some pressure recording information that GWA helped collect, we completed a preliminary calibration of the hydraulic model that had reasonably good agreement with the field data (although there were anomalies as we and EPA noted).

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
55	GEPA 7	1a.	The existing 4-inch, 2-inch and other 6-inch or bigger water distribution system were not accurately accounted and identified in the 2005 water system map. These are crucial in prioritizing the improvement of water pressure in the distribution system and the replacement of existing and/or inadequate water piping sizes.	Comment noted. The hydraulic model was built upon the GIS coverage available at the time, which was incomplete and not been fully field validated. After the creation of the hydraulic model, discrepancies were discovered and they were resolved to the extent possible based on available information (the USGS or GWA/GEPA maps). Most of the missing information was obtained through interviews with GWA staff and limited field investigations.
56	GEPA 8	1b.	The water distribution system and its appurtenances shown in the 2005 water system map do not reflect the actual condition of the existing water distribution system and consequently the model will produce an inaccurate hydraulic analysis and inconclusive results. Thus, more extensive field investigation is needed.	We concur with comment. The actual condition of the existing water system will be more clear when more comprehensive field investigations and surveys are conducted by GWA. (GWA has begun some of those efforts.) The new information collected from the additional field investigations should be used to update the existing GIS database. Section 6.8.3 also lists what needs to be done before the model can be fully calibrated.
57	GEPA 9	1c.	The required water storage capacity and transmission line systems were not properly evaluated to provide accurate data to be used in the hydraulic analysis of the distribution system.	We understand and acknowledge the GIS database needs further development to support more detailed hydraulic analysis. However, the hydraulic analysis of the distribution system was properly evaluated to the extent possible based on the available information.
58	GEPA 10	1d.	The delineation of pressure zone boundaries must include accurate sizes of the existing water distribution lines, transmission lines and booster pumps and other appurtenances to properly identify the size and location of recommended PRVs.	The delineation of the pressure zone boundaries were created to the extent possible based on the available information. The recommended PRVs are identified based on the hydraulic model simulation results.
59	GEPA 11		As a result, Guam EPA can not make proper recommendations pertaining to the following: i. Water pressure at the distribution and transmission system, ii. Sizes of needed water distribution and transmission system, iii. Size of pumps, capacity of storage tanks, wellhead pump, etc. iv. Determination of CIP projects and their prioritization, v. Direction of flow, rate of outflow and inflow at the storage tanks, vi. Adequacy of the delineated pressure zone, to ensure consistency and reliability of water supply, vii. Verification of the proper elevation and capacity of the proposed water storage tanks, booster pumps, etc., and viii. Degree of accuracy of assumed data in the model and validation of the results of the hydraulic analysis.	The hydraulic analysis of the distribution system was properly evaluated to the extent possible based on the available information. However, it should be noted that ongoing QA/QC of the geodatabase is a dynamic activity that requires GWA's staff focus to maintain the integrity of the GIS database as well as the hydraulic model.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
60	GEPA 12	2	The needed fire protection demand (flow rate and duration) must be derived from a national standard or methods (i.e. AWWA and ISO). Land use classification must conform to those establish in the land use plan. The Hawaii standard used in the determination of fire protection requirements does not reflect the actual condition of local building codes and land use.	The use of the Hawaii Water System Standards (WSS) was a requirement in the Stipulated Order with EPA. The WSS was developed with guidance from national standards such as AWWA, ASTM & ANSI. We concur that GWA should develop its own standards that determine to be appropriate for local conditions rather than simply follow the WSS. An example is included in Section 8.3.
61	GEPA 13	3	The quality of untreated water at the sources and treated water delivered to the consumers must be given priority over the fire protection demand when public health protection is considered in prioritizing CIP projects.	Quantity and quality are both important parameters. Noted fire protection improvements will help ensure adequate flow and pressure are also provided to consumers on a daily basis.
62	GEPA 14	General Note	Guam EPA retained WERI as the contractor to review the GWA WRMP documents including the hydraulic analysis and provide comprehensive comments and recommendations as to the adequacy and reliability of the plan. Guam EPA will be submitting additional comments and recommendations to GWA when WERI completes its review/comments.	No response needed.

WERI - Major Comments

Comment No.	WERI Comments	Response
63	We commend the authors of the Master Plan on the overall quality and completeness of the plan. We feel that is the most comprehensive document ever amassed that describes the water supply and waste water systems of the island. The data contained in the report itself and in the many digital data files that accompany the report will be a valuable asset to the island for years to come. It is essential that the Government of Guam and especially GWA take advantage of this landmark collection of resource data that has been accomplished by the study.	No response needed.
64	We are greatly concerned that GWA will be unable to find and retain technical staff to carry out the many computer automated planning and engineering evaluation programs that the Master Plan presents as essential to successful moving ahead and meeting the many stipulated order concerns. Finding and retaining competent, qualified, and licensed technical people have been an age old problem in Guam's agencies. Even with the separation of GWA from the Government there are still problems finding and retaining competent individuals. Until this problem is solved we feel it will be nearly impossible for GWA to carry out the programs presented in the Master Plan, and the consultants will have to remain on retainer forever.	This issue is significant and GWA has made progress in hiring more highly trained staff. Efforts are being made to train GWA staff in the use of the various planning tools used in this master plan development, but diligence will be required on the part of GWA is sustain and expand its staff.
65	In general we feel that the entire document is filled with too many acronyms. While this might make the document easier to prepare and may be easily understood by those developing the document, it is somewhat hard to read for someone, even a technically oriented person, not familiar with the acronyms. In order to read the document it is almost necessary to have a sheet of terms available to decode the mass of acronyms. We suggest that acronyms should in most cases be written out completely to make the document clearer and less tedious to read.	We acknowledge that the document does include a significant number of acronyms. Each volume includes a reference list of acronyms and their meaning near the beginning.

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Comment No.	USEPA/GEPA/WERI/Public Comments	Response
66	The population projections that were provided were made with data that were available at the time of report preparation. The recent announcements by the Department of Defense of relocation of Marines from Okinawa and realignment of new Air Force activities to Guam will present a sever perturbation in the population trends of the island and make the population projections in the Master Plan suspect. The remainder of the plan including the financial plan, resource availability plan, and the water and waste water systems capital improvements plans all depend on these population projections being correct. It is vital that these projections be updated if the plan is to have any validity.	GWA has committed to updating the master plan biannually using the latest information to help address this issue and the fact that significant changes in population may occur in the near future.
67	The financial plan presents a means to pay for the proposed system improvements. Basically these improvements will be paid for by increases of water use rates to the customers of GWA. Most of the rate-justification calculations are based on what is termed the “Typical Customer”. This typical customer supposedly has an average monthly GWA billing of $55. There is no mention as to how the typical customer was determined and how the value of $55 for his billing was obtained. A few quick calculations using the GWA billing schedule reveal that the water delivered to the “Typical” customer amounts to about 8,500 gals/month. If the typical customer has a typical household size of 3.89 (Guam census data) then the average daily use per person is only 73 gallons. While this is a wonderfully low number, the national average is in the range of 125 gal/person/day and in other parts of the Master Plan the daily rate is stated to be much higher (see comments below). The questions are: Who is this “Typical” customer? and How is his or her use rate and billing derived? The GWA customer billing rates are also compared to those in Hawaii. It is interesting to nc	The GWA typical customer water demand is defined as the GWA median water demands of the single family dwelling (SFD) residential customer classifcation; in other words, in FY05-06, before the GWA meter replacement program, 50% of all SFD accounts used less than 8 Kgal/month, and 50% more. In the following years the typcial use increases to 9 Kgal/month as a result of more accurate meters. The combined water/sewer bill for this customer is based on the GWA rates effective 2/06 when the study was prepared. A comparison of GWA rates with those of USA states is outside of the scope of the analysis. See Volume 1, Table 14-38 & Figure 14-7.
68	The justification of the increased rate schedule was made using the AWWA standard that water utility billing should not exceed 2% of median income. In the Master Plan, computation of a reasonable rate was done using Guam’s median family income as their basis. The difference between Guam’s median household income ($30,755) and Guam’s mean family income which is $41,229 is sizable. We believe the median household income should be the one used for any rate computation/comparison. We feel that one should use household instead of family income in this computation. GWA billing is based on residences or households. If one multiplies the median household income by the 2% AWWA value, we get a reasonable monthly billing rate of $51per month which is even less than the “Typical” customer who they presented as being billed at $55 per month. By these computations GWA customers are already paying a reasonable rate.	We believe the mean value is the best value to use at this time, especially if GWA implements an aggressive lifeline program to address the low-end of the family income spectrum.
69	Various scenarios are presented to come up with what kind of rate increases will be required to fund the capital improvement program requirements. While the incremental annual rate increases proposed sound fairly low, because of the compounding factor the final rates are as much as 60 to 70 percent higher than the present rates. These high increases are dismissed lightly in the text by saying that Guam customer should easily be able to pay 4-6% of their income (2 to 3 times the AWWA recommended rate). We are not sure the rate payers will stand for this.	The impact of these rate increases was not taken lightly. As noted, the cumulative effect will be substantial. The rate increases must be weighed against the need to improve systems and attain regulatory compliance, which is the intent of the CIP program. Also see response to comment #98.

Comment No.	USEPA/GEPA/WERI/Public Comments	Response
70	The fire flow analyses on the water system were done very thoroughly and presented some very interesting outcomes. According to the consultant, they were not able to obtain Guam's requirements for fire flows to use in there studies. They used Hawaii's criteria in all of their analyses. The results is that a large share of the required high priority capital improvement projects are for fire flow reasons (since adequate fire flow are a pubic safety issue). GWA needs to work closely with other Guam agencies such as the Guam Fire Department, the Guam Insurance Commission, and other interested parties to determine what are reasonable and applicable fire flow standards for Guam. This needs to be done immediately as it has a serious impact on the entire Master Plan.	The fire flow improvements also ensure basic pressure and flow needs are met as well. Also, see response to comment #136 regarding fire flow requirements. Lastly, note that the Stipulated Order mandated use of Hawaii Water System Standards.
71	The effect of decreasing the water losses in the GWA system on the health of the Northern Guam Lens was discussed in the Master Plan. The consultants felt that if the calculated 50% water loss rate could be lowered to a more reasonable value then the recovered water will be more than enough to meet future needs. One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this "artificial recharge". If this recharge were removed from the water budget with leak repairs and septic tank reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat short sighted and that new well developments and or surface water developments in the south may still be needed to be considered.	Reducing water loss would likely reduce some of the inadvertent "recharge" that occurs from that lost water. The amount that is returning to the aquifer is very difficult to quantify. However, even if with a substantial return, there remains a significant amount of unused sustainable yield in the Northern Lens.
72	To accomplish the many activities defined as essential in the Master Plan, there is a need to set up a well defined set of time oriented goals that are to be accomplished and a way of measuring if these goals are completed. We have to assume that the various software packages described in the Master Plan will accomplish this. We hope that GWA will be able to apply these programs successfully and pass along to the CCU, PUC, and their customers the necessary information so that everyone know how GWA is doing in completing the many Master Plan assignments. If GWA is unable to apply these programs then this may be another case where the consultant will have to remain on retainer indefinitely.	GWA will need to develop time oriented goals as noted. We will be providing some additional guidance to GWA through an implementation plan.

WERI - Specific Comments
Volume 1 Background

Comment No.		WERI Comments	Response
73	Vol 1 Chap 2 2.4	We feel that the statement that Guam's average income of $50,000, although true, might be somewhat misleading. In the report referenced in this section a more reasonable rate provided is Guam's median family income. The difference between Guam's median household income ($30,755) and the $50,000 figure provided is sizable. We believe the median household income should be the one used for any rate calculation/ comparison studies. We recommend that one should use household instead of family because GWA billing is applied to residences or households. We feel that a median household income value should be used to avoid the high-side skewness that is presented when using a straight mean or average value.	The percentage affordability figures can be recalculated easily using the median household income of $30,755. The percentage affordability figures increase by 60%. However, the conclusions do not change much at all. There is still the ability to increase rates above current levels but not to the same extent. Special attention needs to be given to the poorest 25% of households in structuring the rate. More subsidy will be needed for very high levels of capital expenditure. Also see response to comment #98.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
74	Vol 1 Chap 2 2.6	We are greatly concerned that GWA will be unable to find and retain technical staff to carry out the many computer automated planning and engineering evaluation programs that the Master Plan presents as essential to successful moving ahead and meeting the many stipulated order concerns. This problem also occurs in the operation of the water and waste water systems. Finding and keeping competent, qualified and licensed technical people have been an age old problem in Guam's agencies. Even with the partial separation of GWA from the Government of Guam there are still problems finding and retaining competent individuals. Until this problem is solved we feel it will be nearly impossible for GWA to carry out the programs presented in the Master Plan and the consultants will have to remain on retainer forever. Privatization and out sourcing options may be one means of coming to grips with the dilemma.	Recruitment and retention of good technical staff is a major issue on Guam. A special program should be focused on achieving this. Options to analyse and consider for support include consulting panels, operations support contracts, partnering and even outsourcing/privatization of some or many of its functions. It is beyond the scope of the WRMP to provide detailed advice.
75	Vol 1 Chap 3 3.2	Figure 3-1 Where does the PUC fit into the picture? They are part of the rate setting process, therefore they are very important to the success of all of the Master Plan programs.	Emphasis is on the specific organization within GWA. It is recognized that there are many other agencies, peripheral to the agency having an influence on the activities, the PUC being one of these.
76	Vol 1 Chap 3 3.8	What proof is there that there has been a reduction in complaints? It is very important that GWA continues to become more responsive to its customers. If one listens to the local talk shows it appears that many complaints go ignored or unanswered. The lack of major typhoon activity is one important consideration that needs to be considered when discussing improvements from 2003 forward. The last major typhoon that occurred on Guam was in December of 2002. Typhoons are major stressors to all of the utility systems in Guam. They lead to power and water outages pumps system failures, sewage overflows etc. One must be careful in attributing all improvements during this period merely to administrative efforts. These improvements may well be partially because the systems weren't stressed as severely during that time period.	Some of the decrease in the wastewater spills and boil water notices may relate to fewer typhoons.
77	Vol 1 Chap 3 3.10.1	We have examined the waste water system GIS files and have found locational discrepancies through out the island when compared to satellite imagery. These discrepancies are not all due to the difference in projections used. These discrepancies will need correction if the data is to be useful in locating resources.	There are some discrepancies between actual field conditions and the model, but they are not deemed to be significant (particularly for the wastewater model). Also, see comment #2.
78	Vol 1 Chap 3 3.14	It is vital that salaries offered to employees reflect the certification level achieved. These salaries need to be competitive with those offered in the US mainland for similar positions or we will never be able to attract new qualified individuals or retain those who have worked hard to become qualified.	GWA has recently received additional flexibility in establishing its salary structure. Efforts are underway to evaluate changes needed to remain competitive.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
79	Vol 1 Chap 3 Exhibit 3A	The GWA organization chart shows 7 engineering positions including the Chief Engineer. In the past it has been extremely difficulty to recruit and retain qualified people in these positions. The civil service salary structure for these positions has presented an almost insurmountable obstacle for GWA and other Guam agencies to fill these highly technical positions. If the Master Plan is to be carried out successfully all of these positions need to be filled with well qualified people. Government of Guam agencies should make a concerted effort to get the civil service engineering salary schedule in line with salaries offered in the US mainland. All engineers should be urged to gain engineering intern and eventually professional engineer status with pay increases commensurate with there licensing level. Presently and in the past the Chief Engineer at GWA has been a temporary assignee from the public health service. While these people have provided valuable expertise and have provided great service to the utility, their coming and going has failed to maintain a good institutional memory at the top engineering level of the utility. We woul efforts should be made to recruit a utility experienced chief engineer who is a licensed professional engine in the Territory of Guam who can also be expected a long term commitment to the utility.	It is not clear what the consultants can do other than urge GWA to follow the suggestions made in the Comments section. We concur that these are the necessary actions to take to assure success.
80	Vol 1 Chap 4 Fig 4-1	We do not understand the significance and the use of this figure.	Figure 4.1 was developed by Hunter Water to help explain the difference between service levels and performance measures to water and wastewater agencies during training programs. One reference many years old is a paper on service levels by Kevin Young and Ken Harlow available on Brown and Caldwell's asset management website. The diagram and variants of it are in other papers as well. Service levels have been implemented at Seattle Public Utilities, CSD-1 in Sacramento and other places. There is an upcoming article in the July 2007 WE&T magazine that is likely to include a variation to this diagram. So it is not an abnormal diagram and expect to see more of it in future.
81	Vol 1 Chap 4 4.3.1	Reduction in boiled water notices may be due to lack of typhoons since December 2002. See 3.8 above.	See response to comment #76.
82	Vol 1 Chap 4 4.3.2	Where does the 10% figure for intermittent water outages and low pressure come from? Needs further study.	The 10% outage/disruption figure came from discussions with GWA technical and field staff shortly after the WRMP project started in 2004. This figure is likely to have been improved upon since that time.
83	Vol 1 Chap 4 4.3.4	May be same reason as 4.3.1 above.	Some of the decrease in the wastewater spills may relate to fewer typhoons. The service level for normal wastewater spills should be defined in a way that precludes extreme weather events. Spills outside these normal periods should be counted but classified and managed differently.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
84	Vol 1 Chap 4 4.4	Need more details about how recording and maintaining performance measures will be accomplished. This is very important for improvements in service.	The process for implementing service levels follows in a similar way to the implementation pathway at CSD-1 in Sacramento, California. It is the responsibility of the management of GWA to undertake this task with suitable assistance from the CCU. Other regulatory agencies may be interested in monitoring progress.
85	Vol 1 Chap 4 4.4 Step 6	This sounds great, but we are not sure whether we understand what it really means and whether it will ever be carried out.	It is agreed that Step 6 is an ideal and may take many years to gather data for and achieve. However it is important that the whole vision for service levels be documented at the start and that local staff understand their full role and potential. The water and wastewater systems of Guam have special characteristics that need to be identified over time and management responses devised to meet these special needs. Service levels have an important role to play in achieving this vision.
86	Vol 5 Chap 5 5.7	We attended one of the public hearings for the Master Plan. We noticed that the presentation was poor and unorganized. There were no handouts and the Master Plan costs and rate increases were not discussed.	-
87	Vol 1 Chap 5 5.9 Audiences	Should this list have customers first?	Customers could be listed first, but the list is not really in priority order. I could argue that employees should be listed first since they need to understand all the outreach activities that might be proposed so that they can be "ambassadors" for GWA in the community.
88	Vol 1 Chap 5 5.10.1	Does this end after the Master Plan is completed or will the consultant be involved indefitely.	Its GWA's responsibility to carry the plan forward.
89	Vol 1 6.3.3 and the remining of Chap 6	The population projections that were provided were made based on available data at the time of report preparation. The recent announcements by the Department of Defense of relocation of Marines from Okinawa and realignment of new Air Force activities to Guam will present a sever perturbation in the population trends of the island and make the population projections in the Master Plan suspect. The remainder of the plan including the financial plan, resource availability plan, and the water and waste water systems capital improvements plans all depend on these population projections being correct. It is vital that these projections be updated if the plan is to have any validity.	We concur; see response to comment #66.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
90	Vol 1 Chap 8 8.4.8	How large and how well trained will the IT group need to be to handle this?	Section 8.4.8 describes a topic area in which GWA was assessed. It neither evaluates GWA's current practices nor suggests any course of action. The results of the assessment, showing GWA's current status with respect to "best practices," may be seen on page two of Figure 8-2 under the heading, "8.0 Business Support Tools." Although there is obviously room for improvement, GWA did not define what improvements it would like to make or the time frame for any improvements, so we are unable to comment on GWA's IT staffing levels or training needs in this regard.
91	Vol 1 Chap 10	Not sure if GWA will be able to handle the CAPE software. This software might require extensive training and new staff. If GWA staff can't handle, it may require retention of consultant indefinitely. Is this what GWA has in mind?	The CAPE software is straightforward to use. GWA staff are receiving training on its use with the intent that they will be able to use it going forward.
92	Vol 1 Chap 11	Well Done.	-
93	Vol 1 Chap 12 12.1	Besides those listed as factors affecting GWA services, other items that could impact the GWA service are storm damage and vandalism should be included.	The effects of storm damage and vandalism at the water and wastewater pumping stations are an issue more as a result of or lack of physical security. Many of the stations are located in remote areas, often shielded by vegetation, whereby the copper conductors, generator batteries, or the aluminum building materials were subject to theft or vandalism. Several stations that were damaged by typhoons had not been physically repaired or secured with working doors and gates. The electrical service power, to most of the station buildings are installed underground and consequently less susceptible to storm damage. The utility lines, however, are mostly installed overhead and affected by storm damage. The installation of an operational SCADA system addressed the issue of intrusion alarming to improve physical security at the pumping station sites.
94	Vol 1 Chap 13	SCADA is wonderful as long as it is maintained and not sabotaged because it is seen as a replacement for employees. SCADA was tried and failed miserably in the past.	With the greater integration of computers in utility management across the world, SCADA use is now commonplace and is anticipated to have greater acceptance than in the past.
95	Vol 1 Chap 14 Table 14-1	The table indicates that the annual household income will increases 2.5% annually over the next six years. The compounding affect means that it is expected that household incomes will rise by 16% over the next 6 years. What data is used to support these increases? There have been no sizable increases to Government of Guam wages in the last 10 years.	Volume 1 Table 14-1 footnotes state: "The projected Household Income increases have been 1 percent over the consumer price index (CPI). The CPI is projected to be lower than the inflation on GWA costs. No current government infromation exists on recent and projected CPI or household income changes."

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
96	Vol 1 Chap 14 14.3.1	There is very little information on the actual calculations that went into developing the costs of the Capital Improvement Projects. It is hard to comment on assumptions made in this section.	An overview of CIP Cost Estimating is given in Volume 1, Section 15.7.
97	Vol 1 Chap 14 14.9.1	There is no mention as to how the “typical” customer was determined and how the value of $55 (which is shown on several tables) for his billing was obtained. A few quick calculations using the GWA billing schedule reveals that the water delivered to the typical customer amounts to about 8,500 gal/month rather than the 8,000 gallons shown in table 14-35. If the typical customer has a typical household size of 3.89 (Guam census data) then the average daily use per person is only 73 gallons. While this is a wonderfully low number, the national average is in the range of 125 gal/person/day and in other parts of the Master Plan the daily use rate is stated to be much higher. The questions are: Who is this typical customer? and How is his or her use rate and billing derived? The GWA customer billing rates are also compared to those in Hawaii. It is interesting to note that Hawaii’s typical customer is also charged $55 per month (table 14-46). If we assume the typical household on Guam has 3.89 individuals (Guam census information) and multiply this rate by a typical US accepted rate of 125 gal/person/day, we get a monthly use rate of 14,709 gal/month. If we run this consumption through the GWA billing schedule we wo typical bill of $76.97 rather than the $55 amount which is shown on the tables.	The GWA typical customer water demand is defined as the GWA median water demands of the single family dwelling (SFD) residential customer classifcation; in other words, in FY05-06, before the GWA meter replacement program, 50% of all SFD accounts used less than 8 Kgal/month, and 50% more. In the following years the typcial use increases to 9 Kgal/month as a result of more accurate meters. The combined water/sewer bill for this customer is based on the GWA rates effective 2/06 when the study was prepared. A comparison of GWA rates with those of USA states is outside of the scope of the analysis.
		Because of the compounding effect, the eight percent (8%) rate increase scenarios presented in Table 14-35 result in a total of 65% increase (($90-$54.58)/$54.58=65%) in rates in the six year study period. We are not sure the CCU, PUC, or rate payers will stand for these kinds of increases.	

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
98	Vol 1 Chap 14 14.10 & 11	Various scenarios are presented to come up with what kind of rate increases will be required to fund the capital improvement program required. While the incremental rate increase sound fairly low, because of the compounding factor the end rates are as much as 60 to 70 percent higher than present rates. These high increases are dismissed lightly in the text by saying that Guam customer should easily be able to pay 4-6% of their income (2 to 3 times the AWWA recommended rate). Again, we are not sure the CCU, PUC and rate payers will stand for this. Table 14-44 presents a comparison of household incomes against affordable billing at the 2% percent rate. The right side of the table compares the percent of income if all customers had the “typical” bill of $55. This is ludicrous first since the $55 dollar per month billing is low and secondly assuming those who’s household incomes are over $93,000 have the same water demands (and thus billing) as those who’s income is $8000. It is difficult for us to understand the reasoning behind this computation. Another factor that was left out of the computation is that those customers on septic tanks are not paying sewer charges as part of their billing. The Master Plans advocates and aggressive campaign to get the non-sewered households on sewers. This increased revenue do these improvements must be fitted into the calculations.	All rate findings on affordability were developed with caution and sincerity; this author dismisses nothing lightly. The report specifically states: "In conclusion, it appears that the 20-year financial plan is affordable, but with three caveats. First, the Guam community has a disproportionately high level of low-income households, so a vigorous lifeline program is essential if those customers are to continue receiving utility services unabated. Second, it may be difficult for elected utility managers to enact continuous rate increases of over five percent annually. While a public outreach information campaign will create some support for rate increases, either the Base Case CIP or the Minimum Pace CIP funding will be challenging to implement if approval by elected officials is required. The needs and benefits of the improvements will need to be clearly communicated to GWA’s customers to gain support. Third, it is likely that under Guam community practices the current inequitable billing structure can remain in effect. While it has been shown in the cost of service analysis that the current rates impose a higher-than-equitable financial burden on hotels, the effect of this burden is to lower the bills to residents by “exporting” some of the utility costs offshore through the tourist industry." The increased revenues from growth in sewer services has been incorporated into the financial analysis of rate-based revenue requirements.
99		The justification of the increased rate schedules is made using the AWWA standard that water utility billing should not exceed 2% of median income. In making their computation of a reasonable rate they use Guam’s median family income as their basis. The difference between Guam’s median household income ($30,755) and Guam’s median family income which is $41,229 is sizable. We feel that one should use household instead of family because GWA billing is based on residences or households. If one multiplies the median household income by the 2% AWWA values we get a reasonable monthly billing rate of $51 per month which is even less than the “typical” customer who they presented as being billed at $55 per month. By these computations GWA customers are already paying a reasonable rate. Any future increase will push GWA’s rates far above the AWWA recommended levels. In addition, increases in the commercial sector will cause additional inflationary pressures on Guam’s fragile economy.	This comment is factually incorrect, as Table 14-44 shows projected typical bills exceeding 2% by a significant margin. Moreover, AWWA is not a proponent of the 2% affordabiltiy index, and is not offered as the source.
100	Vol 1 Chap 14 14.11	There needs to be some setting of annual goals for the Master Plan. This should include: • What improvements are expected and how these improvements will be measured and reported. • Which Capital Improvement Program projects will be completed and how will the successful completion be measured and reported.	See response to comment #72.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
WERI - Specific Comments Volume 2 Water System			
Comment No.		WERI Comments	Response
101	Vol 2 Chap 1 1.2.1 Table 1-3	It appears that many wells are pumping at rates greater than those allowed in the EPA permit for the well. Is this a problem? Also there should be a clarification between the the difference between secured an in-active on this table.	Pumping in excess of the permitted value is a problem from a permit standpoint, and also potentially from chloride levels. The latter is addressed in 1.2.1. Water loss control is a key to reducing pumping rates. This is a high priority item for GWA. We will add a footnote regarding inactive versus secured wells.
102	Vol 2 Chap 1 1.2.1	The chlorinator descriptions reveal that the injectors are non-pacing. Are these adequate assuming some variability of pump discharge occurs? Also the locations of many of the chlorine stations are next to schools and residential areas. This presents a real safety problem especially when other parts of the Master Plan reveal that the safety equipment at the chlorination sites is not working properly. Also in Table 1.4 and 1.5, Chloride levels seem to be a problem in some of the wells. Pumping rates should be adjusted to maintain acceptable levels even if it means pumping at rates lower that the EPA permitted values.	Ideally the chlorinators would be flow-paced. However, the output from a given well is controlled by operators, as is the chlorine feed rate. The issue of safety, as well as prioritization of chlorination facilties as they relate to public safety, was included in a vulnerability assessment of the water system. This information is confidential, by federal statute. The last paragraph of 1.2.1 discusses the need to consider lower pumping rates to reduce chlorides.
103	Vol 2 Chap 1 1.2.3	One must be very careful in planning on the increased flows from improvements to the Ugum Treatment Plant. The Ugum River water supply has two problems that can limit production. The first is during low flows there is a requirement that at least 2 cfs must pass the diversion structure for downstream conservation purposes. Secondly at high flow rates the turbidity might be so high as to render treatment impossible. Rather than just use the duration curves approach presented, it might be good to run actual flow values and estimated turbidities through a simulation model of the diversion and treatment plant operation. This could provide a more accurate estimate of long term water availability to the plant. It's quite likely that this kind of study would llustrate the importance of some kind of raw water storage facility at the site.	The minimum streamflow requirements are noted in the text of Section 1.2.3. The modeling effort that is suggested is beyond the scope of this project.
104	Vol 2 Chap 2 2.4	The statement that there is a lack of turbidity reading that parallel rainfall events is a bit misleading. We feel that there is not sufficient data available at this time to establish whether or not there is a significant relationship between rainfall and turbidity in the aquifer. That is a topic for future study.	We will rephrase the statement to reflect lack of data.
105	Vol 2 Chap 2 2.5.1.1	The reduced number of coliform hits during the period 2003-2005 could be a result of a lack of typhoons during that period. There has been no typhoon activity in Guam since December 2002. Typhoons with their accompanying high rainfall and winds wreak havoc on the utility systems of the islands causing power failures and island wide pumping problems. These failures can cause sewage backups and spills. The depressurization of portions of the water system after typhoons has also cause contamination problems in the past.	We will note this in the text.
106	Vol 2 Chap 2 2.5.8	The Master Plan states that scores improved on the operator certification exams. More importantly, how many people actually passed the exam?	This level of detail will not have relevance in the life of the master plan since the number of people taking the test and the number of people passing the test change year-to-year.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
107	Vol 2 Chap 3 3.1	The second line makes a reference to Hawaii that really has no place in this section of the report. We do not feel that any Ground Water Under the Direct Influence (GWUDI) of Surface Water ruling will limit the availability of fresh water from the aquifer. It is quite likely that a GWUDI ruling may severely affect the costs of water delivered from the aquifer and the costs of the Capital Improvement Program outlined in the Master Plan. Guam is not two separate island sutured together along the Pago-Adelup fault. That is far too simplistic of a representation of the islands geology.	We agree; comparison to Hawaii and reference to Guam as "two separate islands" will be deleted.
108	Vol 2 Chap 3 3.3.2	There is a problem in using South Guam evapotranspiration rates for Northern Guam. The soils in the north are different, and the soil depths are much shallower. Also the types of vegetative cover are quite different.	We agree. Exhibit 3A cites and compares other studies for Northern Guam before arriving at a water budget for Northern Guam
109	Vol 2 Chap 3 3.4.1	One must be careful in counting on water well development near the coastline. The freshwater lens tends to become less thick in these areas and geologic faulting and other discontinuities can greatly affect the availability of fresh water in these zones. The larger areas (which include the areas beyond the groundwater protection zone) used in the computation have an affect of increasing the assumed sustainable yield calculations beyond what might be safely extracted.	We agree that care must be taken. However, applying a conservative factor of 30% accounts for this concern.
110	Vol 2 Chap 3 3.4.2.2	The statement that new surface water storage reservoir development in South Guam will be “very destructive to the environment” is probably not true. Fena Lake has been operational for many years on Guam and is not viewed as an environmental blight on the island. Life cycle economics must be evaluated to compare the relative advantages of South Guam storage projects as compared to North Guam groundwater development should North Guam’s aquifer be declared under the direct influence of	We agree. Statement will be modified to say "reservoirs may be destructive."
111	Vol 2 Chap 3 3.5	One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this “artificial recharge”. If this recharge were removed from the water budget with leak repairs and septic tank reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat short sited and that new well developments and or surface water developments in the south may still be needed to be considered.	We agree. Recharge is dynamic, and reduction in artificial recharge if it occurs, will be considered in future Master Plan updates.
112	Vol 2 Chap 3 3.5.1 Table 3-6	Are these estimates based on the 30% extraction rate applied to the larger recharge areas discussed in 3.4.1 above? See comments above for 3.4.1.	No, the estimates are based on variable aquifer specific rates that are summarized in the cited references.
113	Vol 2 Chap 3 3.5.2.2	In South Guam we may want to consider individual wells for remote houses or small subdivisions as is common in the U.S. Even the low pumping rates available in the south can provide a substantial and dependable supply of water to singly family residences or small subdivision groups.	We agree. Statement will be added to text.
114	Vol 2 Chap 3 3.6	Many GWA wells are pumping over the limits of their EPA permits. Should the EPA permitted rates be used when evaluating the resource available today?	No. The sustainable yield of aquifers (rather than individual well yields or permitted rates) are the best basis for evaluating available resources.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
115	Vol 2 Chap 3 3.7.2	Don't know what the significance is of the capture zone computation provided in this section. Because water in the aquifer is moving at a very fast pace down gradient any contaminants introduced up gradient of the well may find their way into 11 water pumped by that well. In reality the entire aquifer should be considered as a well head protection zone.	We disagree. The EPA WHPP concept is still valid and useful for high ground water gradients and/or velocities. Overlapping capture zones cover parts of the aquifer where appropriate.
116	Vol 2 Chap 3 3.9	We don't feel that Ground Water Under the Influence of surface water rulings will limit the availability of water, but they could quite possibly affect the economic feasibility of developing that water in comparison to other sources. Planning on using all the water that will be saved due to leakage reduction may be overly optimistic. One must keep in mind that a large portion of the water lost in the northern water system and water percolating from septic tanks in northern Guam becomes recharge to the aquifer system. The dynamic picture we now have of the aquifer includes this "artificial recharge". If this recharge were removed from the water budget with leak repairs and septic tank reduction, the aquifer might respond in a somewhat different manner than it has in the past. We feel that counting on this saved water to provide all of the needs for future development may be somewhat shortsighted and that new well developments and or surface water developments in the south may still be needed to be considered. In addition when all of the new more accurate reading water meters are installed, we might find that people a that losses may be less than anticipated, therefore there may be less water available for future use from existing sources.	We agree; a statement will be added to the first bullet that production costs may increase. We also agree that leakage reduction will decrease recharge and that the water budget is dynamic. The plan states that new wells and/or surface water developments may be necessary in the future.
117	3.10 See 3.5 above		See response to comment #111 and #116.
118	Vol 2 Chap 3 Exhibit 3-B	The calculations in this exhibit assume an average daily demand of 125 gal/person/day. This is not in line with the demands that would be computed using the "typical" billing value of $55 that was used earlier in the plan. It seems like there is no consistency in coming up with a common use rate which is so important in determining the resource used and determining correct revenue projections. It seems like old residential water billing records could have been used to determine at least an approximation of use rate even if the meter reading were somewhat in error. These predictions could be updated by comparisons with use rates for residences which have the newly installed radio-read meters. These numbers are too important to just pull them from Hawaii or what is typical in the US. Guam is not Hawaii or the US mainland.	For the water budget, an actual use of 125 gal/person/day (excluding system losses) was assumed and is reasonable. Better values will be obtained in the near future with the meter replacement program, which is in progress.
119	Vol 2 Chap 4 4.1	Same as Exhibit 3-b above	See response to comment #118 above.
120	Vol 2 Chap 4 4.2	Leak survey on the customer side will not create more revenue for GWA, but could help to enhance the overall water supply.	We concur. Costs for pumping and distribution would be reduced as well.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
121	Vol 2 Chap 4 4.2.1	May want to evaluate all storage tanks for leakage. Also check that all connections shown in the billing data base are unsewered are really unsewered and not in error. In previous studies it has been found that there were mistakes in the database where some customers are connected to the sewer and not being charged. Also GWA must concentrate on it's own water system leakage problems before enforcing controls on the customer side of the meter. Remember the customers are paying for there leaks water plus indirectly they are paying for the water pumped and leaked in the system. Also does a leak detection team of 12 people agree to what is identified in the projected costs earlier in the plan.	We believe this is GWA's intent going forward.
122	Vol 2 Chap 5	Guam has an average of over 8 feet of rainfall per year, but the conservation program does not include any direct catchment of rain water as part of the plan. Our neighbor islands and other areas of high rainfall in the world use direct rainfall catchment extensively. This could include direct rainfall catchment to supplement rural residential supplies, large commercial split systems to provide water for non-potable uses, and combined system for residential housing where GWA water is used only when rain water supply is inadequate. All sources and means of enhancing our water supplies should be examined.	Rainfall catchment was not considered in this study.
123	Vol 2 Chap 6 6.4	We are somewhat confused about how the head vs. discharge relationships were set for the pumping wells in the model. It appears that the design flow was chosen as the EPA permitted flow value and the design head was adjusted until the pump was actually pumping at or near the EPA approved values. If only design head and design flow are provided to the model, the model creates its own pump curve. If this method is used, we are not sure that the actual pumps perform in the manner as predicted by the model. The curves developed by the model should be compared with manufacturers' pumps curves or measured pump curves from field testing.	Actual pump curves were not available. Field tests can be used to infer a curve for model upgrade.
124	Vol 2 Chap 6 6.6.1	The 0.17 gpm/person = 245 gpd assumed for unaccounted for water is spread evenly across the system in the same way as population. Is this a good assumption?	As the plan was being developed, there was no information to suggest a variation across the system although it is likely to vary somewhat. As the system is upgraded and more information collected, the loss can be distributed accordingly.
125	Vol 2 Chap 6 6.6.4	What are the fire flow regulations for Guam? The fire flow analyses that were made on the water system were very thoroughly done and presented some very interesting outcomes. According to the consultant they were not able to obtain Guam's requirements for fire flows to use in their analysis. They used Hawaii's criteria in all cases. The results is that a large share of the required high priority capital improvement projects are for fire flow reasons (since adequate fire flow are a pubic safety issue). GWA needs to work closely with other Guam agencies such as the Guam Fire Department, the Guam Insurance Commission, and other interested parties to determine what are reasonable and applicable fire flow standards for Guam. This needs to be done immediately as it has a serious impact on the entire Master Plan.	See response to comment #60.

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Comment No.		USEPA/GEPA/WERI/Public Comments	Response
126	Vol 2 Chap 6 6.7	This section states that once leak detection is completed a whole new set of pumping rates , usages and usage patterns must be applied. The results of these must serve as input to the development scenarios that are used in other portions of the Master Plan. (revenue projections, capital improvement projects needed, etc) Will GWA staff be able to handle this task.	GWA has committed to updating the master plan biannually using the latest information to help address this issue. Also, see response to comment #130.
127	Vol 2 Chap 6 6.8.3	Same comment as 6.4 above	See response to comment #123.
128	Vol 2 Chap 6 6.9.2	Model well pumps may not have accurate pump curves and therefore will not respond accurately to changes in hydraulic grade lines that are presented to them in the model. See 6.4 above.	See response to comment #123.
129	Vol 2 Chap 6 6.9.3	Figures 6-10, 1-, 25 and 27 show that nearly the entire system is at velocities greater than 6 ft/sec. Is that true or is there an error in labeling.	The labels on 6.10, 6-19 and 6-27 show red as less than 6 fps and blue as > 6 fps. This has been reversed. The red lines indicate velocity greater than 6-fps.
130	Vol 2 Chap 6 6.10	The plan suggested that the consultant and MWHSoft may be able to provide training for GWA employees. A local source of training (WERI) was not mentioned. WERI has over the years carried out several different intensive training programs on water system hydraulics and water system modeling including the use of the MWHSoft Water program. Also GWA will have to come to grips with its salary 13 structure and its ability to attract and retain qualified individuals if it is going to be able to operate and update this model. Having qualified people is the key if in fact we really want GWA to operate, update and use the model in the operation and planning activities of the agency.	Local university personnel can provide both on-going training as well as provide model update activites. GWA will need to determine if in-house resources should be devoted to this or if out-sourcing is more efficient and reliable.
131	Vol 2 Chap 6 6.11.1	The addition population (38,000) demand is to be computed using 150 gpm (page 6-59). Where does this 150 gpm rate come from? Also the 38,000 increase probably is not enough to account for normal growth plus increases from recently announced from Marine and Air force re-deployments to Guam. Adjustments as to the increased numbers and where these increases will occur will need to be made.	150 gpcd was taken as a reasonable estimate of future demand. When more is known about potential military projections, these will need to be incorporated into planning moving forward.
132	Vol 2 Chap 6 6.11.2	The consultant states that well discharges change with head. In their technique of providing design head and design flow the program calculates an assumed pump curve. This may or may not be the same as the actual pump curve exhibited by the pump. The curves developed by the model should be compared with manufacturers' pumps curves or measured pump curves from field testing. Also there is a need to be sure that the pumping rates shown in the model will not cause salt water intrusion problems.	See response to comment #123.
133	Vol 2 Chap 6 6.11.6	Should be careful in lowering low pressure criteria values below 40 psi. This may cause problems in upper floors of 2-3 story apartment buildings as the pressure values computed are based on ground elevations not actual delivery elevations to the residences.	We agree that care and judgment must be applied if a lower value is allowed.
134	Vol 2 Chap 7 7.5	Well chlorination systems are often located in areas near schools and residential areas. This presents an appreciable hazard since in many cases the warning devices on these systems are not working adequately.	The issue of safety, as well as prioritization of chlorination facilties as they relate to public safety, was included in a vulnerability assessment of the water system. This information is confidential, by federal statute.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
135	Vol 2 Chap 8 8.2	A portion of the leaked water serves as recharge to the aquifer. So all water saved by leak detection might not be available for use. See 3.5 above.		Comment noted. It was considered in the evaluation that some of the water loss from leakage in the pipelines is recharging the groundwater acquifer.
136	Vol 2 Chap 8 8.3	We wonder if Hawaii's fire code is applicable to Guam. In Guam nearly all structures are concrete and fire resistant. Was contacts were made with the Guam Fire Department and the Guam's Insurance Commission concerning the fire flows values used. (see 6.6.4 above)		GWA has been in contact with the Guam Fire Department and Insurance Commission, but has not been successful in getting a lower flow rate/duration criteria for use in Guam.
137	Vol 2 Chap 8 8.6	Even if the Ugum Treatment plant capacity is increased to 4.0 mgd an appreciable part of the capacity will not be available at certain times. This is because of low flow in the stream and high turbidity levels during high flow times. This needs to be considered when evaluating the Ugum treatment plant's contribution to the fresh water resources.		When Ugum WTP's full capacity is not available, the normally closed valve located just south of the Route 4 and Route 17 junction will have to be opened to provide water to the South System from the North System. Both the flow and pressure in the system will be negatively affected during this time period.
138	Vol 2 Chap 9	No way to evaluate the costs that were computed for the Capital Improvement Projects. Need more detail on these computations in order to comment.		See response to comment #96.
Public Comments Sinajana, Wednesday 1/03/07				
139		Paul Packbier, resident of Perezville, Tamuning	I have attached a JPEG of a GWA map that shows a portion of Perezville which is not being serviced by any waterlines. This is, of course, not true since in fact we do get water and are metered and billed for it. However, from my years of research and discovery (in my own backyard) our house is serviced by an unmapped 2-inch galvanized waterline that runs beneath the backyards of the homes in the street. The meter for my house was at one time in the back of the house, which now is actually an indoor area. Due to the fact that our house is the last house on this waterline, and it is the highest point of the subject line (our neighbors to the left get water from another source up the road), not only is the pressure inadequate at best, but residual chlorine in the water is non-existent, resulting in a problem with iron bacteria. (On the map, we are the fifth house from the bottom, up Father San Vitores Street (across Mercy Heights)). FYI, I am a GEPA Certified Level III Water Treatment Plant Operator and have been treating our water with chlorine tablets and activated carbon to make it potable.	See Table 8-7, No. N28, on Page 8-9 regarding the recommended waterline improvement that matches what is shown on the referenced photo.

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Comment No.			USEPA/GEPA/WERI/Public Comments	Response
			This is not something I believe is acceptable from a municipal water supply system. I believe that a solution would be to complete "the loop" in Perezville and connect the waterline that terminates at Mercy Heights with the one that comes from Gov. Bradley and Fr. Roman streets. On the JPEG file I have this proposed connection drawn in as a red line, which is approximately 1,000 feet long in real life. In addition to this connection, GWA would have to identify and secure the source of water supplying these homes now (I believe from Camp Watkins Rd.) to make sure that no losses occur after they're switched to the new line. One incident that has prompted me to bring this to your attention now (after years of low pressure, water tanks, and water treatment) is that during a current remodeling/extension project next door, the contractor "surprisingly" dug up the waterline and damaged it in their backyard. This old, rusted, galvanized pipe looked in pretty bad shape when I inspected it.	
			They repaired it (clamped), and proceeded to build their two story extension over the pipe as planned. If any further leaks develop in the future, there will be no way that anybody can repair them, or shut off the water to prevent (unmetered) losses. Moreover, there would be no way to get water to our house besides having to dig up the neighbor's yard and/or home ...As an always on-time rate payer, I'm hereby requesting the inclusion of this approximately 1,000 feet long stretch of pipeline to these existing homes.	
Public Comments Dededo, Wednesday 1/10/07				
140		Joe Garrido	Garrido asked about what kinds of water services GWA provided to the military. Garrido says that we are doing these things in the master plan as a result of the stipulated order we should look into getting the federal government to pay as well. He said that the economic impact to Guam was not fair to be shouldered by just the local government. Garrido says that the federal government needs to do this otherwise he will go to the attorney general and request that she force the federal government to pay.	Craddick: GWA is not providing any existing water services to the military.

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141			Garrido noted that he is very concerned about the long range plan and how this is going to impact Guam. He feels that it is not going to be good for Guam and this will have an adverse impact. Garrido noted that there were too many developments going in Guam. Garrido said he feels that the federal government is responsible for what is happening to Guam. Garrido said that they should pay for at least half of the projects as they are one that caused the problems with the water. Garrido wants GWA to charge the Navy for the lines we run into the Navy. Garrido also wants GWA to charge the developer any projects they undertake which might affect the system.	GWA to respond.
142		San Nicolas	What was the plan for incorporating the military into the waste water and water lines plans?	Specific information about the military expansion plans was not available during key periods of the Master Plan development. Consequently, a general evaluation was completed and provided in Volume I, Chapter 17. The Master Plan will need to be updated to incorporate information as it becomes available and included in the biannual updates.
143		Unknown/Unnamed Person	How do lines get priority?	Craddick: GWA looks at years on the line, and how many customers we have had on the line. Outlined the priorities of the Master Plan: 1. Life and Safety 2. Regulatory Compliance 3. Reliability 4. Redundancy 5. O&M issues not covered in the above.
Public Comments Yona, Wednesday 1/17/07				
144			Only comment - a desire for for extra emphasis to be placed on the management of the Baza Gardens WWRF effluent water – whether by quality of discharged water of by finding another place for it other than the stream.	See response to comment #1.