

June 2009

# DEFENSE INFRASTRUCTURE

## Planning Challenges Could Increase Risks for DOD in Providing Utility Services When Needed to Support the Military Buildup on Guam



GAO

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Highlights of [GAO-09-653](#), a report to congressional requesters

## Why GAO Did This Study

The Department of Defense's (DOD) plans to increase the U.S. military presence on Guam by more than two-and-a-half times the island's current military population of 15,000 by 2020. To keep pace with this growth, DOD has determined that substantial upgrades to the island's existing utilities infrastructure are required for electric power, potable water, wastewater treatment, and solid waste disposal to meet future utility needs.

GAO was asked to examine (1) the condition and capacity of the existing utilities' infrastructure on Guam, the military's estimated utility requirements, and potential solutions for meeting the increased demand on the island's utility systems as well as (2) the extent that DOD has developed a comprehensive plan to address any challenges it faces in its planning for new utility systems. GAO reviewed and analyzed plans and studies within DOD, the services, and several stakeholders on implementing new utility services associated with the Guam military buildup.

## What GAO Recommends

GAO recommends that DOD develop a comprehensive utility plan for Guam, in cooperation with the government of Guam, to strengthen DOD's management of its utility planning efforts and provide additional transparency among its stakeholders. DOD agreed with our recommendation.

To view the full product, including the scope and methodology, [click on GAO-09-653](#). For more information, contact Brian J. Lepore, 202-512-4523, [leporeb@gao.gov](mailto:leporeb@gao.gov).

## DEFENSE INFRASTRUCTURE

### Planning Challenges Could Increase Risks for DOD in Providing Utility Services When Needed to Support the Military Buildup on Guam

#### What GAO Found

Existing utility systems on Guam are currently near or at their maximum capacities and will require significant enhancements to meet anticipated demands of the expanding U.S. military population resulting from DOD's planned buildup. Over the past 2 years, the Navy's Joint Guam Program Office, which is leading DOD's utility planning efforts in cooperation with the Naval Facilities Engineering Command, has conducted several studies to identify and evaluate possible long-term solutions and establish an implementation approach. Currently, DOD is determining its preferred solutions that will likely result in increasing (1) islandwide electric power generation capacity by 31 percent, (2) Navy potable water production by 89 percent, and (3) wastewater collection and treatment capacity at a Guam Waterworks Authority plant by 50 percent. In addition, DOD plans to use the government of Guam's new landfill to dispose of all DOD solid waste, which is likely to increase by 230 percent as a result of the buildup. DOD also determined that certain operating inefficiencies, outstanding deficiencies, and compliance issues with certain environmental regulations in the existing infrastructure—especially related to those systems operated by Guam utility authorities—would need to be addressed to implement some of its potential solutions.

While the Navy's Joint Guam Program Office has made progress in identifying requirements and solutions to meet future demands, it has not developed a comprehensive utility plan, which would be mutually developed with the government of Guam. Our prior work has shown that use of a comprehensive plan is an important planning tool for an organization to increase transparency and improve management of its efforts to achieve overall objectives. Such a plan generally would include information for stakeholders on schedules, costs, financing, goals and objectives, projects and activities, responsibilities, potential risks, challenges, and other factors that could affect implementation. Several challenges could adversely affect future planning efforts. First, the condition of existing Guam utility systems can affect implementation of some potential solutions. Second, the involvement of a number of diverse stakeholders complicates the planning process by requiring continuous coordination and sharing of information as plans are developed and implemented. Third, sources of funding have not been identified although DOD's cost estimates indicate that the total cost for utilities is likely to exceed the amount of utility funding that the government of Japan has agreed to commit. Fourth, the use of a special purpose entity (utilities service provider) approach to provide new utility services has not been previously used by DOD for utility construction, and DOD may currently lack the statutory authority to implement certain aspects of this approach thus potentially increasing uncertainty about financing, stakeholder involvement, and schedules. Lastly, time frames for completing the buildup of utilities to meet DOD's scheduled increase of military presence on Guam provide little flexibility to accommodate any major adjustments in milestone dates. Without a comprehensive plan, DOD lacks an important planning tool to address these challenges and provide consistent, detailed information to its stakeholders.

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United States Government Accountability Office  
Washington, DC 20548

June 30, 2009

The Honorable Solomon P. Ortiz  
Chairman, Subcommittee on Readiness  
Committee on Armed Services  
House of Representatives

The Honorable Madeleine Z. Bordallo  
House of Representatives

The Department of Defense's (DOD) plans to increase the U.S. military presence on Guam by more than two-and-a-half times the island's current military population by 2020. If implemented as planned, this realignment would increase the military population on Guam from about 15,000 in 2009 to about 29,000 in 2014, and to over 39,000 by 2020. This growth will increase the current island population of 178,430 by about 14 percent over those years.<sup>1</sup> The largest portion of the military's population growth is related to the relocation of about 8,000 Marines and their 9,000 dependents from Okinawa, Japan, to Guam as part of an initiative between the United States and government of Japan to reduce forces in Japan while maintaining a continuing presence of U.S. forces in the region. The populations of each of the other military services would also increase as a result of DOD plans to expand their operations and presence on Guam.

To keep pace with the projected growth in the military's population on Guam, DOD has determined that substantial upgrades to the island's existing utilities infrastructure are required for electric power generation, potable water production, wastewater collection and treatment, and solid waste collection and disposal to provide the additional utility capacities and services. The Navy's Joint Guam Program Office, which is leading the planning efforts among DOD components and other stakeholders to consolidate, optimize, and integrate the existing DOD infrastructure on

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<sup>1</sup> A recent report by the government of Guam's Department of Public Works projected continued growth in the population of Guam. The report estimated that by 2030, the 2008 civilian population of 176,000 would grow by 26 percent to 222,000 without the anticipated military buildup; with the military buildup, the report estimated the total population would increase by 44 percent to 253,000 in 2030 from the current population. Government of Guam, Department of Public Works, *2030 Guam Transportation Plan* (Dec. 19, 2008). The population of Guam is estimated to be 178,430 in July 2009, according to the Central Intelligence Agency's *The World Fact Book*, <https://www.cia.gov/library/publications/the-world-factbook/> (accessed June 2009).

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Guam associated with the buildup, in cooperation with the Naval Facilities Engineering Command, conducted a number of technical studies and business case analyses to evaluate potential solutions for meeting the increased demand for utility services. In addition, DOD is awaiting completion of its environmental impact statement study and associated record of decision before making final decisions on the long-term solutions and its implementation approach for developing the new utility services.<sup>2</sup> These solutions will be developed and possibly implemented by a special purpose entity or entities,<sup>3</sup> which DOD would help to create, to provide the technical expertise in constructing and operating the utilities. According to the Joint Guam Program Office, DOD plans to complete new utility construction on Guam and be operational by November 2014.

This is one in a series of reports on DOD's plans for increasing its presence on Guam.<sup>4</sup> At your request, this report reviewed DOD's planning approach for improving Guam's utilities' infrastructure to meet the increased demand for services resulting from the significant growth in the military's population. Specifically, we examined (1) the condition and capacity of

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<sup>2</sup> The National Environmental Policy Act of 1969, codified as amended at 42 U.S.C. § 4321-4347, establishes environmental policies and procedures that shall be followed by all federal agencies to the fullest extent possible. In accordance with these requirements and the regulations for implementing the National Environmental Policy Act of 1969 established by the Council for Environmental Quality, federal agencies typically evaluate the likely environmental effects of a project they are proposing to undertake using an environmental assessment or, if the project constitutes a major federal action significantly affecting the quality of the human environment, a more detailed environmental impact statement.

<sup>3</sup> DOD officials said that the special purpose entity would most likely be a limited liability company or partnership formed for the specific purpose of providing a particular utility service or services on Guam. A limited liability company is a company in which the liability of each shareholder or member is limited to the amount individually invested. A limited partnership is a partnership composed of one or more persons who control the business and are personally liable for the partnership's debts (called general partners), and one or more persons who contribute capital and share profits but who cannot manage the business and are liable only for the amount of their contribution.

<sup>4</sup> These reports include GAO, *Defense Infrastructure: Overseas Master Plans Are Improving, but DOD Needs to Provide Congress Additional Information about the Military Buildup on Guam*, [GAO-07-1015](#) (Washington, D.C.: Sept. 12, 2007); *Defense Infrastructure: Planning Efforts for the Proposed Military Buildup on Guam Are in Their Initial Stages, with Many Challenges Yet to Be Addressed*, [GAO-08-722T](#) (Washington, D.C.: May 1, 2008); *Defense Infrastructure: Opportunity to Improve the Timeliness of Future Overseas Planning Reports and Factors Affecting the Master Planning Effort for the Military Buildup on Guam*, [GAO-08-1005](#) (Washington, D.C.: Sept. 17, 2008); and *High-Level Leadership Needed to Help Guam Address Challenges Caused by DOD-Related Growth*, [GAO-09-500R](#) (Washington, D.C.: April 9, 2009).

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the existing utilities' infrastructure on Guam, the military's estimated utility requirements, and potential solutions for meeting the increased demand on the island's utility systems, and (2) the extent that DOD has developed a comprehensive plan to address any challenges it faces in its planning for new utility systems. You also requested that we review issues related to rates charged by the Navy for water from its Fena Reservoir water treatment operations on Guam, which are discussed in appendix II.

To determine the current condition and capacity of Guam's existing utilities infrastructure, the military's estimated utility requirements, and potential solutions for meeting the increased demand on the island's utility systems, we obtained and reviewed studies and assessments, briefings, annual reports, and other pertinent documentation prepared by DOD, government of Guam, and U.S. federal departments and agencies. We interviewed and discussed this information with officials at the Navy's Joint Guam Program Office, Naval Facilities Engineering Command, U.S. Environmental Protection Agency, offices and organizations of the government of Guam, including the Consolidated Commission on Utilities, Guam Power Authority, Guam Waterworks Authority, and Department of Public Works. We also met with officials of Gershman, Brickner & Bratton, Inc.—the U.S. District Court of Guam appointed receiver for Guam's solid waste operations. We analyzed data on the expected number and timing of military personnel arriving on Guam and reviewed several technical studies, business case analyses, and related studies on the projected utility requirements and associated capacities that would be needed to provide sufficient utilities services. We discussed DOD's projected requirements and potential solutions for providing the needed new utility services with the Joint Guam Program Office, Naval Facilities Engineering Command headquarters and its Pacific and Marianas component commands, the U.S. Pacific Command and its service component commands, and Navy, Marine Corps, and Air Force headquarters. To determine the extent that DOD has developed a comprehensive plan to address any challenges it faces in its planning for new utility systems, we obtained and reviewed studies, reports, briefings, and other documentation and discussed this information with officials at the Joint Guam Program Office, Naval Facilities Engineering Command, U.S. Pacific Command and its service components, and other DOD organizations. To determine the key steps that DOD plans to use in its planning for the development of new utility systems on Guam, we interviewed officials with the Joint Guam Program Office, Naval Facilities Engineering Command, and other key stakeholder organizations and reviewed reports, studies, briefings, and other documentation related to the program. We developed a table of the key steps needed to implement utility solutions based on our audit work and

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discussed and reached concurrence with Joint Guam Program Office officials on the contents of the table. To establish criteria to use in assessing DOD's planning efforts for new utility services on Guam, we reviewed our prior reporting and related studies, as well as outside studies, to identify best practices and key elements of successful planning. We identified a plan as an important element of successful planning to increase transparency of an organization's efforts among stakeholders and to help improve an organization's overall management of its efforts. Such a plan would include information on milestones and schedules, costs, financing and budgets, goals and objectives, projects and activities, organizational responsibilities, implementation strategies, and potential risks, challenges, and other factors that could affect implementation. We conducted this performance audit from June 2008 through May 2009 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. See appendix I for more information on our scope and methodology.

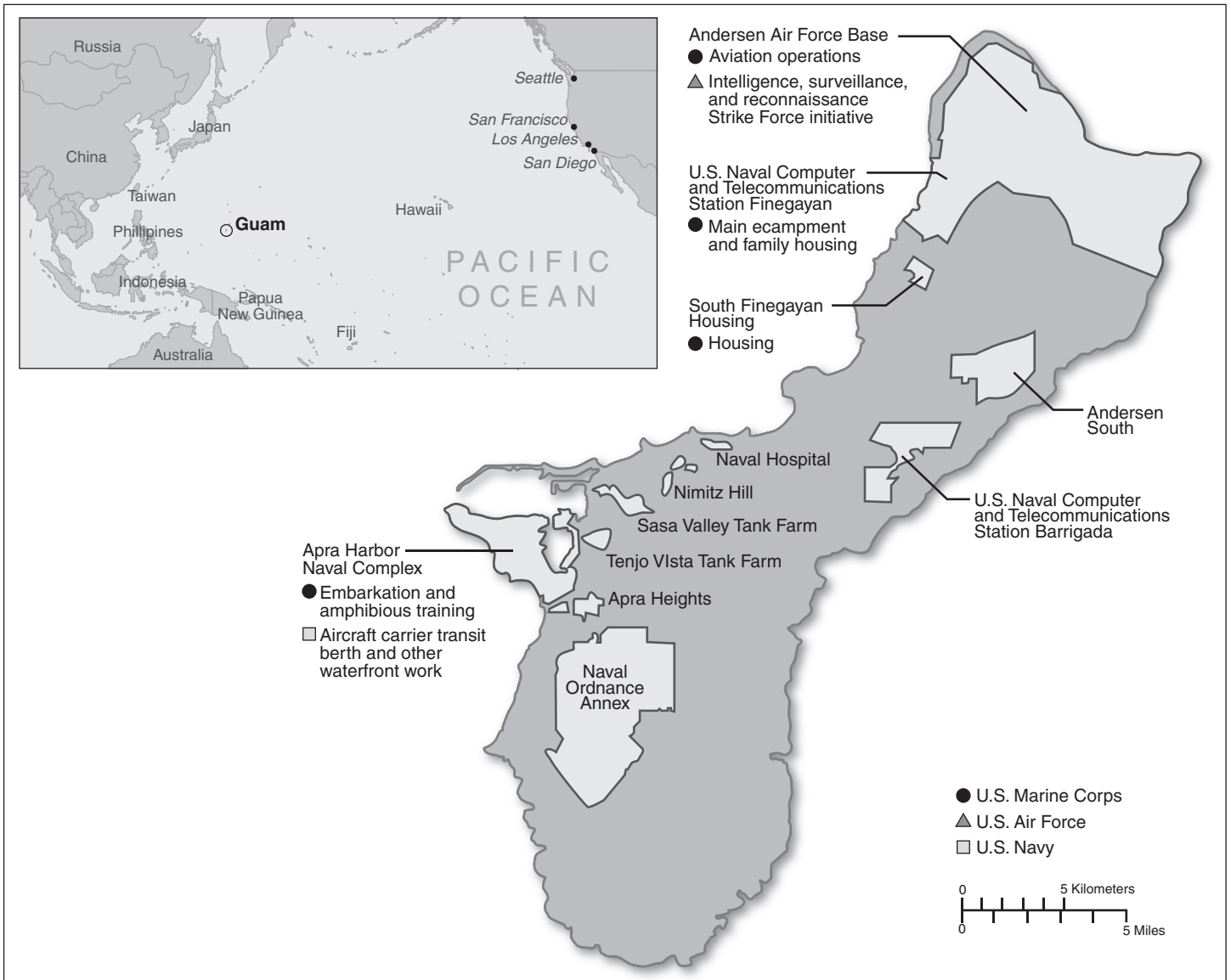
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## Background

Because of Guam's unique strategic location, the United States has long maintained a significant military presence on the island to support and defend its interests in the western Pacific Ocean region. The small remote U.S. territory is located about 1,600 miles east of Manila in the Philippines, 1,560 miles south of Tokyo, Japan, and 3,810 miles west of Honolulu, Hawaii (see fig. 1). DOD currently controls about 29 percent of the land, which is about 62 square miles of the island's total 212 square miles. The U.S. military presently operates two major installations on Guam: the U.S. Naval Base-Guam, located on the southwestern side of the island at Apra Harbor, and Andersen Air Force Base in the north.



**Figure 1: Map of the Territory of Guam and Location of Current and Projected U.S. Military Installations**



Sources: U.S. Marine Corps, U.S. Navy, U.S. Air Force, U.S. Army, GAO and Map Resources.

Note: The location of the Army's air and missile defense task force on Guam has not yet been determined.

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To reduce the burden of the U.S. military presence on Japanese communities while maintaining a continuing presence of U.S. forces in the region, the U.S.-Japan Defense Policy Review Initiative<sup>5</sup> established a framework for the future of U.S. force structure in Japan, including the relocation of American military units in Japan to other areas, including Guam. As a part of this initiative, DOD plans to move 8,000 Marines and their estimated 9,000 dependents from Okinawa, Japan, to Guam by the 2014 goal. Separate from the initiative, the United States also plans to expand the capabilities and presence of Navy, Air Force, and Army forces on Guam over the next several years. As a result of this planned realignment of U.S. forces, the military population on Guam is expected to grow by over 160 percent, from its current island population of 15,000 to over 39,000 by 2020. As shown in table 1, most of the population growth is related to the Marine move. It also shows that about 58 percent (about 14,080) of the total planned increase of 24,402 in military personnel and dependents from all of the military services is expected to be reached by 2014. Most of the extensive population growth and development resulting from the buildup will occur in the northern half of the island, primarily in the northwestern portion where DOD currently plans to construct a new Marine Corps base at Finegayan. The populations of each of the other military services would also increase as a result of DOD plans to expand its operations and presence on Guam. For example, the Navy plans to enhance its infrastructure, logistic capabilities, and waterfront facilities, including capabilities to support forward-based submarines and a transient nuclear aircraft carrier; the Air Force plans to develop a global intelligence, surveillance, and reconnaissance strike hub at Andersen Air Force Base; and the Army plans to place an Army air and missile defense task force on Guam. Joint Guam Program Office officials, however, told us that the currently projected schedules and levels of population growth and force structure could change as buildup plans are further refined and approved.

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<sup>5</sup> DOD officials refer to the process through which the United States and Japan negotiated the initiatives that realign U.S. forces in Japan as the Defense Policy Review Initiative. The realignment initiatives were the result of Security Consultative Committee meetings in 2005 and 2006 between U.S. and Japan officials. The Security Consultative Committee is made up of the U.S. Secretaries of State and Defense and Japan's Minister of Foreign Affairs and Minister of State for Defense. The committee sets overall bilateral policy regarding the security relationship between the United States and Japan. The results of these meetings established a framework for the future U.S. force structure in Japan, including the Marine Corps move from Okinawa, Japan, to Guam.

**Table 1: Projected Military Population Growth by Service from 2009 through 2020**

Number of military personnel and dependents by military service <sup>a</sup>							
Year	Marine Corps	Air Force	Navy	Army	Coast Guard	Special Operations Forces	Total
2009	5	5,095	9,580	80	320	0	15,080
2014	10,895	7,451	10,130	130	504	50	29,160
2020	17,557	7,851	10,930	1,660	504	980	39,482
<b>Total increase over period 2009-2020</b>	<b>17,552</b>	<b>2,756</b>	<b>1,350</b>	<b>1,580</b>	<b>184</b>	<b>980</b>	<b>24,402</b>

Source: Joint Guam Program Office.

Note: According to the Joint Guam Program Office, the projected military population shown in this table—which varied somewhat among utility studies—was used in developing the utility technical feasibility studies conducted by the program office and Naval Facilities Engineering Command to estimate utility system demand and capacity increase for the military buildup. While the estimated population and schedule for growth may change as plans evolve, the projected growth in population is considered to be the currently accepted estimates for planning purposes by the program office.

<sup>a</sup>The population growth shown in the table excludes transient military personnel that will visit Guam for brief periods.

To keep pace with the projected growth in the military’s population on Guam, DOD has determined that substantial upgrades to the island’s existing utilities infrastructure are required for electric power generation, potable water production, wastewater collection and treatment, and solid waste collection and disposal to provide the additional utility capacities and services. In August 2006, the Deputy Secretary of Defense established the Joint Guam Program Office, within the Office of the Assistant Secretary of the Navy for Installations and Environment, to lead the coordinated planning efforts among DOD components and other stakeholders to consolidate, optimize, and integrate the existing DOD infrastructure on Guam to meet requirements associated with the relocation of Marine Corps forces from Okinawa, Japan, and the department’s joint basing initiative.<sup>6</sup> The Navy’s Joint Guam Program Office, in cooperation with the Naval Facilities Engineering Command, conducted a number of technical studies and business case analyses to evaluate potential solutions for meeting the increased demand for utility

<sup>6</sup> Joint basing refers to a recommendation from the 2005 Base Realignment and Closure process that DOD develop a joint region on Guam which will realign installation management functions at Andersen Air Force Base to the Commander, U.S. Naval Forces Marianas. The joint basing initiative is intended to eliminate duplication in base support among installation services capabilities, such as utilities. Joint Region Marianas, Guam, was established January 31, 2009.

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services. The studies considered a range of solutions in each utility sector that would either provide dedicated utilities for the new Marine Corps base only, dedicated utilities that would service only islandwide DOD demands, or upgrade government of Guam systems to meet islandwide DOD demands. The studies then ranked the potential solutions to determine the most likely solutions in each sector. With the exception of solid waste, DOD envisions that the selected solutions would be implemented by a special purpose entity or entities, which would participate in a public-private venture with private sector owners, developers, and operators and public sector stakeholders<sup>7</sup> to provide the technical expertise in constructing and operating the utility. DOD would then pay a negotiated set of rates to this special purpose entity for the services its uses.<sup>8</sup> However, the exact form of this business arrangement and the level of involvement by public sector stakeholders have yet to be determined.

Based on our audit work, we developed table 2, which shows the key steps that the Navy's Joint Guam Program Office confirmed for us that they plan to follow to identify requirements, examine potential solutions, and implement activities to develop and construct the utility infrastructure needed by DOD to support the expanding military population on Guam.

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<sup>7</sup> According to the Joint Guam Program Office, it is anticipated that the special purpose entity will be funded by a mix of public and private funding.

<sup>8</sup>The Duncan Hunter National Defense Authorization Act for Fiscal Year 2009 states that it is the sense of Congress that the proposed utility infrastructure improvements on Guam should incorporate the civilian and military infrastructure into a single grid to realize and maximize the effectiveness of the overall utility system, if appropriate cost-sharing and quality standards are met. See Pub. L. No. 110-417 § 2821(c) (2008). DOD has not yet determined whether a single entity or multiple special purpose entities would construct and operate the new utility systems.

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**Table 2: Key Steps that DOD Plans to Use to Increase Utility Infrastructure Capacities on Guam**

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Examine the condition and capacities of the existing Guam utility infrastructure.
Initiate a series of technical studies and business case analyses to determine preferred technical alternatives and associated business models for meeting future utility requirements, including <ul style="list-style-type: none"><li>• breakpoint analysis regarding the capabilities of existing utilities on Guam and timeline for exceeding those capacities,</li><li>• examination of interim utility alternatives designed to meet construction needs,</li><li>• examination of long-term utility alternative designed to meet the needs of relocated Marine Corps forces and associated DOD growth, and</li><li>• additional studies as required.</li></ul>
Confer and coordinate with applicable stakeholders, including DOD service components, federal regulatory agencies, private entities, the government of Japan, the government of Guam, Consolidated Commission on Utilities, Guam Power Authority, and Guam Water Authority to gain concurrence in concept on proposed interim and long-term solutions and proposed business models.
Complete the environmental impact statement and record of decision, required by the National Environmental Policy Act. <sup>a</sup>
Identify funding sources and develop procurement strategies to implement interim and long-term solutions, including the consideration of special purpose entities and other means to meet increased demand.
Develop plans and schedule for implementation of interim solutions and construction of long-term utilities solutions.
Monitor implementation.

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Source: GAO analysis of data provided by DOD.

<sup>a</sup>An environmental impact statement must include a purpose and need statement, a description of all reasonable project alternatives and their associated environmental impacts (including a “no action” alternative), a description of the environment of the area to be affected or created by the alternatives being considered, and an analysis of the environmental impacts of the proposed action and each alternative. 40 C.F.R. § 1502.13-1502.16.

The program office also works closely with the governments of Japan and Guam, federal agencies, and Congress to manage the comprehensive buildup development effort. It has additional responsibilities for synchronizing funding among DOD components to meet critical timelines in development efforts on Guam and for coordinating DOD’s conduct of an environmental impact statement for moving the Marines to Guam. The Joint Guam Program Office also receives assistance from the Naval Facilities Engineering Command in conducting analyses, determining criteria and requirements, and developing an acquisition strategy in planning for infrastructure needed to support DOD’s operational requirements.

Additionally, the Naval Facilities Engineering Command, in partnership with the program office, the services, and other DOD stakeholders, is developing the Guam Joint Military Master Plan that will form the baseline for military construction budget planning and facility and utility designs and provides a top-level view of the size and type of facility requirements, candidate and preferred land sites, and proposed use of the land to meet the requirements for new personnel and forces planned for Guam. It will

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also describe the planning efforts for construction and development activities related to the buildup to ensure that buildings, utilities, roads, and other infrastructure are built in a compatible manner. The master plan, however, will not include a specific, detailed plan on DOD's utility efforts for Guam. The master plan is expected to be completed shortly after a record of decision for the environmental impact statement that is currently planned to be signed in January 2010, and will be submitted to Congress when approved.

The government of Japan is anticipated to provide \$6.09 billion, in U.S. fiscal year 2008 dollars, of the estimated \$10.27 billion cost of developing facilities and infrastructure for the Marine relocation to Guam. Of the \$6.09 billion, \$740 million is anticipated to be provided by Japan in recoverable financing for development and construction of related utility infrastructure for the Marines.<sup>9</sup> However, specific allocation of the \$740 million among the four utility sectors has not yet been worked out between the U.S. and Japanese governments.

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## Guam's Existing Utility Infrastructure Is Not Sufficient to Meet DOD's Projected Utility Requirements without Further Upgrades

Projected requirements for utilities to serve the growing Guam civilian and U.S. military population over the next decade exceed available capacities of existing DOD and municipal systems, and DOD is evaluating possible options for supporting the expansion of these systems to meet future needs. While generally meeting current DOD and island requirements, existing utility systems—electric power generation, potable water production, wastewater collection and treatment, and solid waste collection and disposal—are largely operating at or near their maximum capacities and have limited reserve capacities to meet a significant new growth in demand for services. While DOD systems are relatively well-maintained, systems operated by Guam utility authorities have experienced a number of operational and regulatory compliance issues that could affect plans for increasing their capacities.

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<sup>9</sup> In addition to the \$740 million, the government of Japan is anticipated to provide \$2.55 billion in financing, of which \$2.1 billion would be recoverable, for the development and construction on family housing for Marine Corps families. The government of Japan is also expected to provide \$2.8 billion for construction of general administrative buildings, instruction buildings, barracks, and quality of life facilities.

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## Existing Utility Systems Have Limited Spare Capacity and Significant New Infrastructure Is Needed to Support Planned DOD Growth

The Joint Guam Program Office has determined that significant increases to existing utility system capacities in all four sectors will be needed to meet the demands of the expanding military population on Guam. Utility systems on Guam—operated by either DOD or Guam utility authorities—are capacity constrained and limited in their ability to satisfy growth in demand for services (see app. III for information on the current providers of utility services on Guam). Over the past 2 years, the Joint Guam Program Office has conducted a series of technical studies and business case analyses to identify reasonable alternatives and determine best business solutions for expanding each of the utility systems to meet interim and long-term demands. However, the final long-term solution for some systems will not be known until the special purpose entities, which will design, construct, and operate the new utility infrastructure, are selected and the precise business arrangements are negotiated. Further, depending on the form of business arrangement and level of involvement of public and private stakeholders, DOD may not possess statutory authority at this time to implement certain potential aspects of this plan, such as the authority to invest U.S. government resources into a special purpose entity for the purpose of improving a utility system outside the jurisdiction of the department. DOD officials told us that they are currently working with the Office of Management and Budget to formulate a legislative proposal that they hope will enable DOD to implement certain potential aspects of this special purpose entity construct. Additionally, DOD has determined that certain operating inefficiencies, outstanding deficiencies, and issues related to compliance with environmental regulations in the existing infrastructure—especially related to those systems operated by Guam utility authorities—would need to be addressed to implement some of its potential solutions. While Guam’s local utility authorities have taken significant actions to improve their systems over the past several years, many improvements and corrective actions remain to be taken.

### Electric power generation

DOD’s power demands are estimated to increase by approximately 233 percent—from 48 to 160 megawatts peak power. The Guam Power Authority’s electric power system—which currently serves all DOD activities on Guam—is operating at capacity meaning that new generating equipment will be needed to satisfy the increased DOD power load. In order to reliably satisfy the increased load, an estimated 170 megawatts of new generation capacity will be needed in addition to the 550 megawatts of generation capacity currently installed as part of the authority’s system,

which is a 31 percent increase.<sup>10</sup> Table 3 summarizes DOD’s current and expected future demand for electric power.

**Table 3: Estimated Effect of DOD Growth on Electric Power Utility System (As of May 2009)**

Current service provider	DOD demand (megawatts)			System capacity (megawatts)			
	Current	Future	Increase	Current	Future	Increase	Comment
Guam Power Authority	48	160	112	550	720	170	According to DOD’s analysis, Guam Power Authority needs to provide 1.52 megawatt of capacity for every 1.0 megawatt of demand load. This means that 170 megawatt of new generation capacity is expected to be needed to satisfy DOD’s 112 megawatt demand increase. Values represent peak power measures.

Source: GAO analysis of DOD technical study and business case analysis for meeting the electrical requirements on Guam.

Note: The “future” columns represent the total demand load and associated system capacity that will be needed by 2020.

The Guam Power Authority’s electric power system has experienced reliability problems over the years such as frequent power outages. A May 2008 Guam Chamber of Commerce report indicates that the authority has improved the reliability of its system over the past 10 years, in part, by entering into public-private partnerships with independent power producers to provide new generation facilities. However, the study noted that the system is still using obsolete and expensive generation that affects the overall reliability of the system. For example, DOD’s technical study indicates that the generators that provide approximately 50 percent of Guam Power Authority’s base capacity date back to the mid-1970s. In addition, according to the Guam Power Authority Generation Resource

<sup>10</sup>Although the installed generation capacity in Guam Power Authority’s plants is approximately 550 megawatts, the current available generation capacity is 485 megawatts. This difference is largely related to units out service for extended periods of time and units not available to be scheduled into the generation capacity. To maintain system reliability standards, Guam Power Authority needs to provide 1.52 megawatts of capacity for every 1.0 megawatt of demand load, according to DOD analysis. The reserve capacity allows for generators to be taken out of service for maintenance and provides an emergency source of power. Therefore, to meet the expected 112 megawatt increase in DOD demand load, 1.52 times this amount, approximately 170 megawatts, of new generation capacity is needed.



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Handbook, Fiscal Year 2008, the authority's existing operations are constrained by the environmental operating permits issued for each power plant. Combined, these factors result in inefficiencies such as units being out of service for extended periods of time or simply unavailable for production.

DOD's preferred long-term technical solution for meeting the increased power demands is to maximize operating efficiencies by expanding Guam Power Authority's electric power system capacity from 550 to 720 megawatts. This solution would involve constructing a separate power plant that could supply new power to Guam Power Authority's grid.<sup>11</sup> Additionally, DOD is examining possible renewable energy systems, such as geothermal and solar power systems, to complement power provided by its preferred long-term solution and help achieve future goals related to renewable energy.<sup>12</sup>

To meet interim needs until the long-term solution is operational, DOD is considering options that include a combination of Guam Power Authority and DOD assets. By refurbishing idle generators at several existing plants on the island, DOD estimates that the authority could temporary provide up to 60 megawatts of additional power. In addition, DOD estimates that it could provide another 30 megawatts of temporary power by upgrading stand-by generators at a DOD-owned plant and using mobile generators.

#### Potable water production

DOD potable water maximum daily demand is expected to increase by approximately 100 percent from 14.5 to 29.3 million gallons per day. The majority of the demand growth results from the planned concentration of Marine Corps personnel around the U.S. Naval Computer and Telecommunications Station in northern Guam, where demand is expected to grow from 0.4 to 12.1 million gallons per day. In addition, DOD growth at Andersen Air Force Base and Apra Harbor is expected to result

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<sup>11</sup>Options for the separate power plant include configurations whereby (1) DOD loads are primarily satisfied by the new plant with excess power delivered to the Guam Power Authority grid, (2) power is provided primarily to the authority's grid with DOD loads being satisfied by the authority, and (3) DOD loads are satisfied by the new plant that operates independently of the Guam Power Authority grid.

<sup>12</sup> For example, section 2911(e) of Title 10, U.S.C., states that it shall be DOD's goal to produce or procure not less than 25 percent of the total quantity of electric energy it consumes within its facilities and in its activities during fiscal year 2025 and each fiscal year thereafter from renewable energy sources as defined in section 203(b) of the Energy Policy Act of 2005 (42 U.S.C. 15852(b)).

in demand increasing from 3.4 to 5.2 million gallons per day and from 10.7 to 12.0 million gallons per day at these respective locations. To meet the growth in demand, production from the Navy’s water system would need to increase from the current level of 18.4 million gallons per day to 34.6 million gallons per day, an increase of 88 percent.<sup>13</sup> Table 4 summarizes DOD’s current and expected future demand for potable water on Guam.

**Table 4: Estimated Effect of DOD Growth on Potable Water Utility System (As of May 2009)**

Current service provider	DOD demand (million gallons per day)			System capacity (million gallons per day)			
	Current	Future	Increase	Current	Future	Increase	Comment
Navy-operated system	14.5	29.3	14.8	18.4	34.6	16.2	Planned 34.6 million gallons of water per day capacity is based on expected 29.3 million gallons of water per day demand plus the size of the largest well in areas where the supply is from well sources. This is a safety factor to ensure that the system will continue to meet demand during circumstances where wells are out of service due to maintenance or other operational issues. DOD demand represents maximum daily values.

Source: GAO analysis of DOD technical study and business case analysis for meeting the potable water requirements on Guam.

Note: The “future” columns represent the total demand load and associated system capacity that will be needed by 2020.

DOD’s preferred long-term solution for meeting expected growth in demand is to increase the production capacity of the Navy-owned water system by optimizing use of existing and developing new pumping, treatment, storage, and distribution facilities. While obtaining water from Guam Waterworks Authority’s system was considered by DOD consultants, their studies determined that DOD should maintain an independent system which can meet DOD needs. However, DOD is

<sup>13</sup>Prior to consolidating under DOD’s joint basing initiative, the Navy and Air Force operated separate water systems that served all DOD needs on Guam. As a result of the consolidation which placed all base operating functions under Navy control, we refer to the water system as being Navy-owned.

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Wastewater collection and treatment

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working with the Guam Waterworks Authority to develop a long-term integrated water resource plan for the island. To increase the capacity of and operate its water system, DOD officials are considering a solution whereby a special purpose entity would implement the utility solutions. To meet interim needs until long-term solutions are in place, DOD expects to be able to phase in new capacity development to match the pace of the expected population growth.

DOD wastewater volume is expected to increase by approximately 275 percent from average flows of 1.2 to 4.5 million gallons per day. This increased wastewater flow will be concentrated in northern Guam—where the majority of the new military population is expected to be located—and will likely be treated at Guam Waterworks Authority’s Northern District Wastewater Treatment Plant.<sup>14</sup> As the only treatment facility in northern Guam, the plant serves both military (Andersen Air Force Base and U.S. Naval Computer and Telecommunications Station Finegayan) and civilian populations. It is currently designed to process 12 million gallons per day on average with a peak capacity of 27 million gallons per day. Increased wastewater flows resulting from both the military buildup and the expected growth in Guam’s civilian population are expected to result in future total flows to the plant of approximately 17.6 million gallons per day on average with a peak of 35 million gallons per day. Based on the increased flows, the plant’s treatment capacity would need to be expanded by 50 percent (from 12 to 18 million gallons per day on average and from 27 to 40.4 million gallons per day at peak). Table 5 summarizes the current and projected future DOD demand for wastewater treatment on Guam.

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<sup>14</sup> The Northern District Wastewater Treatment Plant on the northwestern coast of the island was commissioned in 1979 and is the largest of the Guam Waterworks Authority’s sewage treatment facilities. It currently uses only primary treatment (physical removal of floatable and settleable solids) and disposes of treated effluent through an outfall into the Philippine Sea.

**Table 5: Estimated Effect of DOD Growth on Wastewater Treatment Utility System (As of May 2009)**

Current service provider	DOD demand (million gallons per day)			System capacity (million gallons per day)			Comment
	Current	Future	Increase	Current	Future	Increase	
Guam Waterworks Authority	1.2	4.5	3.3	12 (27 peak)	18 (40.4 peak)	6 (13.4 peak)	Guam Waterworks Authority's Northern District Wastewater Treatment Plant currently processes 1.2 million gallons of water per day of wastewater generated by military installations in northern Guam. This plant—capable of treating 12 million gallons of water per day of wastewater—may be expanded to treat the estimated 17.6 million gallons of water per day of wastewater that will be generated as a result of the military buildup and anticipated growth in Guam's civilian population. Values represent average flows unless otherwise indicated.

Source: GAO analysis of DOD technical study and business case analysis for meeting the wastewater treatment requirements on Guam.

Note: The "future" columns represent the total demand load and associated system capacity that will be needed by 2020.

The Guam Waterworks Authority's wastewater treatment system continues to have a number of deficiencies that result from the effects of natural disasters, poor maintenance, and vandalism. The authority is currently operating under a stipulated order because of issues related to compliance with environmental regulations.<sup>15</sup> Under terms of the order, the authority is to, among other requirements, submit schedules and plans for certain capital improvements to its system. However, according to the authority's 2007 Water Resource Master Plan, the authority's ability to fund needed capital improvements has been hampered by various factors such as uncollected water and sewer bills and excessive emergency repair costs resulting from deferred spending for facility repairs and failure to maintain stocks of critical repair parts. In particular, the master plan notes

<sup>15</sup> *United States of America v. Guam Waterworks Authority and the Government of Guam*, No. 02-00035, Stipulated Order for Preliminary Relief (D. Guam June 5, 2003). The stipulated order requires the authority to, among other matters, develop and submit a water and wastewater master plan and to submit schedules and plans for several different specified projects.

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that the Northern District Wastewater Treatment Plant is in severe critical need of upgrading and equipment replacement. In addition, the treatment plant may need capital improvements that would enable it to become a secondary treatment facility.<sup>16</sup> According to the Guam Waterworks Annual Report for Fiscal Year 2006, in January 2007 the authority contracted with a private company—Veolia LLC—to manage and operate its wastewater system.

DOD's preferred long-term technical solution is to have a special purpose entity that would expand the Guam Waterworks Authority's Northern District Wastewater Treatment Plant, and according to DOD officials, upgrade the plant as required by regulatory authorities to process the expected increase in wastewater flows. If the option of using this plant is not possible, a separate wastewater treatment plant may be necessary to meet DOD's needs.<sup>17</sup> To meet its interim needs until the long-term solution is operational, DOD is working with the Guam Waterworks Authority to use the Northern District Wastewater Treatment Plant which, according to Joint Guam Program Office officials, may include expanding the treatment capacity of the plant. In addition, according to the program office, DOD is working with the Guam Waterworks Authority to consider ways to process wastewater generated by the growing construction workforce which will be on the island in advance of the arrivals of DOD personnel and dependents.

## Solid waste collection and disposal

Solid waste generation resulting from the increased DOD population on Guam is expected to grow by approximately 230 percent from 16,000 to 53,000 tons per year. Table 6 summarizes the current and projected future DOD demand for solid waste disposal on Guam.

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<sup>16</sup>According to officials in the Joint Guam Program Office, this may be a requirement from the Environmental Protection Agency for the Guam Waterworks Authority even without the military buildup.

<sup>17</sup>Options for the separate wastewater treatment plant include (1) constructing a new facility with its own outfall near the proposed DOD development and (2) building a new facility at the Northern District Wastewater Treatment Plant site to treat DOD wastewater flows only and using the existing plant's outfall.

**Table 6: Estimated Effect of DOD Growth on Solid Waste Disposal System (As of May 2009)**

Current service provider	DOD demand (tons per year)			Comment
	Current	Future	Increase	
Navy-operated landfills	16,000	53,000	37,000	The Navy currently operates landfills at Apra Harbor Naval Base and Andersen Air Force Base. These landfills will be used during the initial stages of the military buildup. In 2011, the Navy is expected to stop using these landfills and begin disposing of all its solid waste at a new landfill being constructed by the government of Guam in southern Guam.

Source: GAO analysis of DOD technical study for meeting the solid waste disposal requirements on Guam.

Note: The “future” column represents the estimated total amount of solid waste that will be generated by DOD activities in 2020.

To meet the expected solid waste disposal needs, DOD intends to utilize the new Guam landfill being constructed on the southern part of the island by U.S. District Court of Guam-appointed receiver—Gershman, Brickner & Bratton, Inc.—for the Solid Waste Management Division of the government of Guam’s Department of Public Works.<sup>18</sup> The new Guam landfill will replace the government of Guam’s existing landfill that has been operating over-capacity for over 20 years and has historically been in noncompliance with environmental regulations. According to Joint Guam Program Office officials, DOD is currently in the process of developing a letter of intent with the receiver concerning an outline of the parameters for a future agreement concerning DOD’s use of the new landfill. DOD’s use of the landfill would require DOD entities on Guam to transport their solid waste from military installations, which are predominately in the northern section of the island, to transfer stations or the new landfill and pay tipping fees<sup>19</sup> to the landfill operator for solid waste disposal services.

Until the new landfill is operational, DOD will continue to use its existing landfills at Apra Harbor, within Naval Base Guam, and Andersen Air Force Base, which have very limited remaining service lives. According to officials in the Joint Guam Program Office, the Apra Harbor and Andersen Air Force Base landfills should be usable through 2018 and 2010, respectively, if current operating practices are followed. In addition, the Air Force is planning an expansion of the Andersen Air Force Base landfill

<sup>18</sup> *United States of America v. Government of Guam*, No. 02-00022 (D. Guam March 17, 2008).

<sup>19</sup> A tipping fee is the charge levied upon a given quantity of waste received at a waste processing facility or landfill.

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to provide 1 to 2 years of additional capacity. The government of Guam's new landfill is expected to be operational in 2011, which would allow DOD to use this facility before exceeding capacities at its own landfill facilities. However, according to the program office, options are being considered to extend the life of the DOD landfills should the new Guam landfill be delayed.

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## DOD Lacks a Comprehensive Plan for Addressing Several Planning Challenges It Faces in Providing New Utility Services for Guam

Over the past 3 years, the Navy's Joint Guam Program Office has made progress in leading DOD utility planning efforts to identify requirements and potential solutions to meet future demands, but DOD lacks a comprehensive plan for addressing the many challenges it faces as it moves forward. These planning challenges include the condition of existing Guam utility systems, extent of coordination required among stakeholders, sources of funding, approach chosen to implement solutions, and the schedule for completing key tasks. While DOD recognizes that these challenges could create potential risks for meeting the utility needs of Guam's growing military population, it has not begun development of a comprehensive plan for utilities that provides its stakeholders with specific information on its planning efforts, including critical milestones and schedules, interim and long-term options under consideration, approach to be used for developing and implementing new utility services, costs and financing, and potential utility projects. Without a comprehensive plan for utilities, DOD lacks an important planning tool to use in managing the several challenges it faces and for informing stakeholders, including Congress, on the specific details of its utility planning for Guam.

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## A Comprehensive Plan is an Important Planning Tool to Increase Transparency and Improve Management of Program Efforts

The Joint Guam Program Office faces many challenges that could adversely affect its planning efforts as it moves forward to meet the demands of the expanding military population on Guam; however, it has not used a comprehensive plan to help overcome these challenges. Our prior work has shown that a comprehensive plan is an important planning tool for an organization to increase transparency and improve management of its efforts to achieve overall objectives. A comprehensive plan would generally provide stakeholders with specific information on the organization's program, including milestones and schedules, costs, financing and budgets, goals and objectives, projects and activities, organizational responsibilities, and potential risks, challenges, and other factors that could affect implementation of its plans. Such a plan would also generally provide a means to bring together all aspects of an organization's plans into one central document and a source that updates

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information on critical milestones and schedules, and if these are missed, what accommodations are being made.

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## DOD Faces Five Planning Challenges in Providing New Utility Services for Guam

DOD faces five planning challenges that could create risks that would adversely affect its efforts to provide new utility services when needed to support its growing military population in Guam. These challenges are:

- condition of existing Guam infrastructure affects DOD's selection and implementation of possible utility solutions;
- involvement of a number of stakeholders complicates the DOD's planning process for utilities;
- proposed solutions are likely to require more than one funding source;
- implementation of new approach to upgrade utility services on Guam lacks key details; and
- tight schedule for meeting buildup requirements increases the complexity of utility planning efforts.

Officials in the Navy's Joint Guam Program Office told us that DOD recognizes the potential adverse effect that these challenges could have on its utility program and has taken some actions to address them. For example, the officials said that the program office developed an initial risk-based management approach in 2008 as part of an initiative to examine ways to improve its management effectiveness. Although Joint Guam Program Office officials told us that the approach still needs further refinement, they said the approach is in place and being used to access, mitigate, and monitor risks to its goals.

## Condition of Existing Guam Infrastructure Affects Selection and Implementation of Possible Solutions

Many of the potential solutions that DOD is considering using to provide the increased capacities and new utility services on Guam would involve either integrating with or using elements of Guam's existing utilities infrastructure. In selecting solutions, various upgrades to the existing infrastructure may need to be made and a number of operating inefficiencies, outstanding deficiencies, and certain regulatory compliance issues would need to be resolved in time for implementation.

Prior to DOD's military buildup decision, the Consolidated Commission on Utilities, Guam utilities authorities, and the government of Guam had done long-term utility planning to upgrade, expand, and repair Guam's power, water, and wastewater systems to support a larger population, according to the chairman of the Consolidated Commission on Utilities. This planning was based on the island's population growing by 25 percent by 2025. Under the current military buildup plans, however, this same level of growth would be achieved by 2014. As a result, some upgrades to its



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existing infrastructure may need to be completed earlier than was originally planned by the Guam utilities partly as result of the buildup. For example, on the basis of its Water Resources Master Plan projections, the Guam Waterworks Authority did not anticipate expanding its Northern District Wastewater Treatment Plant, which currently provides wastewater treatment service to both the civilian population and the military population at Naval Computer and Telecommunications Station Finegayan and Andersen Air Force Base in northern Guam, until 2015. Officials in the Joint Guam Program Office noted that many of these upgrades and repairs in the near-term are also driven by the need to address existing operational and regulatory compliance issues in Guam's utilities regardless of the buildup. According to the officials, for the infrastructure upgrades related to the military buildup, DOD will provide funds through customer fees which will support the Guam Power Authority's and Guam Waterworks Authority's planned activities. For activities which may be implemented earlier than originally planned due to the military buildup, the program office officials stated that the Consolidated Commission on Utilities will coordinate with DOD and Guam's utilities authorities to address such projects.

Additionally, officials from the Governor of Guam's Civilian-Military Task Force<sup>20</sup> told us that the influx of a large force of about 15,000 temporary workers—most of them from outside Guam—required to construct the military's planned facilities will place significant demands on the existing utility infrastructure sooner than the arriving new military personnel and dependents. The government of Guam, Consolidated Commission on Utilities, Guam Power Authority, and Guam Waterworks Authority are in the initial stage of adjusting their long-term plans to fund and to make the necessary improvements and repairs to their utility systems needed to support DOD's buildup plans.

Some solutions that DOD is considering would depend on Guam utility authorities being able to develop new or upgrade existing systems when needed to support military population growth. For example, DOD is considering using a new islandwide landfill that the government of Guam, through a court-appointed receiver, plans to develop and complete by

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<sup>20</sup> According to the Guam Civilian-Military Task Force, the task force was created in 2006 by the Governor of Guam's Executive Order 2006-10 to maximize opportunities for the civilian and military community resulting from increases in military presence, and that one of the task force's responsibilities is to develop a comprehensive master plan that would accommodate the military buildup and relocation of the Marines to Guam.

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mid-2011. DOD plans to be a customer and officials in the Joint Guam Program Office told us that they are in the process of developing a letter of intent with the receiver concerning an outline of the parameters, such as the tipping fee to use the new landfill, for a future agreement. Using the government of Guam's landfill allows DOD to forego developing its own new landfill and close its two existing ones that are nearing the end of their service lives. However, if the completion of the new Guam landfill is delayed, DOD may need to consider other alternatives.

Additionally, selection of some DOD solutions may also depend on whether corrective actions can be taken to address a number of operating inefficiencies, outstanding deficiencies, and regulatory compliance issues with the existing Guam infrastructure in time for implementation. DOD is considering a solution, for example, that would expand and upgrade the Guam Waterworks Authority's Northern District Wastewater Treatment Plant to handle its planned significant increase in treatment capacity. However, the U.S. Environmental Protection Agency has recently issued a notice of proposed action under the Clean Water Act and Environmental Protection Agency regulations containing a tentative decision to deny an application for a renewed variance from certain secondary treatment requirements<sup>21</sup> at the Northern District Wastewater Treatment Plant. The agency's tentative decision has been made available for public comment, and at the completion of the public comment period, the Environmental Protection Agency will consider these comments and make a final decision. DOD officials stated that the resolution of this waiver issue could be further delayed if the agency's final decision is challenged in court by the government of Guam. If implemented, Guam Waterworks Authority and Naval Facilities Engineering Command officials stated that the costs for upgrading to provide secondary treatment could be substantial. Additionally, while not necessarily affecting DOD's selection, other solutions would benefit from improvements made to existing systems by the Guam utility authorities, which are needed independent of the buildup. For example, while significant upgrades are needed to improve Guam Power Authority's aging transmission and distribution system, making

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<sup>21</sup> Secondary treatment is the second step in most waste treatment systems during which bacteria consume the organic parts of the wastes. This is accomplished by bringing the sewage, bacteria, and oxygen together in trickling filters or within an activated sludge process. Secondary treatment removes all floating and settling solids and about 90 percent of the oxygen demand from substances and suspended solids. Disinfection by chlorination is the final stage of the secondary treatment process. The Environmental Protection Agency establishes secondary treatment standards for publicly owned treatment works.

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Involvement of a Number of Stakeholders Complicates the Planning Process

these upgrades would also be useful in supporting DOD's future electrical needs.

Stakeholders, which include DOD components, government of Japan, government of Guam, various federal departments and agencies, and private companies, require a significant level of communication and coordination to share information, resolve issues, reach agreements, and make decisions to facilitate effective planning and implementation activities. For instance, DOD would need to reach agreement with the government of Guam's utility organizations, which currently own and operate the utilities, as well as the government of Japan, which is expected to contribute funds toward the utilities, as well as other public and private stakeholders that may contribute funds and expertise to this venture, in order to select and implement utility solutions that involve using a special purpose entity to improve existing Guam infrastructure. Further, depending on the precise business model that is ultimately selected, DOD may not have statutory authority at this time to implement certain potential aspects of this plan, such as the authority to invest U.S. government resources into a special purpose entity for the purposes of improving a utility system outside the jurisdiction of the department. DOD officials told us that they are currently working with the Office of Management and Budget to formulate a legislative proposal that they hope will enable DOD to implement certain potential aspects of this special purpose entity construct. DOD would also need to later negotiate with the special purpose entity that is ultimately selected to determine specific details of its business arrangement in designing, constructing, and operating the new utility systems.

The Joint Guam Program Office communicates and coordinates its activities with a widerange of public sector entities including the government of Japan, government of Guam and its utility organizations, other DOD entities, and U.S. federal departments and agencies, such as the Environmental Protection Agency, and private sector consultants and contractors. The program office, according to officials with the Joint Guam Program Office, has established routine conference calls, meetings, briefings, E-mail, conferences, and other communication methods among the many stakeholders to provide information, discuss planning and issues, coordinate actions, and obtain agreement on a range of activities. Officials with the program office and the government of Japan, for instance, engage in monthly meetings to discuss and share information on the progress of plans and associated activities. Similarly, program office officials meet weekly with various officials in the Naval Facilities Engineering Command, the services, and other federal agencies to discuss

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utility planning efforts and resolve issues. The program also holds frequent meetings with government of Guam organizations and conducts community meetings with the Guam civilian population to discuss concerns and provide information.

However, despite the level of coordination that the Joint Guam Program Office has attempted to maintain, program office officials told us that it is often difficult to satisfy the immediate information needs of all stakeholders. These officials believe this is partly the result of the preliminary nature of utility plans for which studies and other analyses are still being refined, decisions are yet to be made, and funding and specific schedules are still being determined. A transportation engineer with the Federal Highway Administration Region 9 Field Office, who has responsibilities for planning road infrastructure improvements in Guam, told us that without knowing the specific details of utility solutions under consideration, it is difficult coordinating with DOD to identify possible conflicts between planned road and utility improvements, such as new power transmission lines that may encroach on a road's right-of-way, and scheduling of projects. The official also said that the highway administration needs to obtain sufficient information from DOD to ensure that its projects are funded and completed when needed to support the buildup. Officials in the Joint Guam Program Office told us that the program office has provided as much information to its stakeholders when available and that they recognize the difficulty of stakeholders developing their own plans with preliminary data and analyses.

Additionally, Guam utility officials said that while DOD has provided preliminary information on its utility plans, they believe that DOD has not provided the level of detail that is needed for the government of Guam and its utility organizations to do comprehensive utilities planning. The Chairman of the Consolidated Commission on Utilities told us that for the government of Guam to adjust its planning for the buildup, it needs information, such as the final numbers and arrival schedules for DOD personnel and dependents. The Chairman also said that there is a need for closer coordination and involvement between the government of Guam and the Joint Guam Program Office, DOD, and other federal agencies to better integrate their efforts for utilities planning and to obtain funding for their planning efforts and to make the required improvements.

Officials in the Joint Guam Program Office told us that DOD has provided an unprecedented level of information to the government of Guam but many details are still being worked on or pending final decisions. The program office officials said that it would not be appropriate to release

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Proposed Solutions Are Likely to Require More Than One Funding Source

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these details since they are likely to change during ongoing reviews. In February 2009, the Joint Guam Program Office began to provide more specific information on the range of utility proposals under consideration and its preferred solutions to the government of Guam and its utility organizations.

DOD's cost estimates indicate that the total cost for utilities is likely to exceed the amount of utility funding that the government of Japan is anticipated to provide towards the Marine Corps' move to Guam. While the total capital costs of implementing long-term utility solutions are not known at this time, cost estimates for various solutions being examined by DOD indicate that the total cost of implementation could significantly exceed the financing anticipated from the government of Japan. As a result, additional funding would likely need to be obtained from other public and/or private sources to implement its long-term utilities infrastructure plans. Further, DOD will not know the ultimate cost of implementing its long-term utility solutions until the special purpose entity—essentially a service provider of a utility commodity—is established and begins development and design work on utility solutions concepts. However, our review of preliminary cost estimates that were developed as part of DOD's business case studies for each utility sector indicate that implementing various combinations of solutions across the utility sectors could significantly exceed the \$740 million in equity investments and loans tentatively committed by the government of Japan and thereby require additional sources of financing. For instance, while the cost estimates are still preliminary and subject to change as the solutions are refined and developed, our analysis shows that the total cost of implementing long-term solutions across the four utility sectors could range from \$1.35 billion to \$1.79 billion, which would exceed the government of Japan financing by \$614 million and \$1.05 billion, respectively.

Additional funding could come from the United States,<sup>22</sup> the government of Guam, other public and private sources, or a combination of these

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<sup>22</sup> However, depending on the precise business model that is ultimately selected, it is unclear whether statutory authority exists at this time to enable DOD to invest U.S. government resources into a special purpose entity for the purposes of improving a utility system outside the jurisdiction of DOD. DOD officials told us that they are currently working with the Office of Management and Budget to formulate a legislative proposal that they hope will enable DOD to implement certain potential aspects of this special purpose entity construct.

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organizations, but the cost of financing from these sources could be higher and more difficult to obtain than the loans provided by the government of Japan through its Japan Bank of International Cooperation.<sup>23</sup> The Joint Guam Program Office, in a written response to us, stated it is likely that Japanese funding will offer lower cost financing than that obtained through the commercial lending market or the business arrangements with special purpose entities. While the Guam Power Authority and Guam Waterworks Authority may be able to provide financing through their capacity to raise public debt, both authorities have had bond ratings that were below investment grade.<sup>24</sup> In December 2008, the bond rating for the Guam Power Authority was upgraded by Standard and Poor's Ratings Services to a rating of medium investment grade because of its sustained trend of improved operational and financial performance. The Guam Waterworks Authority's bond rating was also recently upgraded but still remains slightly below investment grade. Even with better bond ratings, the authorities may still have some difficulty obtaining favorable rates because of the recent downturn in global financial markets. A senior official in the Joint Guam Program Office told us that Guam is in the process of seeking federal aid through grants, loans, and the normal federal budget process to improve its ability to fund its improvements and repairs. The official stated that low-cost rural development loans from the U.S. Department of Agriculture to the government of Guam are being considered as a source of funding to support Guam's utility infrastructure improvements.<sup>25</sup> Additionally, as part of a special purpose entity's

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<sup>23</sup> The Japan Bank for International Cooperation is one of four policy-based financing institutions that are part of the Japan Finance Corporation, which is a public corporation wholly owned by the Government of Japan. In conducting its operations to fulfill its mission of contributing to the sound development of the Japanese and international economy, the bank's role is to complement the financing provided by private sector financial institutions.

<sup>24</sup> When a bond is rated investment grade, its issuer is considered able to meet its obligations, exposing bondholders to minimal default risk, which makes it easier to attract investors and obtain lower interest rates.

<sup>25</sup> In testimony before the U.S. Senate Committee on Energy and Natural Resources on May 1, 2008, the Acting Deputy Assistant Secretary of the Interior for Insular Affairs stated that as is typical for government loan programs, the rural development loans from the U.S. Department of Agriculture require that the government get an appropriation only for the risk associated with the loan rather than the entire loan amount. Loans where there is a reasonable risk of default will have a higher cost than those which typically do not default. For instance, the renewable energy guaranteed loan program has a 10 percent subsidy rate compared to the hardship electric loan program which has a 0.12 percent subsidy rate. Because utilities typically have little risk of default, financing of electric loans is secure and carries a low up-front financing cost on behalf of the federal government.

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Implementation of New  
Approach to Upgrade Utility  
Services on Guam Lacks Key  
Details

proposal, the entity could also include funds obtained from loans in the commercial lending market for implementing their utility plans. However, it is not clear what type of rates these investors may be able to obtain under current financial conditions.

With the exception of solid waste collection and disposal, the Naval Facilities Engineering Command plans that a special purpose entity would develop, construct, and operate the new long-term utility infrastructure needed on Guam to meet DOD's future demands for electric power, water, and wastewater. Command officials stated that the entity would likely be a limited liability company or partnership formed for the specific purpose of providing these utility services, which would likely participate in a public-private venture with private sector owners, developers, operators, and public sector stakeholders. While the command, which is responsible for planning and managing construction related activities for the buildup, has often used a public-private venture approach for developing military housing, it has not used this approach before for the development of utilities on the scale envisioned for Guam. Further, DOD may not possess statutory authority at this time to enable DOD to implement certain proposed aspects of this special purpose entity approach, such as the authority to invest U.S. government resources into a special purpose entity for the purposes of improving a utility system outside the jurisdiction of DOD. Additionally, many specific details about the special purpose entity, such as the entity's scope, business and financial arrangements, utility system cost and rate structure, and specific projects have not yet been determined. The entity, or entities, is scheduled to complete implementation of the new long-term utility systems by November 2014, according to the Joint Guam Program Office.

Although officials at the Joint Guam Program Office and the Naval Facilities Engineering Command agree that the lack of specific details at this time about use of the special purpose entity approach creates some uncertainty about implementing utility solutions when needed on Guam, these officials said that the Naval Facilities Engineering Command has gained experience in its public-private ventures for housing that will provide the ability to link the interests and the needs of the stakeholders and derive the best business arrangement to meet DOD's utility needs. The Joint Guam Program Office noted that large-scale public-private housing projects also involve the construction and privatization of significant utility infrastructure. It further stated that developing a revenue-based, commercially acceptable financing structure, with the added dimension of public-private partnership, is a particular skill that the Naval Facilities Engineering Command has gained through its public-

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private venture housing efforts. However, the authorities available under chapter 169 of Title 10, U.S. Code, are available only for the purposes of the Military Housing Privatization Initiative, and as stated above, it is unclear to what extent DOD possesses authority to implement certain proposed aspects of this special purpose entity approach for utilities on Guam.

Joint Guam Program Office officials told us that, while the technical aspects of utility systems and their construction have natural differences from military housing public-private efforts, the Naval Facilities Engineering Command brings together subject-matter expertise from across DOD to address the relevant technical, financing, and business management issues that will arise. In addition to in-house capabilities, the command plans to use outside consultants that have significant experience with public-private efforts. For example, the command has contracted with an economics and real estate development advisory firm to conduct a study that will enable DOD to better understand market conditions affecting potential investments and develop the needed business model. The business model will provide a notional assessment of how a special purpose entity could be organized and operate and would include information on estimated capital costs to construct potential utility systems and forecasted utility rates that would be assessed to recover capital costs and fund the systems' operations and maintenance. The Naval Facilities Engineering Command plans to use the model for developing DOD's request for information to industry to solicit proposals and for negotiating with the selected special purpose entity on the terms and conditions of their utility services agreement.

**Tight Schedule for Meeting  
Buildup Requirements  
Increases the Complexity of  
Planning Efforts**

Joint Guam Program Office's utility plans entail meeting a number of key milestones and associated events over the next 5 years to complete its environmental impact statement process, select a special purpose entity to develop and implement its long-term, and possibly its interim, solutions, and finish utility construction by November 2014. Keeping pace with this tight schedule not only becomes critically important to meeting the utility needs of the continuously growing military population, but also to the successful execution of schedules for major military construction, movement of Marines and other forces, and other related buildup activities. While the program office has taken some actions to mitigate schedule risks, the schedule for utilities provides little flexibility to accommodate any major adjustments in milestone dates.



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## **Environmental impact statement completion**

Currently the Joint Guam Program Office is working toward completion of its environmental impact statement for relocating the Marines to Guam. Officials from various offices within DOD, government of Guam, and federal agencies told us that the amount of time allotted for completing milestones within the study is very compressed when compared to other impact studies that are less complex and smaller in scope. The Joint Guam Program Office plans to distribute a working draft of the environmental impact statement to various cooperating agencies and DOD organizations for initial review and plans to release the draft environmental impact statement for a 60-day public comment period in the final quarter of fiscal year 2009. The office intends to issue a record of decision in January 2010 to begin its planned fiscal year 2010 construction program for the buildup on time. Environmental Protection Agency Region 9 officials told us the short period allotted for receiving and resolving comments creates possible risks that federal agencies, such as the Fish and Wildlife Service, may not be able to complete their reviews, and possible environmental challenges from public and private interests could delay approval of the study and affect the implementation of other buildup events.

The tight schedule has also affected how long-term utility solutions were examined during the conduct of DOD's environmental impact statement for the Marine relocation. Because the final size, scale, and specific details of potential utility projects needed to implement the long-term solutions will not be known until they are developed by the selected special purpose entity at a later date, officials from the Joint Guam Program Office told us that the long-term solutions for utilities will be considered at a high level in the environmental impact statement that is planned for completion in 2010. The program office stated that a site specific environmental impact statement for the long term utility solutions will be conducted at a later date, but before DOD enters into any underlying contracts for long term services from the special purpose entity.

## **Creation of special purpose entity**

The next series of major milestones relate to the selection of a special purpose entity and the creation of a business model whereby the entity would develop, implement, and construct the long-term solutions for electric power, water, and wastewater utilities. As table 7 shows, there are a number of actions that need to be taken to create the special purpose entity for utilities, including development and approval of a business model for the special purpose entity, the evaluation of qualifications and

service proposals, the selection and creation of the entity, and construction. However, according to the Joint Guam Program Office, while the plan is to complete utility construction by November 2014, the program office has not yet finished its coordination within DOD to determine the intervening dates for completing the actions needed to implement the special purpose entity approach and begin design and construction of the potential utility projects. A Joint Guam Program Office official told us that the program office does not believe at this time that the undetermined schedule dates will affect its ability to meet its construction completion date.

**Table 7: Actions Needed to Implement the Special Purpose Entity Approach for Utilities<sup>a</sup>**

Complete preliminary development of business model for the special purpose entity.
Obtain U.S. government approval of the business model.
Obtain government of Japan approval of business model.
Advertise Request for Qualifications for prospective special purpose entity offerors.
Complete evaluation of requests for qualifications from prospective offerors <sup>b</sup>
Receive proposals from qualified offerors.
Select winning special purpose entity and begin exclusive negotiation, design development, and permitting.
Execute business and/or real estate documents that formalize the agreement between the special purpose entity and the U.S. government for the provision of utility services. Items such as service availability dates and utility rates would be established in the agreement.
Special purpose entity completes site permitting and begins construction.
Special purpose entity completes construction of utilities.
Special purpose entity operates the utilities.

Source: Joint Guam Program Office.

<sup>a</sup>DOD officials told us that they are currently working with the Office of Management and Budget to formulate a legislative proposal that would enable DOD to implement certain potential aspects of this special purpose entity construct. Thus, obtaining legislative authority would be a critical step in DOD's ability to implement several aspects of this special purpose entity approach.

<sup>b</sup>Prospective special purpose entity offerors who meet the qualification criteria will be allowed in a future step to submit proposals to provide utility services.

### Addressing capacities gaps

The current capacities of existing Guam utility systems will be exceeded by the needs of the continuously growing military population before the special purpose entities can complete new utility construction and be operational by November 2014. The Naval Facilities Engineering Command conducted breakpoint studies for each of the utility sectors to

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predict when utility capacities would be exceeded.<sup>26</sup> Although the predicted breakpoint date varied by utility sector, the studies determined that there are potential deficiencies in electricity, water, and wastewater about 2 years into the Marine Corps relocation effort, which would require interim operating solutions to bridge the gaps in needed capacity until the long-term solutions were in place. Joint Guam Program Office officials told us that to control implementation costs of the utilities, the interim utility solutions are planned as a part of the long-term solutions. As part of DOD's current environmental impact statement study for the Marine buildup, the Naval Facilities Engineering Command stated that they have included an evaluation of these interim solutions for possible environmental impacts. Although the command at this time expects that DOD will bear most of the costs of implementing interim solutions, estimates of these costs have not yet been fully developed. Additionally, the role that the special purpose entity or entities would have in implementing the interim utility solutions has also not been determined.

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### DOD Lacks a Comprehensive Plan for Its Utility Efforts on Guam

DOD has not developed and communicated a comprehensive plan for its utility efforts on Guam to use in managing the several challenges it faces and provide its stakeholders, including Congress, with a central source for obtaining specific information on its critical milestones and schedules, interim and long-term options, approach for utilities development, costs and financing for utility projects, and challenges. Officials in the Navy's Joint Guam Program Office told us that while the program office intends to develop a comprehensive utility plan, the pre-decisional nature of the work performed for the environmental impact statement, the pending selection of preferred utility solutions, uncertainty about costs and financing for utility projects, and associated challenges have precluded the plan's development. The Deputy Director of the Joint Guam Program Office also told us that while meeting DOD's mission requirements would be the ultimate goal of such a plan, the program office recognizes that the plan should be developed in collaboration with the government of Guam so that Guam's concerns are sufficiently addressed, and integrated islandwide utility solutions are considered that will benefit Guam residents.

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<sup>26</sup> Breakpoints were developed by matching the supply of the existing utility to the demand from forces (to include service members, contractor support and dependents) at their projected arrival on Guam.

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Nevertheless, without a comprehensive plan for utilities development, DOD does not have use of an important tool to address the risks and uncertainty posed by several critical challenges—the condition of existing Guam utility systems, extent of coordination required among stakeholders, sources of funding, approach chosen to implement solutions, and the schedule for completing key tasks—it faces in carrying out DOD’s planning and implementation of utility solutions on Guam. Such a plan would also help increase transparency among stakeholders and improve DOD’s overall management of its efforts by providing a central source of consistent, detailed information on various aspects of DOD’s planning for utility development to meet future demands on Guam. An opportunity now exists to begin development of a comprehensive plan as DOD completes its environmental impact statement effort and the Guam Joint Military Master Plan is finalized. It is expected that such a plan would evolve in its content and be updated as information is better refined and decisions are made.

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## Conclusions

Expanding the U.S. military presence on Guam by more than two-and-a-half times the current population is expected to put great stress on Guam’s infrastructure, especially when significant increases are expected as soon as 2014 with further increases continuing over the next several years to 2020. Although DOD has taken a number of actions to identify its requirements and potential solutions for meeting this significant demand, it has not begun development of a comprehensive utilities plan to use as an important planning tool in managing and informing stakeholders, including Congress, on the several challenges that pose considerable risk to the success of building up the infrastructure to meet the demand and ensure utilities are available when needed. Without sufficient utility services, major construction projects, movement of Marines and other forces, and other buildup activities may fall behind schedule and increase implementation costs due to further compression of the timeline near the end of the implementation period. Congress would also benefit from having an additional source of details on DOD’s utility efforts and its progress in addressing planning challenges and implementing utility plans to better inform its decisions and ensure proper congressional oversight of DOD’s military buildup on Guam, including the potential need for greater levels of appropriations.

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## Recommendation for Executive Action

Because of the importance that DOD places on developing the utility infrastructure needed to support its planned military buildup on Guam, we recommend that the Secretary of Defense direct the Secretary of the Navy, in consultation with the Joint Guam Program Office and the Naval Facilities Engineering Command, to take the following action:

- Develop a comprehensive plan for DOD's utility development efforts that includes specific information on options under consideration; projected costs; sources of financing and related budget information; schedules with associated critical milestones; the construct for the special purpose entity approach or alternative approaches that would be used to plan, develop, construct, and operate the new utility infrastructure; organizational relationships and associated responsibilities; status of government of Guam actions to improve its existing infrastructure that may have application to DOD plans; and, potential risks, challenges, and other factors affecting implementation of DOD's plans. Additionally, this plan should be:
  - developed in cooperation with the government of Guam;
  - prepared in time so that an initial version of the plan can be included with DOD's submission of its final comprehensive Guam Joint Military Master Plan for the buildup to Congress in 2010;
  - provided to congressional defense committees, with subsequent versions of the plan provided as they become available; and
  - updated, as needed, to adapt to changing circumstances.

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## Agency Comments and Our Evaluation

In written comments to a draft of this report, the Executive Director of the Navy's Joint Guam Program Office agreed with our overall assessment of DOD's planning efforts to increase the capacities and services on Guam to support the planned U.S. military buildup over the next several years and with our recommendation that the Joint Guam Program Office, in consultation with the Naval Facilities Engineering Command, should develop a comprehensive plan that would provide specific information on DOD's utility planning for Guam, information such as options under consideration, projected costs, schedules with critical milestones, and other factors affecting implementation of DOD's plans. The Executive Director also agreed that this plan should be prepared in time so that an initial version of the plan could be included with the department's submission of its final comprehensive Guam Joint Military Master Plan in 2010 and be provided to congressional defense committees, with subsequent versions provided as they are updated. However, while the Executive Director stated in his comments that our recommendation was

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fair because it focuses on DOD's utility development, he suggested we clarify our recommendation so as not to create the impression that DOD's development of a comprehensive utility plan would account for all utility needs on Guam and would need mutual agreement with the government of Guam. While we continue to believe that collaboration with the government of Guam is important because many of DOD's preferred solutions described in this report involve utilization of utilities currently owned and operated by the government of Guam, we have clarified our recommendation, as DOD suggested, to now state that the comprehensive utility plan for Guam should be developed "in cooperation" with the government of Guam rather than "in collaboration." Further, the Executive Director stated that DOD's span of control and influence to resolve overall utilities concerns on Guam is limited. We agree that DOD is limited in its ability to resolve overall utilities concerns on Guam, and have identified the extent of coordination required among stakeholders as a planning challenge throughout this report.

Additionally, the Executive Director stated in his comments that our report was unclear on how a comprehensive plan would increase transparency or what such transparency would entail. He therefore suggested that we modify or consider deleting references to transparency in the report. We have acknowledged in our report that DOD has provided, to the extent possible, a significant amount of information to its stakeholders, including the government of Guam, to provide transparency of its utility efforts. We also stated, however, that a comprehensive plan for utilities is another important planning tool that DOD can use to improve the management of its efforts and provide its stakeholders with detailed, consistent information on its utility planning efforts—thereby providing an additional level of transparency to its stakeholders. Such a plan would also generally provide a means to bring together all aspects of those plans into one central document and a source that updates information on critical milestones and schedules, and if these are missed what accommodations are being made. DOD's preparation of a comprehensive utility plan would also mutually reinforce the utility planning being conducted by the government of Guam to support both the needs of the military buildup and those of the civilian population. As the Executive Director suggests in his comments, an example of a more quantitative method of achieving transparency could be the inclusion of additional review milestones with the government of Guam as the comprehensive plan is being developed. Additionally, we believe that another example would be for DOD to set review milestones with other stakeholders, such as the Environmental Protection Agency and the Federal Highway Administration, in preparing its plan. Such additional

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coordination could help to ensure those stakeholders' mutual interests, plans, and budgets, which support the needs of the military and island populations, are aligned in DOD's plan. For these reasons, we have retained our discussion of transparency in the report.

DOD's comments are reprinted in their entirety in appendix IV. Also, DOD provided technical comments on a draft of this report, which we incorporated as appropriate.

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As agreed with your office, unless you publicly release the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies of this report to interested congressional committees, the Secretary of Defense, the Secretary of the Navy; and the Governor of Guam. In addition, the report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staff have any questions about this report, please call me at (202) 512-4523 or [leporeb@gao.gov](mailto:leporeb@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Other major contributors to this report are listed in appendix V.

A handwritten signature in black ink, reading "Brian Lepore". The signature is written in a cursive style with a large, stylized initial "B".

Brian J. Lepore, Director  
Defense Capabilities and Management

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# Appendix I: Scope and Methodology

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To determine the current condition and capacity of Guam's existing utility infrastructure, the military's estimated utility requirements, and potential solutions for meeting the increased demand on the island's utility systems, we obtained and reviewed studies and assessments, briefings, annual reports, and other pertinent documentation prepared by the Department of Defense (DOD), government of Guam, U.S. federal departments and agencies, and private companies. We interviewed and discussed this information with officials at the Department of the Navy's Joint Guam Program Office, Naval Facilities Engineering Command, U.S. Environmental Protection Agency, offices and organizations of the government of Guam, including the Consolidated Commission on Utilities, Guam Power Authority, Guam Waterworks Authority, Department of Public Works, Guam Environmental Protection Agency, and the Guam Civilian Military Task Force. We also spoke with officials of Gershman, Brickner & Bratton, Inc.—the U.S. District Court of Guam appointed receiver for Guam's solid waste collection and disposal operations—to discuss the status of actions being taken to correct outstanding operational deficiencies with solid waste operations and the development of a new landfill in Guam. We discussed electric power approaches and considerations used in the Hawaiian islands with officials at the Hawaiian Electric Company to provide us with a comparative basis for power operations in Guam. We analyzed data on the expected number and timing of military personnel arriving on Guam and reviewed several technical studies, business case analyses, and related studies on the projected utility requirements and associated capacities that would be needed to provide sufficient utility services. We discussed DOD's projected requirements and potential solutions for providing the needed new utility services with the Joint Guam Program Office, Naval Facilities Engineering Command headquarters and its Pacific and Marianas component commands, the U.S. Pacific Command and its Navy, Marine Corps, and Air Force component commands, and U.S. Navy, U.S. Marine Corps, and U.S. Air Force headquarters. We obtained data on the current capacities of Guam's existing utility systems from the Naval Facilities Engineering Command. These data are of undetermined reliability; they were obtained from utility studies that were conducted by the command's contractors who worked directly with the government of Guam and its utility organizations in establishing current utility system capacities and DOD demand and for providing a baseline to determine the extent of additional capacities needed to meet future DOD demands. We used these data in order to consider the planning required to increase the capacities of the existing utilities. Joint Guam Program Office officials told us that the Naval Facilities Engineering Command is in the process of verifying and validating the data used in its technical utility studies.



To determine the extent that DOD has developed a comprehensive plan to address any challenges it faces in its planning for new utility systems, we obtained and reviewed studies, analyses, reports, briefings, planning documents, and other supporting and relevant documentation. We also held discussions with officials at the Joint Guam Program Office, Naval Facilities Engineering Command and its Pacific and Marianas component commands, U.S. Pacific Command and its service component commands, and other DOD organizations and offices. To determine the key steps that DOD plans to use in its planning for the development of new utility systems on Guam, we interviewed officials with the Joint Guam Program Office, Naval Facilities Engineering Command, and other key stakeholder organizations and reviewed reports, studies, briefings, and other documentation related to the program. We developed a table of the key steps needed to implement utility solutions based on our audit work and discussed and reached concurrence with Joint Guam Program Office officials on the contents of the table. To establish criteria to use in assessing DOD's planning efforts for new utility services on Guam, we reviewed our prior reporting and related studies, as well as outside studies, to identify best practices and key elements of successful planning. We identified a plan as an important element of successful planning to increase transparency of an organization's efforts among stakeholders and to help improve an organization's overall management of its efforts. Such a plan would include information on milestones and schedules, costs, financing and budgets, goals and objectives, projects and activities, organizational responsibilities, implementation strategies, and potential risks, challenges, and other factors that could affect implementation. We reviewed the Joint Guam Program Office sanctioned technical studies and business case analyses that were used to develop possible solutions for providing increased utility capacities and services to support the growth in the military population. From these studies we obtained information on potential costs, possible impacts on the existing Guam utility infrastructure, and implementation approaches, which we discussed with Joint Guam Program Office and Naval Facilities Engineering Command officials. To better understand stakeholder relationships, we met with officials within the Joint Guam Program Office, Naval Facilities Engineering Command, Joint Staff, Office of the Secretary of Defense, the Service headquarters, U.S. Pacific Command and its service components, the government of Guam, particularly its utility authorities, U.S. Environmental Protection Agency, and private companies. Regarding the environmental impact statement that is being conducted for the Marine Corps move to Guam, we reviewed planning documents, status reports, and other documentation, which we discussed with officials from DOD

organizations, government of Guam, U.S. Environmental Agency Region 9, as well as other cognizant officials.

Additionally, we obtained information on the Department of the Navy's Fena Reservoir water treatment operations on Guam, the determination process used to establish the rates it charges its customers for water, and the feasibility of consolidating Fena water operations with the Guam Waterworks Authority's water system. We obtained and reviewed briefings, studies, reports, official correspondence, and other pertinent documentation related to the Navy's Fena Reservoir water operations on Guam and the Navy Working Capital Fund, which establishes the procedures used by the Navy to manage the costs of its operations and provides the process for determining water rates. We also discussed this information with appropriate officials at the Naval Facilities Engineering Command Marianas, Naval Facilities Engineering Command Headquarters, Guam Waterworks Authority, and Guam's Consolidated Commission on Utilities. Additionally, we discussed the operational and water rate issues with the Department of the Navy's Naval Audit Service, which was conducting a review of the process used by the Department of the Navy to establish the water rates that it charges the Guam Waterworks Authority on Guam. We obtained and reviewed the Naval Audit Service's final April 2009 report issued on the results of its Guam water rates' review.

We conducted this performance audit from June 2008 through May 2009 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Table 8 shows the organizations and offices we contacted during our review.

**Table 8: Organizations and Offices Contacted during Our Review**

<b>Washington, D.C., area</b>
• Joint Guam Program Office, Assistant Secretary of the Navy (Installations and Environment)
• Naval Facilities Engineering Command, Headquarters
• Joint Staff, Logistics Engineering Division
• Office of the Deputy Under Secretary of Defense, Installations and Environment Division
• Marine Corps Headquarters, Defense Policy Review Initiative, Installations and Implementation Branch
• Commander, Navy Installations Command
• Air Force Headquarters
• Naval Audit Service, Department of the Navy
• Gershman, Brickner & Bratton, Inc.
<b>Oahu, Hawaii, area</b>
• U.S. Pacific Command, Headquarters
• U.S. Pacific Fleet
• U.S. Marine Forces Pacific
• U.S. Pacific Air Forces
• Naval Facilities Engineering Command, Pacific
• U.S. Department of Transportation, Region 9, Federal Highways Administration
• First Hawaiian Bank
• Hawaiian Electric Company
<b>Guam</b>
• Joint Guam Program Office Forward
• Naval Facilities Engineering Command Marianas
Government of Guam
• Civilian/Military Task Force, Office of the Governor of Guam
• Consolidated Commission on Utilities
• Department of Public Works, Solid Waste Division
• A.B. Won Pat Guam International Airport Authority
• Guam Coastal Management Program
• Guam Power Authority
• Guam Waterworks Authority
• University of Guam, Water and Environmental Research Institute of the Western Pacific
• Guam Environmental Protection Agency
<b>San Francisco, California, area</b>
• Environmental Protection Agency, Region 9

Source: GAO.

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# Appendix II: Department of the Navy's Fena Reservoir Water Treatment Operations and Rates on Guam

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During our review we obtained information on the (1) Navy's Fena reservoir water treatment operations, (2) process used by the U.S. Navy to set rates for its military customers and the Guam Waterworks Authority for water obtained and produced from the Navy's Fena reservoir water treatment operations, and (3) feasibility of consolidating the Fena water operations with the Guam Waterworks Authority's water system.

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## Navy's Fena Reservoir Water Treatment Operations

DOD currently produces and provides potable water to meet all of its needs at military installations on Guam. In the northern half of the island, its water comes from a network of wells on DOD land that pumps fresh water from an underground aquifer. In the south, its water is obtained from surface freshwater resources, including the Fena Reservoir, which the Navy constructed in 1951, to provide the primary source of water to Naval Base Guam operations, military personnel, and dependents. Water is pumped from the manmade reservoir and two nearby springs to the Navy Fena Water Treatment Plant where raw water is treated by coagulation, sedimentation, and filtration to reduce turbidity and chlorinated. The plant is the largest and most complex water treatment plant on Guam and, according to the Commanding Officer of the Naval Facilities Engineering Command Marianas, has complied with the Safe Drinking Water Act over the past 5 years, with the exception of a few minor monitoring and reporting issues.

To augment the water supply for civilian residents it serves on Guam, the Guam Waterworks Authority<sup>1</sup> purchases about 3 million gallons of water of the Navy's daily production at its Fena water treatment plant. The purchased water serves the authority's customers in three villages in close proximity to the reservoir and/or its water distribution pipes but can also be conveyed to other customers in its water system. The Navy's plant currently turns out about 9 million gallons of water each day but is capable of producing upwards of 13.5 million gallons each day.<sup>2</sup> According to the Naval Facilities Engineering Command, the Fena water treatment

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<sup>1</sup> The Guam Waterworks Authority, which is a public corporation responsible for the production, treatment, distribution, and sale of drinking water, provides water services to the entire civilian population of Guam. Most of its water—about 70 percent—comes from wells that pump water from the northern aquifer; the remaining 30 percent comes from surface water sources, including rivers and reservoirs (ground level and elevated tanks).

<sup>2</sup> A memorandum of understanding in 1991 between the U.S. government and the government of Guam set the Navy's daily commitment at upwards of 4.39 million gallons of water.

operation on Guam is the only Navy water operation that sells water to an off-base entity.

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## Navy's Process for Determining Water Rates

The Navy's water production and distribution systems in Guam are operated through the Navy Working Capital Fund, which is a revolving fund that relies on sales revenue instead of direct congressional appropriations to finance its operations. The fund must recover the full cost of its operations, and rates for its products and services are set so its operations will break even over time, thereby neither making a profit nor incurring a loss.<sup>3</sup> The Navy has used this financing approach for over 30 years for its water operations and as a basis for its water rates for both its military and civilian customers in Guam.

Because gains or losses in revenue may occur as a result of variations in operations, the Navy water rates are adjusted each year to recover the full costs of operations and break even over time. In accordance with normal Navy Working Capital Fund procedures, the Navy's Naval Facilities Engineering Command Marianas initially sets a new water rate for its Fena reservoir operations through its budget process 2 years prior to the fiscal year of execution. The proposed new rate is determined from actual and estimated costs available at the time of development and knowledge of future costs and sales volume events, such as an increase in population or customer base. According to water rate historical data provided by the Naval Facilities Engineering Command Marianas used in preparing its fiscal year 2009 rate, operation costs included direct labor, overhead, material (fuel), depreciation, equipment rental, electricity, hazardous waste disposal, water laboratory testing, engineering support, and contracts for operations and maintenance, minor repairs, ground maintenance, major repairs, data collection, management software, and other services.

The Naval Facilities Engineering Command Marianas reflects the proposed new water rate in its supporting budget documentation that it submits to the Naval Facilities Engineering Command-Pacific for the associated fiscal year budget submission. In turn, the documentation is provided to the Naval Facilities Engineering Command Headquarters, which reviews the documentation and submits it as part of its consolidated budget to the

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<sup>3</sup> See 10 U.S.C. § 2208; see DOD 7000.14-R, Department of Defense Financial Management Regulation, Vol. 2B, Ch. 9, § 09010 (Sept. 2008).

Navy's Office of Budget/Business and Civilian Resources Division. Subsequently, the consolidated budget is presented to the Office of the Secretary of Defense's Comptroller. After the Office of the Secretary of Defense's review, a program budget decision is published establishing the new water rate for the associated fiscal year and any needed adjustments are made to the Naval Facilities Engineering Command Marianas' budget.

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## Feasibility of Consolidating Navy and Guam Water Systems

In regard to the feasibility of consolidating the Navy's Fena water operations with Guam Waterworks Authority's water system, the Naval Facilities Engineering Command told us that the command has consistently maintained ownership of water rights on Navy land throughout the world and the Navy would like to maintain this right for its reservoir on Navy land in Guam. Further, the Government of Guam recognized the fee simple title and ownership of the United States' real and personal property used by the Navy to produce and distribute potable water, (which includes the Fena Reservoir) in a 2003 Consent Decree.<sup>4</sup> The Commanding Officer of the Naval Facilities Engineering Command Marianas, in an October 2008 letter to the Chairman of Guam's Consolidated Commission on Utilities, stated that the Command sees few engineering, operational, or financial benefits that would result from consolidation. He stated that while the Guam local water system has undergone significant improvements in the quality of its drinking water, the system still has a very high loss rate of approximately 50 percent and continues to lack adequate water transmission and storage infrastructure. In contrast, the Navy water system's loss rate is 17 percent, which is close to the industry standard of 15 percent or less. The commanding officer also stated that the Guam Waterworks Authority's primary water system in northern Guam is largely separate and distinct from the Navy's system. Another Naval Facilities Engineering Command Marianas official told us that most of the authority's water comes from the island's northern aquifer. According to the command, while the water is of sufficient quality to not require treatment, the authority's rates remain higher than those of the Navy, which operates a full water treatment plant. Additionally, the officer told us that because the Fena reservoir is located within the Naval Base Guam Ordnance Annex,<sup>5</sup> there are security, liability, and

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<sup>4</sup> *United States of America v. Government of Guam*, No. 99-00102 (D. Guam Apr. 24, 2003).

<sup>5</sup> The Naval Base Guam Ordnance Annex is located approximately 1 mile southeast of the main base. It encompasses nearly 18,000 acres and is a major storage and supply point for many types of weapons. The annex is also the site of the Fena reservoir.

antiterror/force protection concerns that would be raised by nonmilitary ownership of the reservoir.

The Chairman of the Guam's Consolidated Commission on Utilities told us it is the long-term goal of the government of Guam to integrate DOD's and Guam's water systems under the control of the Guam Waterworks Authority. However, the chairman told us that for the time being the government of Guam has shifted its focus to planning for the buildup and looking for opportunities to collaborate with DOD on developing integrated water and wastewater solutions for the buildup. He further stated that the government of Guam would revisit the ultimate integration of the entire system at a later time.

# Appendix III: Current Sources of Utility Services for Civilian and DOD Customers on Guam

DOD current sources of utility services for electric power, potable water, wastewater treatment, and solid waste disposal come from both military- and government of Guam-owned and operated systems. The Guam Power Authority provides DOD with all of its electric power services. The Guam Waterworks Authority provides wastewater collection and treatment services for all of DOD’s installations in northern Guam, such as Andersen Air Force Base, but DOD provides its own treatment services for the Naval Base Guam in the south. DOD currently produces all of its own potable water and handles all of its solid waste collection and disposal. Table 9 summarizes the sources of utility services for Guam civilian and DOD customers by utility sector.

**Table 9: Current Source of Utilities Services for Guam Civilian and DOD Customers by Utility Sector**

Utility sector	Customer sector	Current source of utility services
<b>Electric power generation</b>	Guam civilian	<ul style="list-style-type: none"> <li>Guam Power Authority provides all power services.</li> </ul>
	DOD (Navy and Air Force bases) <sup>a</sup>	<ul style="list-style-type: none"> <li>Purchases all of its power services through a customer services agreement with Guam Power Authority.<sup>b</sup></li> </ul>
<b>Potable water production</b>	Guam civilian	<ul style="list-style-type: none"> <li>Guam Waterworks Authority produces most of its own water but purchases some water from the Navy’s Fena reservoir water operations.</li> </ul>
	DOD (Navy and Air Force bases)	<ul style="list-style-type: none"> <li>Navy Base Guam and Andersen Air Force Base produce and provide water to all DOD customers.</li> </ul>
<b>Wastewater collection and treatment</b>	Guam civilian	<ul style="list-style-type: none"> <li>Guam Waterworks Authority operates seven wastewater treatment plants and basins that treat wastewater from resident and military customers.<sup>c</sup> An estimated 41 percent of island residents use individual wastewater disposal systems, such as septic tanks.</li> </ul>
	DOD (Navy and Air Force bases)	<ul style="list-style-type: none"> <li>The Navy treats all of its wastewater in southern Guam at its own treatment plant at Naval Base Guam.</li> <li>Guam Waterworks Authority handles wastewater from Andersen Air Force Base and Navy facilities in northern Guam.</li> </ul>
<b>Solid waste collection and disposal</b>	Guam civilian	<ul style="list-style-type: none"> <li>Guam Department of Public Works maintains a single landfill and only provides solid waste services for civilian customers in Guam.<sup>d</sup></li> </ul>
	DOD (Navy and Air Force bases) <sup>a</sup>	<ul style="list-style-type: none"> <li>Joint Region Marianas maintains a landfill at both Navy Base Guam and Andersen Air Force Base and provides solid waste services for the bases.</li> </ul>

Source: DOD and government of Guam.

<sup>a</sup>Beginning January 31, 2009, the Navy Region Marianas assumed responsibility for installation support services, including utilities, on all military bases and DOD facilities on Guam under DOD’s joint basing initiative as recommended by the 2005 Base Realignment and Closure Commission, and was designated as Joint Region Marianas, Guam.



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**Appendix III: Current Sources of Utility  
Services for Civilian and DOD Customers on  
Guam**

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<sup>b</sup>According to information provided by DOD officials, the Guam Power Authority supplies power to each DOD facility up to the base transformer; from there, each base is responsible for its on-base power distribution. According to DOD officials, the customer services agreement between the Guam Power Authority and DOD establishes the electrical rates paid to the Guam Power Authority and states that DOD will be a customer of the authority. It further states that the operations and maintenance of the islandwide power system will be the responsibility of the authority. DOD plans to renegotiate the agreement, which is in force until 2012.

<sup>c</sup>According to the Guam Waterworks Annual Report, in January 2007 the authority contracted with a private company—Veolia LLC—to manage and operate its wastewater system.

<sup>d</sup>In March 2008, the U.S. District Court of Guam appointed Gershman, Brickner & Bratton, Inc, as Receiver for Guam's solid waste operations.

# Appendix IV: Comments from the Department of Defense



DEPARTMENT OF THE NAVY  
OFFICE OF THE ASSISTANT SECRETARY  
(INSTALLATIONS AND ENVIRONMENT)  
1000 NAVY PENTAGON  
WASHINGTON, D.C. 20350-1000

June 25, 2009

Mr. Brian J. Lepore  
Director, Defense Capabilities and Management  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, DC 20548

Dear Mr. Lepore:

This is the Department of Defense (DoD) response to the GAO draft report, GAO-09-653, "Defense Infrastructure: Planning Challenges Could Increase Risks for DoD in Providing Utility Services When Needed to Support the Military Buildup on Guam," dated May 29, 2009 (GAO Code 351225). Detailed comments on the report recommendations are enclosed.

We agree with recommendations as a whole. There are two significant items that we recommend adjusting.

On page 16, section "Comprehensive plan ...to increase transparency and improvement management...". Likewise, on page 26, the last paragraph includes reference to "increase transparency." It is not clear what such "transparency" would entail, or how DoD/Joint Guam Program Office (JGPO) could provide better "transparency." The report acknowledges that there has been a significant amount of information shared between DOD/JGPO and the government of Guam and that if information has not been shared, this is due to the information not having been determined yet. We recommend to delete reference to "transparency" or lack of transparency be deleted, or perhaps amplify a more quantitative method of achieving transparency (i.e. including more program review milestones with Government of Guam as the comprehensive plan is being developed).

On page 27, section "Recommendation for Executive Action" indicates that a comprehensive plan for DOD's utility development should be prepared. This recommendation is fair because it focuses on the DoD utility development, however it creates the impression that DoD development of such a plan will account for overall utility needs on Guam. The "span of control and influence" of DOD to resolve utilities concerns on Guam is limited. This plan includes inputs from government of Guam utilities as well as from the Government of Japan. Further, the reference to "collaboration" in the first sub-bullet as to the development of the DOD comprehensive plan implies mutual agreement with government of Guam utilities will be necessary.

Note: Page numbers in the draft report reviewed by agency may differ from those in this report.

DoD recommends to change the wording in the first sub-bullet to read “developed in coordination with the government of Guam.”

Thanks for the opportunity to review the draft report.

Sincerely,



David F. Bice  
Executive Director  
Joint Guam Program Office

Enclosure: As stated

GAO DRAFT REPORT – DATED MAY 29, 2009  
GAO CODE 351225/GAO-09-653

"DEFENSE INFRASTRUCTURE: Planning Challenges Could Increase Risks for  
DoD in Providing Utility Services When Needed to Support the Military Buildup on  
Guam"

DEPARTMENT OF DEFENSE COMMENTS  
TO THE RECOMMENDATION

**RECOMMENDATION 1:** The GAO recommends that the Secretary of Defense direct the Secretary of the Navy, in consultation with the Joint Guam Program Office and the Naval Facilities Engineering Command, to develop a comprehensive plan for DoD's utility development efforts. The plan should include: specific information on options under consideration; projected costs; sources of financing and related budget information; schedules with associated critical milestones; the construct for the special purpose entity approach or alternative approaches that would be used to plan, develop, construct, and operate the new utility infrastructure; organizational relationships and associated responsibilities; status of government of Guam actions to improve its existing infrastructure that may have application to DoD plans; and, potential risks, challenges, and other factors affecting implementation of the DoD's plans. Additionally, this plan should be developed in collaboration with the government of Guam; prepared in time so that an initial version of the plan can be included with DoD's submission of its final comprehensive Guam Joint Military Master Plan for the buildup to Congress in 2010; provided to congressional defense committees, with subsequent versions of the plan provided as they become available; and updated as needed, to adapt to changing circumstances.

**DOD RESPONSE:**

DoD concurs with the assessment and recommendation of the GAO. This recommendation is fair because it focuses on the DoD utility development, however it creates the impression that DoD development of such a plan will account for all utility needs on Guam. The "span of control and influence" of DOD to resolve overall utilities concerns on Guam is limited. This plan includes inputs from government of Guam utilities as well as from the Government of Japan.

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# Appendix V: GAO Contact and Staff Acknowledgments

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## GAO Contact

Brian J. Lepore, (202) 512-4523 or leporeb@gao.gov

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## Acknowledgments

In addition to the contact named above, Mark A. Little, Assistant Director; Michael W. Armes; Raj C. Chitikila; Grace A. Coleman; Katherine S. Lenane; Mahender Dudani; Patrick E. Peterson; and Mark J. Wielgoszynski, Analyst-in-Charge, made major contributions to this report.

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# Related GAO Products

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*High-Level Leadership Needed to Help Guam Address Challenges Caused by DOD-Related Growth*, [GAO-09-500R](#), Washington, D.C.: April 9, 2009.

*Defense Infrastructure: Opportunity to Improve the Timeliness of Future Overseas Planning Reports and Factors Affecting the Master Planning Effort for the Military Buildup on Guam*. [GAO-08-1005](#). Washington, D.C.: September 17, 2008.

*Defense Infrastructure: High-Level Leadership Needed to Help Communities Address Challenges Caused by DOD-Related Growth*. [GAO-08-665](#). Washington, D.C.: June 17, 2008.

*Defense Logistics: Navy Needs to Develop and Implement a Plan to Ensure that Voyage Repairs are Available to Ships Operating Near Guam When Needed*. [GAO-08-427](#). Washington, D.C.: May 12, 2008.

*Defense Infrastructure: Planning Efforts for the Proposed Military Buildup on Guam Are in Their Initial Stages, with Many Challenges Yet to Be Addressed*. [GAO-08-722T](#). Washington, D.C.: May 1, 2008.

*Defense Infrastructure: Challenges Increase Risks for Providing Timely Infrastructure Support for Army Installations Expecting Substantial Personnel Growth*. [GAO-07-1007](#). Washington, D.C.: September 13, 2007.

*Defense Infrastructure: Overseas Master Plans Are Improving, but DOD Needs to Provide Congress Additional Information about the Military Buildup on Guam*. [GAO-07-1015](#). Washington, D.C.: September 12, 2007.

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*DOD's Overseas Infrastructure Master Plans Continue to Evolve*. [GAO-06-913R](#). Washington, D.C.: August 22, 2006.

*U.S. Insular Areas: Multiple Factors Affect Federal Health Care Funding*. [GAO-06-75](#). Washington, D.C.: October 14, 2005.

*Results-Oriented Government: Practices That Can Help Enhance and Sustain Collaboration among Federal Agencies*. [GAO-06-15](#). Washington, D.C.: Oct. 21, 2005.

*Opportunities Exist to Improve Future Comprehensive Master Plans for Changing U.S. Defense Infrastructure Overseas.* [GAO-05-680R](#). Washington, D.C.: June 27, 2005.

*Results-Oriented Government: GPRA Has Established a Solid Foundation for Achieving Greater Results.* [GAO-04-38](#). Washington, D.C.: March 10, 2004.

*Environmental Cleanup: Better Communication Needed for Dealing with Formerly Used Defense Sites in Guam.* [GAO-02-423](#). Washington, D.C.: April 11, 2002.

*Compact of Free Association: Negotiations Should Address Aid Effectiveness and Accountability and Migrants' Impact on U.S. Areas.* [GAO-02-270T](#). Washington, D.C.: December 6, 2001.

*Foreign Relations: Migration From Micronesian Nations Has Had Significant Impact on Guam, Hawaii, and the Commonwealth of the Northern Mariana Islands.* [GAO-02-40](#). Washington, D.C.: October 5, 2001.

*Overseas Presence: Issues Involved in Reducing the Impact of the U.S. Military Presence on Okinawa.* [GAO/NSIAD-98-66](#). Washington, D.C.: March 2, 1998.

*U.S. Insular Areas: Development Strategy and Better Coordination Among U.S. Agencies Are Needed.* [GAO/NSIAD-94-62](#). Washington, D.C.: February 7, 1994.

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