

CHAPTER 4.

CHANGES BETWEEN THE DRAFT AND FINAL EIS

4.1 INTRODUCTION

The purpose of this section is to identify information and analysis that has been added to this EIS between publication of the Draft EIS in November 2009 and the Final EIS. This additional information further supports the disclosure of environmental impacts related to the proposed military relocation on Guam and CNMI. The reasons for adding this information are to provide:

- the latest status of coordination and discussions between DoD, GovGuam and federal agencies on critical issues such as infrastructure upgrades associated with the proposed military relocation;
- updated information on additional scientific surveys and studies prepared by the DoD that were not available or completed at the time of the Draft EIS; and
- more discussion of the proposed actions, alternatives, existing conditions, environmental impacts or proposed mitigation measures to appropriately respond to comments submitted on the published Draft EIS.

The following itemized changes are incorporated into the Final EIS.

4.2 ONE GUAM

There have been numerous comments on the Draft EIS that the Island of Guam cannot support the off base impacts of the proposed military relocation program. The term “One Guam” has been used to denote the need to identify funding for improvements of existing off base deficiencies in infrastructure and public services so that citizens of Guam and its natural and cultural resources are not overwhelmed by the pace and scale of the proposed military relocation program. Numerous examples of existing poor infrastructure, and under-funded and under-staffed public services were cited by state and federal resource agencies, GovGuam, and citizens of Guam. As documented in this EIS, DoD acknowledges the existing sub-standard conditions of key public infrastructure systems and social services on Guam and the interest to have DoD fund improvements to these systems and services. DoD’s ability to fund actions is limited by federal law. However, to minimize adverse impacts associated with the proposed military relocation program and since the issuance of the Draft EIS, DoD has begun leading a federal inter-agency effort to identify other federal programs and funding sources that could benefit the people of Guam. This DoD approach to support identification of funding for repairs of existing sub-standard conditions on Guam would reduce adverse impacts associated with the proposed program.

The Navy acknowledges that there is the potential for effects on social services, such as educational and medical facilities, due to the added demand on services from DoD military and civilian populations as well as demand from others coming to Guam as a result of potential induced growth that may result from the DoD proposed actions. Additionally, those potential impacts, resulting in increased demands on the Guam social service, would also be affected by a possible shift in trained personnel from public and private facilities on Guam to the DoD facilities on Guam. Based upon a proposed 2014 completion date for the Marine Corps realignment effort, efforts have been made to quantify those impacts in the Final EIS. These estimates were prepared using the best available information, but were influenced by several variables, such as possible shifts of trained personnel from public and private facilities on Guam to DoD facilities, that cannot be ascertained at this time. Thus, the quantification of impacts presented in the Final

EIS is less than certain. Because DoD may consider a modified timing and sequencing for the relocation of troops through force flow reduction, the quantification of socioeconomic impacts noted in the Final EIS may not occur. Because of difficulties in quantifying such impacts in normal circumstances, much less under a under force flow reduction mitigation scenario, those social service needs on Guam are best addressed by the independent, ongoing, work of the Office of Economic Adjustment in support of the Economic Adjustment Committee's (EAC) development of a Guam infrastructure plan for those social services.

4.3 PROGRESS ON DOD – GUAM UTILITY SYSTEMS COOPERATION.

During production of the EIS and on a continuing basis, Navy representatives have also been meeting regularly with Guam Power Authority (GPA) and Guam Waterworks Authority (GWA). These meetings have been to coordinate needed utility upgrades, identify the best technical solutions, discuss business solutions to implement the technical solutions, and lead toward viable utility solutions for both on base and off base utility needs. Draft Memoranda of Understanding (MOU) have been developed to solidify cooperative arrangements for the future utility needs of DoD and to address GWA utility shortfalls related to the proposed DoD relocation, and are included as appendices to this Final EIS. These meetings have resulted in significant progress and are highlighted by utility sector as follows:

4.3.1 Power

- Concurrence has been obtained from GPA on the proposed reconditioning of existing GPA generating facilities for reliability/reserve power, capacity, and upgrades to the GPA transmission and distribution system, to meet increased power demand from the proposed DoD relocation. This was accompanied by a reassessment of current power demands on the GPA system and estimated new demand associated with the proposed DoD relocation.
- Discussions continue on the best business approach to facilitate the required power system upgrades. This could involve the use of Special Purpose Entities (SPEs), which would likely be private business entities formed to finance, operate, manage, upgrade, or develop utility plants. It is anticipated that a SPE would utilize Government of Japan financing provided in accordance with the Realignment Roadmap. Alternatively, Government of Japan financing could be provided to GPA to conduct the upgrades. The precise manner in which the SPEs would operate is not known.
- It is anticipated that a transient aircraft carrier and its escort ships would rely on shoreside utility infrastructure for water, wastewater, and solid waste after 2015. Electric power would be provided in accordance with customer service agreements (CSA) between GPA and the U.S. Navy. Any GPA commitments for additional power to support the aircraft carrier and its escort ships will be determined by future CSA modifications. Any changes in the shoreside power requirements for the aircraft carrier and its escort ships may require additional NEPA review
- The facilities may be operated by the SPE or by GPA. Fees generated through utilities service contracts could be used by the SPE or GPA to repay financing costs or a portion thereof. The DoD rate structure that would be established with any utilities service contract with a SPE or GPA would reflect current rates adjusted for inflation.

4.3.2 Water

- GWA and DoD have agreed to develop a joint management team to manage the use of the Northern Guam Lens aquifer. This team would include experts from DoD, GWA, GEPA, USEPA Region 9, the U.S. Geological Service, and the UoG Water and Environmental Research Institute.

The draft MOU between DoD and GWA includes provisions related to this joint management team and the cooperative management of the Northern Guam Lens aquifer.

- Discussions continue on the best business approach to facilitate the required water system upgrades. This could involve the use of a SPE, which would likely be a private business entity formed to finance, develop, upgrade, operate and manage on and off base potable water infrastructure associated with the military relocation. It is anticipated that this SPE would utilize Government of Japan financing provided in accordance with the Realignment Roadmap. The precise manner in which these SPEs would operate is under development, and therefore is not known at this time.
- Transfer of additional and currently available excess water from the Navy-operated systems to GWA has been discussed. This would alleviate water shortages in the GWA system in the early years of the proposed military relocation due to civilian population growth, including the construction workforce accompanying the military relocation. These discussions led to a MOU for the cooperative use of water resources in Guam.
- Expediting installation of the proposed new Navy operated water extraction wells is necessary to meeting current and future deficiencies in the GWA water supply system and will support the workforce that will construct the facilities supporting the proposed DoD relocation.

4.3.3 Wastewater

- Discussions continue on the best business approach to facilitate the required wastewater system upgrades. This could involve the use of a SPE, which would likely be a private business entity formed to finance, operate, manage, upgrade, or develop potable water infrastructure. It is anticipated that this SPE would utilize Government of Japan financing provided in accordance with the Realignment Roadmap. Alternatively, Government of Japan financing could be provided to GWA to conduct the upgrades. The precise manner in which these SPEs would operate is under development, and therefore is not known at this time.
- The Northern District Wastewater Treatment Plant (NDWWTP) may be operated by the SPE or GWA. Fees generated through utilities service contracts could be used by the SPE or GWA to repay financing costs or a portion thereof. The DoD rate structure that would be established under any utilities service contract with a SPE or GWA would reflect current rates adjusted for inflation.
- Although the U.S. Government has not yet ordered the implementation of secondary treatment for Guam's wastewater treatment plants, DoD, USEPA Region 9 and GWA have agreed in principle what specific upgrades would be required at the NDWWTP to achieve secondary treatment standards. Discussions regarding technical solutions and financing for other GWA wastewater treatment plants requiring secondary treatment and collection system upgrades, including the Hagatna wastewater treatment plant (WWTP), are on-going.

The DoD will continue to coordinate with GWA and USEPA Region 9 to ensure that GWA implements planned Capital Improvement Program projects designed to repair, refurbish, improve existing water and wastewater infrastructure to meet the needs associated with the proposed DoD relocation and associated population growth. However, the ability of GWA to secure necessary funding for the required Capital Improvement Program projects remains a key concern and a potential impediment to the Guam military relocation effort and the return of GWA to full compliance with the Clean Water Act and the Safe Drinking Water Act.

The Realignment Roadmap Agreement, described above, states “Japan will provide \$6.09 billion (in U.S. fiscal year 2008 dollars), including \$2.8 billion in direct cash contributions to develop facilities and

infrastructure on Guam to enable the III MEF relocation.” Of this amount, the Government of Japan will provide \$740 million of financing for utilities upgrades, expansion, and development associated with the Marine Corps relocation. Currently, the Government of Japan is considering approximately \$575 - \$600 million of financing for water and wastewater improvement projects. This funding is part of the \$740 million mentioned above.

In addition to DoD’s efforts to secure funding with the Government of Japan, the Council on Environmental Quality has also facilitated interagency discussions with DoD and appropriate federal agencies to identify the specific projects, the of level of funding, and source of funding for necessary water and wastewater infrastructure improvements that must be accomplished in the first five years of the DoD relocation effort. Although no validated estimates are yet available, a preliminary estimate has these various projects totaling approximately \$1.3 billion the five year period. These estimates continue to be refined.

The EAC is evaluating overall Guam civilian hard and soft infrastructure needs, including those associated with the proposed DoD relocation. As part of this evaluation the EAC is specifically examining federal funding options for the remaining portion of the estimated \$1.3 billion water and wastewater improvements that may not be provided by Government of Japan financing.

4.4 ROADWAYS

Since the DEIS, three additional bridges were identified as having rating factors below the appropriate load-bearing capacities for many of the military vehicles and would require replacement. These bridge replacement projects have been included in the analysis presented in this Final EIS.

4.5 ADDITIONAL SURVEYS OF CORAL REEFS IN APRA HARBOR AND SOUTHERN GUAM

During the spring of 2010, DoD sponsored additional marine resources surveys for Apra Harbor and four watersheds in southwestern Guam. The surveys were undertaken to complement previous surveys of Apra Harbor that were reported in the November 2009 Draft EIS done in association with proposed development of berthing facilities to accommodate visiting aircraft carriers. The survey locations in these latest efforts included all of outer Apra Harbor (excluding Sasa Bay, Sumay Cove and Guam commercial port) and the marine environment adjacent to discharge points of the Ugum, Umatac, Toguam and Geus watersheds in southwestern Guam.

The additional study has been used to document existing near-shore marine resources conditions at watershed sites and potential artificial reef sites on Guam. In addition, the work has been used in support of evaluation of mitigation options to compensate for loss of coral associated with the proposed development of new channel and wharf for visiting aircraft carriers in Apra Harbor.

Information from these additional surveys has been incorporated into this Final EIS; primarily in Volume 4. The field reports are also included in Volume 9 (Appendix) of the Final EIS.

Discussions with USEPA, National Oceanic and Atmospheric Administration (NOAA) and Department of Interior (DOI) identified additional data these agencies want to have available for analyzing specific alternative sites for the aircraft carrier transient berth. The Navy will voluntarily collect additional data on marine resources in Apra Harbor. The type and scope of the additional data to be collected has been developed cooperatively with USEPA, NOAA and DOI. The additional data collected, and associated analysis, will be used, along with any other data deemed appropriate by the USACE, in follow on site-specific analysis to inform the subsequent decisions regarding selection of a specific site for the transient

aircraft carrier berth as well as supporting any and all future Clean Water Act and Rivers and Harbors Act permit and associated mitigation decisions for future site selection decisions.

4.6 DEBATE ON METHODOLOGIES TO ASSESS IMPACTS TO CORAL

Adverse impacts to and loss of coral reef resources may be an unavoidable consequence of developing berthing accommodations for transient aircraft carriers in Apra Harbor on Guam. The assessment of the existing condition of the system of coral reefs that may be impacted by future construction activities for aircraft carrier transient berthing facilities is an important initial step for the NEPA, and the CWA, and the RHA permitting processes. There are various methods that are used to assess coral reef ecosystem structure and function, all of which have specific advantages and limitations. Historically, one of the more commonly used methods has been to calculate the area of benthic habitat and component coral communities using photographic evidence collected on-site. The DoD used this method in April and May 2009 to analyze ecosystem structure and function of coral reef communities in the region of Apra Harbor, Guam that would be affected by proposed dredging activities required for safe passage of nuclear aircraft carriers. An additional assessment method, proposed by Federal Resource Agencies, involves the collection of additional size, density, and morphology information in designated quadrats via in-water surveys to evaluate community composition, biodiversity, and size-frequency distributions of each different population of coral species.

4.6.1 Photographic Percent Coral Cover (Method Used by DoD at Apra Harbor)

This method involves the use of two-dimensional photographic data to measure coral community structure in terms of percent area cover. Field methods involve the recording of digital photographs along transects using a camera mounted on a rigid frame to ensure nearly-identical dimensions of all photos. These photos are then analyzed in the laboratory using appropriate software to provide an estimate of community structure (coral as well as other types of bottom cover) within a two-dimensional format. This is a very common method for assessing coral reef ecosystem structure and function because it allows researchers to quantify the area coverage of community types at a given point in time. The ability to identify changes in community structure provides scientists and managers with a sound decision-making tool in terms of general reef monitoring and management.

In terms of repeatability, the photographic cover method produces a permanent record of the data source which can be analyzed by multiple investigators in an identical manner to arrive at reliable and repeatable estimates of coral community cover. Replication reduces the potential for bias. Furthermore, remote sensing has become a proven tool for quantifying reef community structure and distribution at large scales.

4.6.2 In Situ Quadrat Method (As Proposed by Federal Resource Agencies)

This method involves divers collecting size, density, and morphology data within defined quadrats. Colonies are identified by a variety of factors including color, morphology, tissue and skeletal boundary separation and the density and size data of corals within known quadrats are counted and measured.

These measurements are then used to evaluate community composition, biodiversity, and produce size-frequency distributions of each population of coral species within the quadrant. In-situ quadrat methods count and size organisms, estimate two-dimensional and three-dimensional percent coral cover, and estimate biodiversity.

In summary, DoD believes that the photographic percent coral cover method, with added rugosity data, is sufficient for the programmatic decision to locate the aircraft carrier transient berth on Guam and to support selection of a specific transient berth. In response to concerns raised by the resource agencies, Navy has voluntarily agreed to conduct additional studies that will be used to further inform the subsequent selection of a specific site for the aircraft carrier transient berth and any required CWA and RHA permits for the selected site.

4.7 WATERSHED ASSESSMENT SURVEYS

Sedimentation and run-off from non-point sources contribute to the degradation of coral resources located in coastal waters off Guam. Control of these sedimentation sources would remove suspended sediment from stream and stormwater flows. DoD sponsored field surveys of four watershed areas during the spring of 2010 as complimentary assessments to the offshore survey of coral habitat in southwestern Guam.

Rapid Watershed Assessments were conducted in the Ugum, Umatic, Tonguan and Geus watersheds to assist in the selection of potential upland mitigation sites and strategies within and near the Bolanos Conservation Area in southern Guam. The purpose of the upland mitigation within and near the Bolanos Conservation Area is to reduce sediment deposition into the marine environments of southern Guam. The Bolanos Conservation Area is a 2,850 acre parcel managed by GovGuam, Division of Aquatic and Wildlife Resources for hunting and outdoor recreation (e.g. hiking). The Bolanos Conservation Area comprises some of the upland portions of the study area's watersheds.

Information from these watershed assessment studies including proposed conservation projects that would reduce accelerated erosion and sedimentation within the four watersheds has been incorporated into the compensation options discussion included in Volume 4. The Final Rapid Watershed Assessment report is included in Volume 9 (Appendix) of the Final EIS.

4.8 STORMWATER MANAGEMENT PLANNING

A comprehensive drainage and low impact development (LID) implementation study was prepared for the proposed Finegayan main cantonment area, the preferred alternative. The LID study was to determine the pre- and post-development hydrology of the site and to determine the stormwater runoff quantities and qualities that would need to be accommodated. Utilization of LID would protect resource through reuse, treatment, and infiltration of stormwater runoff to reduce impact to Guam's natural resources including the underlying groundwater aquifer.

Storm water management requirements for the Finegayan installation include meeting Leadership in Energy and Environmental Design (LEED) for water quality and quantity. This would be best achieved by utilizing Best Management Practices (BMPs) that act to both meet volume and flow requirements and also provide high levels of water quality treatment.

Pre- and post development site hydrology was analyzed and compared using a two dimensional dynamic hydrologic/hydraulic model to obtain and compare the baseline existing stormwater runoff to the post-construction stormwater runoff. Post development hydrology was based on the Guam Joint Military Master Plan (GJMMP) and the notional grading plan.

BMPs, acting as on-site detention and storage systems, were placed in context of the GJMMP in almost all cases with little or no effect on the GJMMP. A number of drainage impacts associated with the GJMMP were identified and will allow LID planning to be tailored more precisely to reduce drainage

impacts. Existing drainage primarily flows overland and infiltrates into the natural ground. In as much as practicable, the proposed drainage scheme and infiltration schemes emulates the existing condition.

The Comprehensive Drainage and Low Impact Development Implementation Study prepared for the potential Main Cantonment site at Finegayan provides design recommendations for capturing, treating, and routing the 95% exceedance stormwater flows (NAVFAC Pacific 2010b). For storms greater than the 95% exceedance storm and up to the 50-year, 24-hour storm event, stormwater would travel through Integrated Management Practices/Best Management Practices (IMP/BMP) treatment trains before being directed to underground and open-air detention basins that would allow infiltration to groundwater. For each subbasin, water quality treatment strategies (treatment trains) were selected based on the effectiveness of IMPs/BMPs to treat identified pollutants of concern from proposed land uses within that subbasin. The selected water quality treatment strategies resulted in estimated total suspended solids (TSS) reductions of 83.7% to 90.3%, total phosphorous reductions of 9.4% to 49.9%, and total nitrogen reductions of 11.2% to 62.6% for the representative subbasins (NAVFAC Pacific 2010b). These results illustrate that use of IMPs/BMPs can achieve significant reductions to non-point source pollutant loads. Additional information on this study is included in Volume 9 (Appendix) of the FEIS.

Also included in this Final EIS is the Final Storm Water Implementation Plan for the Guam Road Network (May 2010). A copy of this Plan is included in Appendix G of Volume 9. The Plan is for the Guam Department of Public Works to implement these measures for federally funded projects related to the proposed actions included in this Final EIS. The Plan includes source control and a suite of treatment Best Management Practices for the various Guam Road Network project and addresses pollutants of concern, right of way constraints, maintainability, existing drainage infrastructure, proximity to wetlands, as well as existing treatment devices.

4.9 SUSTAINABILITY STUDIES FOR MAIN CANTONMENT

The DoN prepared a Sustainability Summary Report as part of the master planning process (NAVFAC Pacific 2010a). This report is included in Appendix N of Volume 9 and summarized in Volume 8 of the EIS. The foundations of the Sustainability Program are the federal mandates and targets related to energy, water, transportation, green building/LEED and greenhouse gas emissions. Each primary system – water, energy (building, district, renewable and public realm), green building/LEED, transportation, and ecosystem services – was optimized to achieve the maximum environmental benefit in the most cost-effective manner. By applying the Sustainability Program that meets the federal mandates, the baseline program achieves the following improvements: 30% energy use reduction, 26% water use reduction, 30% reduction of petroleum use in fleet vehicles, 7.5% of total energy from renewable sources, and 7.6% reduction of vehicle miles traveled, as well as a target of 34% reduction in greenhouse gas emissions. These reductions are applied to the analysis presented in Volume 6 of the EIS.

4.10 COMPLETED NATURAL RESOURCES SURVEYS

In order to assess the potential impacts to natural resources resulting from the relocation on DoD lands and non-DoD lands, a variety of natural resource surveys were conducted. These surveys included avian, butterfly, fruit bat, reptiles and amphibians (herpetofauna), marine waters, tree snail, and vegetation. The survey areas included specific locations on North Finegayan, South Finegayan, the FAA parcel, Orote Point, Inner Apra Harbor, Polaris Point, the Naval Munitions Site, Navy Barrigada, Andersen Air Force Base (AFB), Andersen South, Air Force Barrigada, the Route 15 parcel east of Andersen South, the Route

15 Valley, Access Road Option A for the southern Naval Munitions Site, Pott's Junction, and the Camp Covington Wetlands.

Additional work completed since the November 2009 DEIS includes avian, butterfly, reptiles and amphibians (herpetofauna), tree snail, and vegetation surveys along the proposed utility corridors on AAFB (three transects) and Navy Barrigada (one transect) and on Andersen South where Route 15 may be re-aligned (one transect), in-river and avian surveys at five bridges along Route 1 (Marine Corps Drive); fruit bat and Mariana swiftlet surveys in the area of the Route 15 lands, terrestrial surveys performed by NAVFAC at Polaris Point and AAFB Finegayan, and additional data on North Finegayan including avian, reptiles and amphibians (herpetofauna), tree snail, and vegetation for the additional 119 acre area (one transect) at Naval Computer and Telecommunications Station (NCTS) Finegayan.

The DoN also commissioned the USFWS and USGS to undertake natural resources surveys on Guam and several CNMI locations as part of this EIS. These studies are presented as four reports: 1) a report prepared by USGS that documents results from a biological assessment for the Pacific sheath-tailed bat that was undertaken in 2008 on Tinian and Aguiguan; 2) terrestrial resource surveys of Tinian and Aguiguan in 2008 done by USFWS; 3) small mammal surveys undertaken by USGS from 2005 to 2007 on Guam, Tinian, Rota and Saipan; and 4) avian surveys conducted by USFWS in 2008 on Tinian and Aguiguan. All of these reports and surveys were conducted to assess baseline abundance and densities and assess trends in population.

Information from these surveys has been used as natural resource baselines throughout the Final EIS. The full surveys are included in Appendix K of Volume 9 of this Final EIS.

4.11 WETLANDS REMOTE SENSING SURVEYS

Wetland areas within the vicinity of project alternatives were identified in the Draft EIS using best available information including maps of field delineated wetlands on military properties and National Wetlands Inventory mapping for non military properties. Field biologists also verified the location of wetland and waters of the United States for certain project alternatives. To further examine the possible presence of wetland areas, DoD has sponsored the preparation of maps using remote sensing and field verification of wetland areas within the vicinity of project alternatives. The remote sensing and field verification surveys of wetland areas were undertaken during the spring of 2010 between the publication of the Draft and Final EIS. DoD coordinated with both the U.S. Army Corps of Engineers and EPA during the wetlands remote sensing surveys.

Remote Sensing is the science and art of acquiring information (spectral, spatial, temporal) about material objects, area, or phenomenon, without coming into physical contact with the objects, or area, or phenomenon under investigation. The surveys used existing National GeoSpatial-Intelligence Agency imagery of Guam. The imagery depicts wetland characteristics such as heat by plant type and moisture of hydrology. The characteristics are "ground-truthed" by wetland biologists in the field using Geographic Positioning System devices to match the characteristics 'sensed' by the remote sensing imagery. The results are depicted on new project maps that portray the boundaries of any wetlands located in the vicinity of the proposed project alternatives. This process improves the level of detail for wetlands identification and aids in the discussion of the Least Environmentally Damaging Practicable Alternative provided in this EIS for the proposed military relocation program. However, it is also acknowledged that additional field surveys to fully delineate and assess value and functions of wetlands and waters of the U.S. would be needed during the Section 404 permitting stage of the proposed project.

Updated wetland maps and related information have been included in the water resources chapters of the various Volumes. The full Wetlands Remote Sensing Surveys are also included in Volume 9 of this EIS.

4.12 LAND ACQUISITION INFORMATION

A Land Acquisition Baseline Report was compiled, which provides basic real estate and land use data for the various parcels of land to be potentially acquired. That Baseline Report is available in Volume 9 Appendix F and information from the Report has been added to Chapter 8 of Volume 2.

Information from the Land Acquisition Baseline Report was also used to perform Economic and Sociocultural impact analysis; these analyses have been added to Chapter 16 of Volume 2, as well as the Socioeconomic Impact Assessment Study (SIAS), which is also available in Volume 9 Appendix F.

Land acquisition type has not yet been determined, is subject to negotiations with land owners, and is subject to Congressional funding and approval. The Department of Navy has no intent to use eminent domain (condemnation) as means to acquire property and will seek to work cooperatively with landowners, both public and private. It is anticipated that acquisition of real estate ownership would involve either:

- Negotiated purchase (including cash purchase or land exchange)
- Long-term leasing

While the government is authorized to acquire property through its powers of eminent domain (condemnation), it has been the consistent policy of the Department of the Navy to acquire real estate through negotiation with owners. Use of the condemnation process may be necessary even with willing sellers in order to clear problems with title.

In certain cases, most notably in conjunction with the training ranges, it may be necessary for DoD to acquire additional land outside of the proposed boundaries noted in the Baseline Report, in order to avoid severing a unitary land holding.

Responses to comments concerning land acquisition are noted in Volume 10 and can be summarized in this manner: The DoN is required to comply with federal land acquisition law and regulations, which includes the requirement to offer just compensation to the owner, to provide relocation assistance services and benefits to eligible displaced persons, to treat all owners in a fair and consistent manner, and to attempt first, in all instances, acquisition through negotiated purchase. Information regarding the main regulation on Federal land acquisition, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended, is available in Volume 2, Chapter 16.

4.13 CEQ DRAFT MONITORING GUIDANCE AND GUIDELINES ON GLOBAL CLIMATE CHANGE

Council on Environmental Quality (CEQ) drafted a *Guidance for NEPA Mitigation and Monitoring* (February 18, 2010) that outlines three goals to improve agency mitigation and monitoring. These goals and Final EIS consistency with these goals are summarized as follows:

1. *Proposed mitigation should be considered throughout the NEPA process. Decisions to employ mitigation measures should be clearly stated and those mitigation measures adopted by the agency should be identified as binding commitments to the extent consistent with agency authority and reflected in the NEPA documentation and any agency decision documents.*

The Final EIS, Volume 7, Chapter 2 includes a summary table of mitigation measures proposed in Volume 2 through 6. Mitigation measures coordinated with agencies continue to evolve as regulatory agency consultations and permit application reviews (i.e., Biological Opinions, Programmatic Agreements, etc.) proceed. The Final EIS proposes mitigation measures to reduce or avoid environmental impacts identified during the NEPA environmental review process; however, the Final EIS and NEPA environmental review process does not commit the DoD to the proposed mitigation measures. Commitment to a mitigation measure would be established in the Record of Decision (ROD), which is informed by the Final EIS. Environmental requirements can also change or emerge post-ROD as a result of agency consultations and coordination, permit conditions, and new laws, regulations, and policies.

2. *A monitoring program should be created or strengthened to ensure mitigation measures are implemented and effective.*

A Post-ROD Mitigation Monitoring Plan would be developed with the ROD to track the implementation of mitigation measures committed within the ROD. Naval Facilities Engineering Command Marianas (NAVFAC MAR) would ultimately be responsible for preparing and implementing the post-ROD monitoring plan. As a matter of policy, the DoN adaptively manages its construction programs to monitor the effectiveness of mitigation measures and adjusts them as necessary to improve effectiveness during and after construction (CNO 2007, CMC 2008).

3. *Public participation and accountability should be supported through proactive disclosure of and access to agency mitigation monitoring reports and documents.*

Mitigation measures committed to by the DoD will be published in the ROD. The DoD intends to work collaboratively with members of the public and agencies throughout implementation of the proposed action and mitigation measures. Many of the mitigation measures proposed in this Final EIS were recommended or coordinated with agencies or recommended to the DoD in comments. Virtually all monitoring reports and documents are available to the public and access is provided under the Freedom of Information Act (FOIA), within a reasonable timeframe, upon request to DoD public affairs or community planning and liaison offices. Additional information on mitigation and monitoring is presented in Volume 7, Chapter 2.

A *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* was issued by CEQ on February 18, 2010. The greenhouse gas emissions associated with the proposed actions are described in Volume 6. The potential effects of proposed GHG emissions are by nature global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. Climate change could result in impacts to marine resources, aquifers and waterfront facilities. The potential cumulative impact of the proposed action in conjunction with these climate change impacts are described in Volume 7, Chapter 4.

4.14 INTRODUCTION TO INDIRECT AND INDUCED IMPACTS ON DEVELOPMENT

Sections 4.15 and 4.16, below, discuss the impacts of indirect and induced development that would be expected as a result of the proposed action. While these sections are focused on growth and development, for purposes of clarity in these sections, it is important to explain how the classifications of indirect and induced were determined. In contrast to Volume 1, Table 2.1-2 (above) and the Socioeconomic and General Services section of Volume 7 which are based on economic factors, the most important factor to consider in classification of indirect and induced development is the expected location of population.

The three major locations people are expected to reside are on-base, in workforce housing, and on the regular Guam housing market – determinations of direct, indirect and induced development are thus classified according to these locations:

- Direct – Development that would occur from population that would live in on-base housing. This population includes military personnel and the dependents of military personnel. Development of on-base facilities is discussed thoroughly in the EIS and is not repeated in this chapter.
- Indirect – Development that would occur from population that would live in workforce housing. Only H-2B workers are considered in this population; however, it is expected that some other temporary construction workers would reside in workforce housing.
- Induced – Development that would occur from population that would live in housing provided by the Guam housing market. This population set includes civilian military workers, non-H-2B construction workers, and all other workers employed in jobs that would be generated by economic activity related to the proposed action and the dependents of these groups.

Section 4.15 focuses on indirect development – the development of workforce housing. It identifies potential sites and potential environmental impacts of the development of these sites.

Section 4.16 focuses on induced development by, first estimating the need for additional housing in the off-base communities on Guam and, secondly, by estimating how many businesses and jobs would be created. (It should be noted, that development of commercial properties would be caused by direct, indirect and induced populations but since it would occur off-base, it is classified as induced development.)

4.15 WORKFORCE HOUSING: AN INDIRECT IMPACT OF THE PROPOSED ACTION

As described in this Volume, Section 2.7.1, the magnitude and schedule of the construction of facilities to support the proposed action would require more labor than Guam residents can provide. Workforce housing was described in the Draft EIS in Volume 2, Chapter 16 Socioeconomics. A table and figure of potential workforce housing sites were provided. In addition, workforce housing was described in DEIS Volume 6, Related Actions as a related action. Related actions, as defined in 40 CFR 1508.25, are actions that are closely related to the proposed action. Such actions automatically trigger other actions that have environmental impacts, cannot or would not proceed unless other actions have been taken previously or simultaneously, or are interdependent parts of a larger action and/or depend on the larger action for their justification. If not for the proposed actions, then the related action would not occur.

The Final EIS discusses workforce housing as indirect impacts rather than related actions. Chapter 16 of Volume 2, Socioeconomics, addresses the indirect impact of workforce housing and other induced populations on socioeconomics. The analysis is also presented in the Socioeconomic Impact Analysis Study, which is attached as Volume 9, Appendix F to this Final EIS. Volume 6 also assesses the effects of workforce population and other induced population on utilities as indirect impacts. In addition, estimates on the demands for potable water, wastewater, power and traffic include the needs of the workforce housing and induced population as well as the direct population associated with the proposed military relocation program on Guam. The indirect impacts of the workforce housing proposals on other resources are consolidated in this section rather than dispersed throughout Volume 2. The Chapter 4 of Volume 7, Cumulative Impact Assessment, also includes the workforce housing proposals.

DoD would not provide workforce housing, but DoD construction contracts would require the contractor to accommodate the workforce in accordance with specified health and safety standards. More detail on

induced growth is presented in below in Section 4.16. Various proposals are being developed by potential contractors in anticipation of being awarded a Navy contract.

As addressed below in Section 4.15.4, several of the applications for development of workforce housing have received approval from GovGuam land development regulatory authorities and several were still under review. All temporary workforce housing land use permits are for temporary land uses. One workforce housing project has begun construction. It is likely that additional projects would begin in advance of the Record of Decision.

There are two mitigation measures that could be applied to the construction phase that would reduce the on island population and potentially reduce the number of workforce housing sites required. Both are discussed in Section 4.17 below.

Currently, there are no plans to allow contractors to locate workforce housing on DoD controlled land. Therefore, it is anticipated that should workforce housing needs require the construction of new housing, such workforce housing would be located on either private or GovGuam lands.

4.15.1 Conditions to be Met by Operators of Work Force Housing

The DoN and GovGuam acknowledge the potential impacts of the influx of transient workforce. They share the goal of mitigating potential impacts of the transient workforce to the extent practical. The basic goals for workforce housing projects to meet the GovGuam and DoN minimum standards are as follows (NAVFAC Pacific 2009b):

- provide safe, sanitary and adequate living conditions for all workers;
- provide adequate health care for all workers;
- provide safe, sanitary and healthy food supply/dining conditions for all workers;
- implement a transportation management plan that minimizes impacts on public roadways; and
- maintain protection of all personnel and property.

It is the responsibility of the contractor to demonstrate it can meet these basic requirements. GovGuam would attach conditions to Guam Land Use Commission (GLUC) land use approvals. Specific provisions of DoN construction contracts also would include the basic requirements listed above. However, DoD has no decision-making authority on the current proposals for construction workforce housing, and the Record of Decision would not endorse any specific proposals for workforce housing.

4.15.2 GovGuam

4.15.2.1 Guam Land Use Commission

Guam Land Use Commission Resolution No. 2009-01 (March 26, 2009) and accompanying guidelines establish that housing facilities for temporary workers (workforce housing) are a conditional land use, which is permitted within Light Industrial land use zones. The conditional use permit must be approved by the GLUC. The following are standard conditions attached to the permit, but others can be imposed by GLUC.

- Initial term is 2 years, with possible annual reviews thereafter.
- Project must have an adequate sanitary sewer system and adequate fire flow.
- Project shall comply with all health and safety regulations of GovGuam and U.S. Occupational Safety and Health Administration standards.
- Project shall have perimeter fence 6 ft (1.8 m) in height and be subject to a landscape plan.

- Project must include a development plan with specific design parameters for sleeping, toilet and shower facilities, laundry services, food services, security, medical care, transportation services and recreation areas.

4.15.2.2 Guam Department of Labor

The GovGuam Department of Labor Alien Labor and Processing & Certification Division requires a Temporary Labor Certification to petition for the use of H-2B workers with the Department of Homeland Security. Per 8 CFR 214.2 the Governor of Guam has authority to issue Temporary Labor Certifications for job opportunities on Guam.

The employers are required to demonstrate that qualified, able U.S. workers were not available. Guam Administrative Rules 17, Chapter 7, Temporary Alien Workers must be met.

A non-refundable fee of Two Hundred Dollars (\$200) is to be paid to the Department of Labor upon the registration of any Temporary Alien Worker to be employed by an employer on Guam. If such registration is for a period of less than one year, the amount of this fee is to be prorated to the amount necessary to cover that portion of a year for which the registration is made.

There is currently a non-refundable yearly foreign labor fee of \$1,000 per worker that Contractors must pay. The funds collected make up the Manpower Development Fund, which is used to train Guam's local workforce in highly skilled jobs.

4.15.3 Department of the Navy Contract Provisions for Foreign Workforces

DoD would rely on construction contractors, who have significant expertise in the areas of workforce housing and logistics, to support temporary foreign worker housing requirements. While GovGuam and federal agencies would retain their authority to conduct inspections and enforce laws, DoD contract provisions would require quality control, oversight and the hiring of contractors with proven track records. Well thought-out plans related to workforce housing, including quality of life requirements, would be given award preference. Contract provisions would also include requirements to provide workforce medical, dining, transportation and safety/security. There would be health screenings of all workers to reduce health risk to the Guam population. Contractors would be required to provide health care either by supplementing local Guam staff and resources or building their own clinic.

Each of the applicable requests for proposals (RFP) has an evaluation factor for Workforce Housing and Logistics. The RFP requires the potential Contractor (Offeror) to meet the following conditions.

4.15.3.1 General Conditions

Submit a comprehensive narrative plan to address the housing requirements under the responsibility of the Offeror and all prospective subcontractors, and include the following as a minimum.

- Explain the means and methods of providing temporary resident workers housing and discussion on how these facilities would minimize impacts to the local community.
- Provide maps/plans of the location of temporary resident worker housing facilities and the number of living quarters at each location.
- Provide a discussion showing that the housing facilities meet the GovGuam regulations/policies and any contemplated contractual arrangements/agreements with housing providers, permits or other documentation that support the Offeror's housing plan demonstrate a complete understanding and ability to successfully manage the proposed housing requirements.

- Provide workforce housing facilities for temporary resident workers with appropriate contractual board and lodging agreements with its workers and/or workers' representatives. Provide secure, adequate, clean, and healthy housing in accordance with 29 CFR 1910.142 and all statutes and regulations of the U.S Federal Government and/or GovGuam in effect on the date of award of the contract or thereafter promulgated by the aforementioned governmental authorities.
- Obtain all permits, licenses or other authority required by the statutes and regulations of the U.S Federal Government and/or GovGuam to construct or otherwise furnish facilities necessary for the safe and adequate housing of the Contractor's temporary resident workers employed in the performance of the work required by the contract.

4.15.3.2 Medical Care

Submit a comprehensive narrative plan to address the medical services requirements under the responsibility of the Offeror and all prospective subcontractors, and include the following as a minimum.

- Explain the means and methods of performing pre-deployment physical condition and general health screening for all workers equal to GovGuam pre-employment standards and requirements (i.e. tuberculosis test, chest x-ray, blood pressure, dental exam, etc.).
- Explain the means and methods of providing medical services and/or facilities to minimize impacts to the local medical community.
- Explain the means and methods of providing routine and emergency medical services at the work sites and temporary resident workforce housing.
- Assure that staffing, personnel assignment and other human resources practices result in development and maintenance of a healthy Contractor and Subcontractor workforce employed in the performance of the contract in accordance with all statutes and regulations of the U.S Federal Government and/or the GovGuam in effect on the date of award of the contract or thereafter promulgated by the aforementioned governmental authorities. Perform health care activities in accordance with 10 Guam Code Annotated, Chapters 84 - 96 – Guam Health Act; 25 Guam Administrative Rules (G.A.R.) Chapter 6 – Guam Board of Nurse Examiners; 25 G.A.R. Chapter 11 – Guam Board of Medical Examiners; 26 G.A.R. §§ 4401, et seq., Health Certificate Regulations, and 26 G.A.R. §§ 6200, et seq., Ambulance and Emergency Medical Technician.
- Perform worker pre-deployment physical condition and general health screening for all deployed workers equal to GovGuam pre-employment standards and requirements prior to their departure to Guam. At a minimum, said screening shall include a tuberculosis test, chest x-ray and medical evaluation, blood pressure, dental exam, and other medical tests as necessary to ensure that each worker's health status prior to deployment to Guam for work on the Government contract is adequate for performance of the activities to which the worker will be assigned giving consideration to the climatic and other physical elements to be experienced on Guam. This requirement shall not apply to managerial, specialized technical and administrative Contractor and Subcontractor workers and consultants visiting Guam for business purposes for periods of 14 calendar days or less.
- Ensure that each Contractor worker deployed to work on Guam for a period in excess of 14 calendar days shall be covered by either commercially purchased health and medical care insurance or Contractor self-furnished health and medical facilities for the entire duration of the worker's or consultant's deployed assignment. The Contractor shall effect appropriate contractual agreements with its workers and/or workers' representatives that require such workers to accept the Contractor's insurance plan coverage and/or use of the Contractor furnished medical facilities.

To the extent possible and cost effective, consider purchasing insurance and health care from established and reputable agencies rather than providing health care. The minimum insurance plan coverage and/or medical facilities furnished by the Contractor shall be as follows:

- Emergency Medical Care - initial outpatient treatment, including related diagnostic service, of the sudden and unexpected onset of a medical condition which has severe symptoms. If immediate medical attention is not obtained, the symptoms could result in serious and permanent medical consequences. Examples of such symptoms are severe chest pains, convulsions or persistent, severe abdominal pains.
- Primary Health Care - services typically included represent the full spectrum of organizations which provide care services to the population of focus. The services should include care for chronic diseases, preventive and screening services, and acute care delivery in the outpatient setting; as well as health promotion services delivered through an inter-professional team.
- Prescription Drugs - drugs or medicines that require a doctor's signature to dispense and are approved by the U.S. Food and Drug Administration for use in treating the sickness or injury for which they are prescribed.
- Comply with U.S. Government Occupational Safety & Health Administration standards and requirements (29 CFR 1910, et seq. - Occupational Safety & Health Standards). Provide medical care at the worksites during all work operations in accordance with U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1, dated 15 September 2008, and effective 12 January 2009 (EM 385-1-1), Section 3 Medical and First-Aid Requirements. At least two employees on each shift shall be qualified to administer first-aid and CPR when a medical facility or physician is not accessible within 5 minutes of an injury to a group of two or more employees. Worksites for which fewer than 100 persons are employed (greatest number of employees on a shift), and where neither a first-aid station nor an infirmary is available, shall be provided with a first-aid kit complying with ANSI Z308.1. There shall be one first-aid kit for every 25 (or fewer) employees. Worksites for which more than 99 and fewer than 300 persons are employed (greatest number of employees on a shift), shall establish and equip, as directed by a Licensed Physician (LP), a first-aid station. Worksites for which 300 or more persons are employed (greatest number of employees on a shift), shall establish and equip, as directed by a LP, an infirmary. The type of facilities, equipment, and qualified personnel provided at the first-aid station and infirmary shall comply with EM 385-1-1.
- Certify that each (1) deployed worker had a pre-deployment physical condition and general health screening and (2) each worker has a contractual agreement to accept the Contractor's insurance plan coverage and/or use of the Contractor furnished medical facilities.

4.15.3.3 Orientation Programs

- Ensure all personnel receive and acknowledge receipt of a safety, security and anti-terrorism briefing the content of which shall be consistent with inherent safety, security and anti-terrorism requirements of the project(s) to which the person will be assigned. The content of the personnel briefing for each project shall be approved by the Contracting Officer. Updated and refresher safety, security and anti-terrorism briefings will be conducted as directed by the Contracting Officer.
- Provide cultural resource awareness training.
- Provide environmental protection awareness training (proposed as mitigation for this EIS).

- Provide invasive species awareness training (proposed in Biological Assessment).

4.15.3.4 Lodging and Food

- Comply with Guam regulations. For example, if an employer certifies more than five such workers on Guam, it must make lodging and board available that complies with the details set out in the regulations. Guam regulations provide for deductions from the H-2B employee's pay (currently up to \$80 per week without itemization) to allow the employer to recover costs for lodging, board and personal hygiene needs of the employee. There is a minimum space allowance for sleeping areas.

4.15.3.5 Transportation

- Comply with Guam regulations that require employer to provide transportation to/from the worksite.
- Submit a comprehensive narrative plan to address the workforce transportation requirements under the responsibility of the Offeror and all prospective Subcontractors, and include as a minimum:
 - Provide maps/plans for travel routes to and from the worksites and discussion on how these travel routes will minimize impacts to the local community.
 - Provide travel schedules (times of day) to and from the worksites and discussion on how these schedules will minimize impacts to the local community.
 - Provide means and methods to reduce vehicle travel to and from the worksites to minimize impacts to the local community.
 - Provide safe, secure and adequate transportation services for temporary resident workers to and from temporary resident workforce housing facilities and worksites to accommodate work schedules including multiple work shifts or non-standard work shifts. Work performed must comply in all respects with all statutes and regulations of the U.S. Federal Government and/or the GovGuam in effect on the date of award of the contract or thereafter promulgated by the aforementioned governmental authorities.
 - Ensure basic transportation services are provided between temporary resident workforce housing facilities and available emergency shelter facilities during emergency events (man-made or natural disasters).
 - Ensure necessary vehicle and equipment inspection(s) and registration as well as operator licenses and permits are obtained and maintained current throughout the performance of the contract in accordance with all statutes, rules and regulations of the U.S. Federal Government and/or the GovGuam.

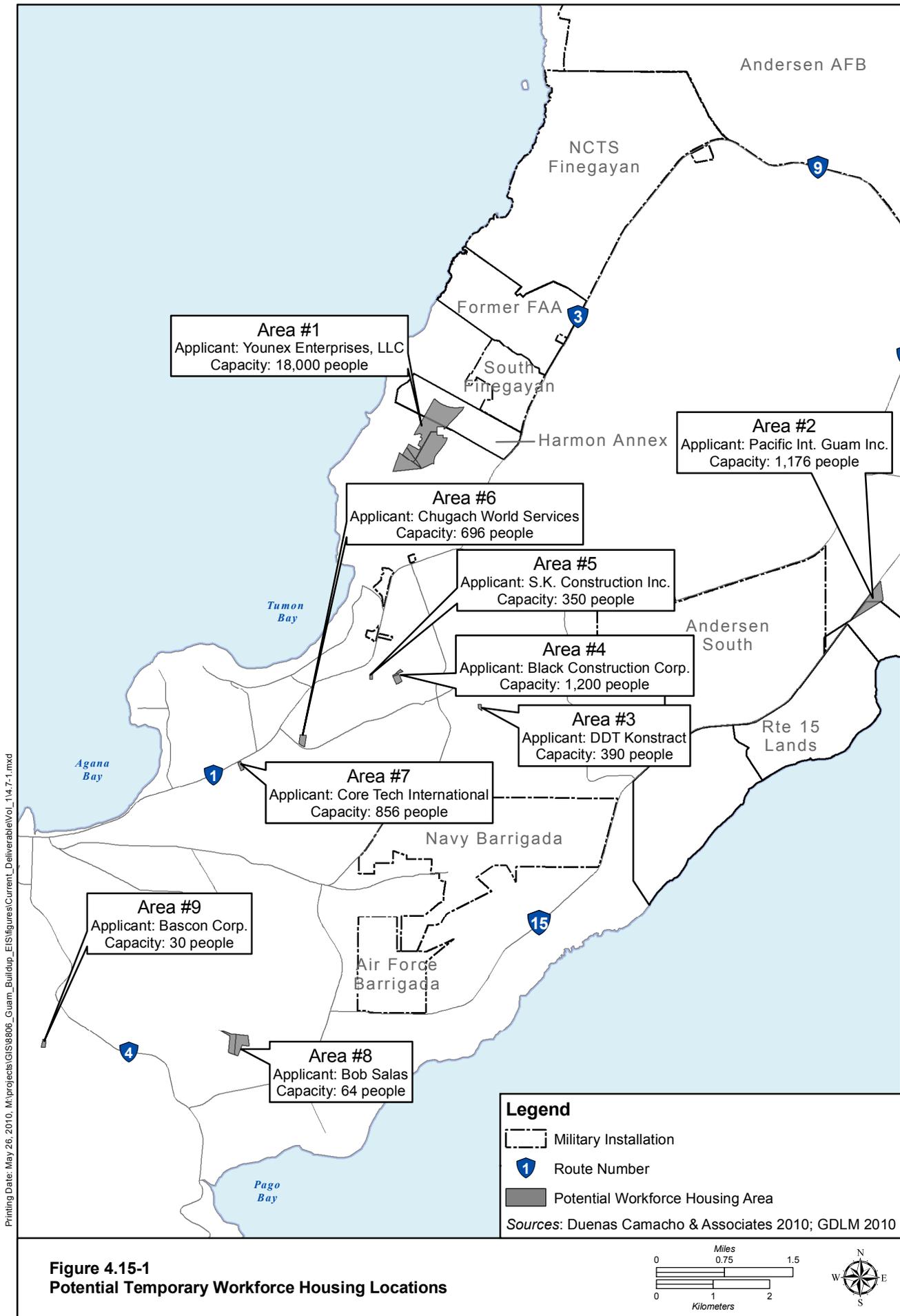
4.15.4 Workforce Housing Proposals

This section of the Final EIS provides an additional assessment of Workforce Housing by resource area. Table 4.15-1 lists the current permit applications and status for workforce housing areas as of May 2010. Figure 4.15-1 shows the nine areas in relation to the military facilities on Guam. Aerial photos for each site are provided in Figures 4.15-2 through 4.15-9. Younex Enterprises, LLC began construction at Site #1 in May 2010.

Table 4.15-1. Current and Future Locations of Temporary Workforce Housing

	<i>Guam Land Use Commission Case #</i>	<i>Applicant</i>	<i>Legal Lot Description</i>	<i>Municipal District</i>	<i>Location</i>	<i>Current Zone</i>	<i>Status</i>	<i>Capacity (people)</i>
1*	2009-56	Younex Enterprises, LLC	L10184 & L5039	Dededo / Tamuning	North	"M-1" (Light Industrial)	Approved by GLUC 10/29/2009	18,000
2	2010-22B	Pacific Int. Guam Inc.	L7024-R5	Yigo	North	"A" Rural	Currently being processed	1,176
3	2009-093B	DDT Konstract	L5224-6-2	Barrigada	Central	"A" Rural	Approved by GLUC 4/8/2010	390
4	2009-78	Black Construction Corp.	L5161-1-1 & -1-R15	Tamuning	Central	"M" (Light Industrial)	Approved by GLUC 2/25/2010	1,200
5	2009-94	S.K. Construction Inc.	L5106-5-NEW	Tamuning	Central	"M" (Light Industrial)	Currently being processed	350
6	2010-18	Chugach World Services Inc.	L5148-REM-EAST-1	Tamuning	Central	"M" (Light Industrial)	Currently being processed	696
7	2010-19	Core Tech International	L2103-1A-1	Tamuning	Central	"M" (Light Industrial)	Currently being processed	856
8	2008-53	Bob Salas	L3462 & 3474	Mangilao	Central	"A" Rural	Currently being processed	64
9	2008-72	Bascon Corp.	L3278-2	Ordot	Central	"R-1" (Single-Family Dwelling)	Currently being processed	30
								22,762

*Note: As of May 13, 2010 Younex reported to the GLUC that they have lowered their planned number of units to a maximum of 14,000.



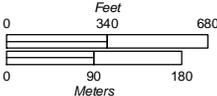
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Figure 4.15-1
Potential Temporary Workforce Housing Locations



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Figure 4.15-2
Temporary Workforce Housing Site 1 Aerial Photo



Legend
 Harmon Annex Boundary
 Potential Workforce Housing Area
 Sources: Duenas Camacho & Associates 2010; GDLM 2010

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Figure 4.15-3
Temporary Workforce Housing Site 2 Aerial Photo

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Figure 4.15-4
Temporary Workforce Housing Site 3 Aerial Photo

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Figure 4.15-5
Temporary Workforce Housing Site 4 & 5 Aerial Photo

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Figure 4.15-6
Temporary Workforce Housing Site 6 Aerial Photo

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Figure 4.15-7
Temporary Workforce Housing Site 7 Aerial Photo



Figure 4.15-8
Temporary Workforce Housing Site 8 Aerial Photo

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Figure 4.15-9
Temporary Workforce Housing Site 9 Aerial Photo

4.15.5 Indirect Impacts of Workforce Housing Projects and Population

The Final EIS considers workforce housing an indirect impact of the proposed military relocation, specifically the Marine Corps proposed actions. This section qualitatively assesses the impact of this indirect impact. The resource areas are the same as those assessed in Volumes 2 through 6. Workforce Housing is likely to have less than significant impacts on the following resource areas: Airspace and Marine Transportation. The development and operations of these proposed Workforce Housing projects would be subject to the environmental regulatory oversight of GovGuam as well as the conditions of the contract provisions as referenced above. Beyond the contract provisions referenced, DoD does not have the authority or responsibility for environmental regulatory oversight of workforce housing projects as they would be located on non-DoD property.

4.15.5.1 Geological and Soil Resources

The proposed workforce housing sites are located in areas of northern and central Guam that have for the most part been previously developed. Due to the relatively moderate footprint of most of the workforce housing site proposals, minimal disturbances to soil, topography, and geologic resources are expected. Construction activities would implement BMPs in accordance with GovGuam regulations to ensure that impacts are minimized. A description of the standard BMPs and resource protection measures required by GovGuam regulatory mandates can be found in Volume 7 of this Final EIS. Enforcement of these BMPs and resource protection measures must be part of the GovGuam land use regulatory process. Implementation of measures such as re-vegetation as soon as possible after any ground disturbance or grading, and minimizing construction and grading during times of inclement weather would prevent erosion, thus there would be minimal impacts from soil erosion. Soil types disturbed can be found in Table 4.15-2. A more detailed description of each soil type can be found in Volume 2. Soil erosion is primarily a concern for discharge into surface or near-shore waters that are not located near the proposed workforce housing sites. There are no known sinkholes in the vicinity of the proposed workforce housing sites, however, if found, sinkholes should be avoided and a buffer zone of vegetation should be left around it as a mitigation measure to prevent further erosion or expansion. Hazards associated with earthquakes, fault rupture, and liquefaction should be minimized by adherence to UFC 3-310-04 Seismic Design for Buildings (USACE 2007). Both construction and operation of proposed workforce housing would result in less than significant impacts to soil and geologic resources.

Table 4.15-2. Soil Types at Workforce Housing Sites

<i>Workforce Housing Area</i>	<i>Soil Type</i>
Area #1	Guam Cobbly Clay Loam
Area #2	Guam Cobbly Clay Loam and Ritidian-Rock Outcrop Complex
Area #3	Guam Cobbly Clay Loam
Area #4	Agfayan Clay
Area #5	Agfayan Clay
Area #6	Agfayan Clay
Area #7	Agfayan Clay
Area #8	Pulantat Clay
Area #9	Pulantat Clay

4.15.5.2 Water Resources

Construction associated with the proposed workforce housing would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. For construction sites that disturb one or more acres, a Construction General Permit would be obtained and followed and a Storm Water Pollution Prevention Plan (SWPPP) would be prepared and implemented in accordance with GovGuam

regulations. The SWPPP would identify construction-specific BMPs that would be implemented as part of construction activities to reduce the potential for erosion, runoff, sedimentation, and subsequent water quality impacts. For sites that disturb less than one acre, impacts to water resources would be minimal; water quality protection measures (i.e., BMPs) should also be implemented for these sites as practicable). A description of the standard BMPs and resource protection measures required by GovGuam regulatory mandates can be found in Volume 7 of this EIS. In addition, Guam Soil Erosion and Sediment Control Regulations would need to be followed to further reduce potential impacts.

New workforce housing would increase the amount of impervious area, resulting in an associated but relatively minor increase in stormwater discharge intensities and volume. This small increase would be accommodated by existing or new stormwater infrastructure and could result in minor increases in pollutant loading to water resources. Runoff volumes and quality would continue to be similar to existing conditions. There are limited areas of wetlands in central and northern Guam where the workforce housing sites are proposed. Therefore, impacts to wetlands would not be expected to occur. Moreover, several of the sites have been previously developed with little vegetation or other natural features remaining on site. Overall, impacts to water resources would be less than significant.

4.15.5.3 Air Quality

Construction activities associated with earth disturbances occurring at the proposed workforce housing sites would result in indirect short-term air quality impacts. Given the relatively small footprint of these sites, the temporary impact would be less than significant. During the construction period, these housing sites would use power supplies provided under the preferred power alternative described in Volume 6 of this Final EIS. As discussed in Volume 6, power-related air quality impacts including those from the operations of these sites would be less than significant. Operational emissions from commute vehicles accessing workforce housing sites are considered in Volumes 2 through 6 of this Final EIS. These emissions are considered when the potential construction activity air quality impacts are assessed. According to the emissions assessment, the potential air quality impacts from overall construction activities, including those resulting from workforce commute vehicle operations, would be less than significant.

4.15.5.4 Noise

Noise impacts due to workforce housing would be due to construction activities and the traffic associated with the workers transported by shuttle buses from the housing area to the workplace. Noise associated with construction would be from the use of graders and excavators clearing and grading the property. Site areas 1, 2, 3, part of 4, 8, and 9 appear to be undeveloped and would require more grading activities. However, only Site 1 would be large enough to accommodate multiple pieces of construction equipment sufficient to create unacceptable noise levels approaching 75 dbA. Only two residences would be affected by elevated noise levels and each could be mitigated by project sequencing and using a minimum number of equipment at a time nearest the residences. All of the other sites would either be on previously developed parcels and would not require much grading or would be too small to fit a great number of excavators and/or graders on the site. Traffic noise impacts would be minor because the DoD requires contractors to provide “means and methods to reduce vehicle travel to and from worksites...” which could be met using bus transportation. Please also refer to this Volume, Section 4.15.5.12 for a discussion on roadways. Noise impacts associated with workforce housing would be considered less than significant.

4.15.5.5 Land and Submerged Land Use

None of the proposed workforce housing sites results in acquisition of land or submerged land by the federal government. Therefore, based on the land use criteria applied in the EIS for Volumes 2 through 6, there would be no impact to land or submerged land ownership as a direct consequence of the proposed action.

Once approved by GLUC, it is assumed the sites' land use zoning is consistent with GLUC Resolution No. 2009-01 (March 26, 2009). As construction workforce housing is for the proposed military relocation program, the proposed land uses are temporary. In addition, it is assumed the zoning is consistent with GovGuam future land use planning or is an acceptable variance for temporary use. Based on a review of the aerial photographs it appears sites 1, 2, 3, and 8 are greater than 75% vegetated open space. Sites 6 and 7 appear developed. Site 9 is approximately 50% developed and one lot (L5161-1-1) of Site 4 appears developed. The loss of open space could be considered a significant adverse land use impact when the surrounding land uses are largely vacant. Sites 1, 2, 3, and 8 would result in significant impacts due to loss of open space. The remainder of the sites that result in loss of open space would have a less than significant impact. Loss of open space in an area that is largely developed is less than significant. Proposed development of the sites does not appear to restrict access to adjacent properties; therefore, no land use access impacts are identified.

4.15.5.6 Recreational Resources

The presence of the workforce associated with the proposed relocation would produce similar effects on the recreational resources that Marines and their dependents would have on non-DoD properties throughout Guam (refer to Volume 2, Chapter 9). In particular, recreational resources in northern and central Guam would experience negative effects (e.g., crowding, deterioration of resources, competition for use/space, and etc.) associated with simply having more users on their resources. This includes effects to National Park Service units associated with the War in the Pacific National Historic Park. Increased visitation associated with direct, indirect, and induced population increases would affect park resources, values, facilities, and other users. Similar to the Marines and their dependents, heavier user presence is expected on weekends and holidays since workers would be working otherwise. The gradual arrival of the Marines and their dependents would enlarge the potential recreational user population, and this would exacerbate the negative effects experienced at these recreational resources.

4.15.5.7 Terrestrial Biological Resources

Area 1. The dominant vegetation consists of shrub/grasslands, scrub forest, and tangantangan. Although recovery habitat for Mariana crow, Mariana fruit bat, and Guam Micronesian kingfisher has not been identified within the area, approximately 65% of the site has been identified as potential Guam rail recovery habitat. The proposed development of Area 1 would result in significant impacts to Guam rail recovery habitat due to the size of the site and the additive loss of Guam rail recovery habitat under the proposed action. There would be no significant impacts to other terrestrial biological resources.

Area 2. The dominant vegetation consists of tangantangan, scrub forest, and limestone forest. Approximately 30% of the site has been identified as potential recovery habitat for Mariana crow, Mariana fruit bat, and Guam Micronesian kingfisher and approximately 50% is identified as potential recovery habitat for Guam rail. Due to the size of the site, the loss of the small area of potential rail recovery habitat with the potential land development would not result in significant impacts to terrestrial biological resources. There would be no significant impacts to other terrestrial biological resources.

Area 3. This area is currently completely surrounded by urban development and consists of disturbed non-native tangantangan forest. There would be no impacts to terrestrial biological resources with the development of Area 3 for workforce housing.

Area 4. This area is currently completely surrounded by urban development and consists of disturbed non-native tangantangan forest. There would be no impacts to terrestrial biological resources with the development of Area 4 for workforce housing.

Areas 5, 6, and 7. These areas are currently completely developed and there would be no impacts to terrestrial biological resources with the development of Areas 5, 6, and 7 for workforce housing.

Areas 8 and 9. Areas 8 and 9 are adjacent to currently developed areas and approximately 25% and 60%, respectively, of the sites is already developed. Vegetation consists of only scrub forest. Although recovery habitat for Mariana crow, Mariana fruit bat, and Guam Micronesian kingfisher has not been identified within the area, approximately 75% of Area 8 and 40% of Area 9 have been identified as potential Guam rail recovery habitat. Due to the size of the sites and their proximity to developed areas, the loss of potential rail recovery habitat with the potential development of Areas 8 and 9 would not result in significant impacts to terrestrial biological resources.

4.15.5.8 Marine Biological Resources

Construction associated with the proposed workforce housing would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation as described in the water resource section above and Volume 2, Chapters 4 and 11. Water quality protection measures (i.e., BMPs) would be implemented for these sites as required by GovGuam agencies for construction SWPPPs. A description of the standard BMPs and resource protection measures required by GovGuam regulatory mandates can be found in Volume 7 of this EIS.

The increase of impervious areas on some of the proposed workforce housing sites would result in an increase in stormwater discharge intensities and volume that may transfer to sedimentation impacts to the nearshore environment. However, given the existing limestone substrate, percolation of stormwater runoff would be high and, therefore, impacts from construction activities to the nearshore environment and marine biological resources would be less than significant and have no adverse effect on essential fish habitat (EFH).

The presence of the workforce population associated with the proposed military relocation would produce similar effects on the marine biological resources that Marines and their dependents would have on non-DoD properties throughout Guam (refer to Volume 2, Chapter 11 and Volume 7). In particular, indirect negative effects from increased recreational activities (high speed water craft/boating, fishing, tidal harvesting, diving, etc.) in the nearshore environment may be seen islandwide. Significant impacts to special-status species, such as sea turtles, and the coral reef ecosystems may occur from increased use of this resource by construction workers; the magnitude of impacts is directly related to the increase in recreational use. Damage to reefs may be long-term if caused by anchors, reef-walkers, or reckless dive or snorkel activities, resulting in an adverse effect on EFH.

4.15.5.9 Cultural Resources

Significant adverse impacts to historic properties could result from construction at the workforce housing sites proposed by private sector applicants. Ground excavation and soil removal associated with this construction could disturb historic properties. The addition of workforce personnel in the area could increase accidental damage or unauthorized collecting. This is especially of concern at workforce housing

site Area #1, which is located near the coast. This coastal area contains a number of historic properties. Construction of additional workforce housing could also require the removal of natural resources of cultural concern. These impacts and proposed mitigation measures under NEPA are also addressed in Volume 7 under cumulative impacts. Proposed mitigation measures for these impacts include avoidance of sites found during initial surveys or data recovery if avoidance is not possible. To mitigate for cumulative impacts, DoD would assist the Guam and CNMI SHPO with the five-year updates of their respective Historic Preservation Plans (HPP) (see a discussion of cumulative impacts in Volume 7, Chapter 4. The curation of archaeological collections for non-DoD properties would be at the Guam Museum.

The National Park Service has expressed concern that the induced growth resulting from the influx of construction workers would overwhelm National Park Service and National Historic Landmark resources. However, plans would be made to minimize impacts to the local community from increases in population.

The National Park Service has consulted with the Advisory Council on Historic Preservation and the Guam State Historic Preservation Office regarding the large-scale increase in permit requests for implementation of projects in the next decade. The overall workload at the Guam State Historic Preservation Office has been significantly streamlined through consultations related to the existing Programmatic Agreement. The DoD is pursuing a cultural resource agreement for DoD projects that would further streamline the review process. This action would help offset the increase in permit reviews by private developers.

4.15.5.10 Visual Resources

Construction of the workforce housing would alter the visual character of the proposed locations, but the degree of alteration is expected to be minimal. This is because some of the workforce housing is proposed in urban infill areas (Areas 4, 5, and 7—Black Construction Corporation, S. K. Construction, Inc., and Core Tech International, respectively). Completion of these projects would achieve compatibility with the existing surrounding development; therefore, these projects would have the effect of enhancing the visual character of the proposed locations. In some instances, construction of the workforce housing would facilitate the urbanization of the existing areas. These locations include Areas 3, 6, 8, 9—DDT Konstruct, Chugach World Services, Bob Salas, Bascon Corporation, respectively. For Area 2—Pacific International Guam Inc.—the construction of workforce housing would substantially alter the visual character in this predominantly open space location. The workforce housing proposed in Area 1 abutting the Harmon Annex would substantially alter the visual character of the location as well; the construction of the facility would trigger the beginning of the urbanization of the proposed Main Cantonment location (however, as stated above, it is assumed that any workforce housing development must satisfy GovGuam zoning and land use conditions and be approved by GovGuam in order to proceed).

4.15.5.11 Socioeconomics and General Services

Volume 2, Chapter 16 provides the impact assessment of workforce housing. In summary, the location of the specific sites has minimal impact. Construction of the sites would provide beneficial impacts through construction jobs. The primary socioeconomic impacts are related to the increase in on-island population. Significant adverse impacts are identified due to strains placed upon government services and the social fabric resulting from differences in norms and customs between longtime Guam residents and foreign workers or Freely Associated States (FAS) in-migrants arriving on Guam for jobs. Additional impacts from population growth are discussed in Volume 2, Chapter 16.

4.15.5.12 Utilities and Roadways

Utilities

The basic four utilities of power, water, wastewater and solid waste would experience differing impacts from the establishment of a workforce housing facility, but they would not be location dependent, except for wastewater, which may flow to different wastewater treatment plants. Thus the analysis presented is applicable to all nine sites. Below is a brief discussion of the expected impacts of the workforce housing facilities for each of these utilities. For a more in depth evaluation of utility impacts from the proposed DoD relocation, including all projected population increases, see Volume 6 of this Final EIS.

Power

Power is provided by GPA via an island-wide power system. The analysis of the GPA system predicts that by adoption and implementation of the preferred power alternative, adequate power supplies would be available in sufficient time to support all of the various current proposals for workforce facilities. Localized upgrades to transmission and distribution systems would need to be provided by GPA and the developer for all of these locations in order to deliver the required power to the facilities. The financial and technical capabilities of GPA are deemed adequate to successfully provide the required infrastructure to deliver power to any or all of the currently proposed workforce housing facilities. Therefore, impacts of workforce housing on the power utility are assessed as less than significant.

Potable Water

Potable water is provided by GWA via an island-wide water system. Currently the water systems of GWA are considered barely adequate to meet current demands (see Volume 6 for detailed utilities analysis). Some of GWA's groundwater extraction wells have experienced increasing salinity and pumping from these wells has been ceased to allow the aquifer to locally relax and restore the fresh water/salt water separation. DoD has their own water system, which currently has excess water production capacity. As discussed in Section 4.3.2., above, DoD has been meeting with GWA and has established a draft memorandum of agreement for cooperation in use of water resources, including the transfer of excess DoD system water to GWA via current and proposed interconnections between the two systems.

However, the GWA distribution system is substandard and may not be able to adequately deliver this additional water. Depending on the location of the selected workforce facilities, the localized GWA distribution system may require new facilities, upgrades, and/or repair. DoD does not know enough specifics of the GWA water system to evaluate in detail which workforce housing facility locations would face the largest challenges in providing adequate water service. However, the proposed DoD interconnects to the GWA water distribution system would minimize impacts by more efficiently delivering water through the DoD water transmission system to areas where water is needed vice using the inadequate GWA distribution system.

The financial and technical capabilities of GWA are deemed marginal and may not allow GWA to successfully repair and upgrade the infrastructure to provide adequate water service to some of the proposed workforce housing facilities. For these reasons, the impacts of workforce housing and civilian induced population growth on the water utility are assessed as significant. Mitigations could include 1) the Government of Japan providing funding to repair and upgrade selected water and wastewater infrastructure, 2) U.S. Government funding of needed utility infrastructure repairs and upgrades through the efforts of the EAC, and/or CEQ facilitated discussions with various federal agencies, 3) an adaptive program management approach to alter construction tempo to reduce peak construction workforce

requirements, and 4) force flow modifications. Adaptive program management and force flow modifications are described in more detail in below.

Wastewater

Wastewater collection and treatment systems are provided by GWA through various treatment plants located throughout Guam. Areas 1 and 2 of the currently proposed workforce housing facilities would use the NDWWTP. The other proposed locations would use the Hagatña WWTP.

Effluent from the NDWWTP is currently not meeting all NPDES permit requirements. Average daily influent is also very close to permitted limits, with peak daily influent exceeding permitted limits. Thus, the addition of workforce housing would exacerbate this exceedance and potentially cause exceeding the actual average daily influent. However, the original physical design capacity of the NDWWTP is 12 million gallons per day (MGd) average daily influent and 27 MGd peak daily influent. Current physical capacity has been estimated at approximately 7.96 MGd. Thus with permit modifications, the NDWWTP should be able to handle the increased demand from workforce housing even prior to implementation of the preferred wastewater alternative. Sewer collection systems serving the NDWWTP are aged and reportedly in poor shape. Thus, sewer upgrades and system expansions would be needed to serve the proposed workforce housing facilities.

The Hagatña WWTP has recently been refurbished, but is still operating without meeting the requirements of its NPDES permit. The capacity of the Hagatña WWTP is adequate to handle the additional demand from the currently proposed workforce housing facilities; however, permit modifications are needed to allow for higher peak flows as the plant is currently exceeding those permitted levels. The effluent pump also requires repair as it is not operational. This can cause effluent backup during certain tidal conditions. The sewer collection system serving this area are aged and reportedly in poor shape. Thus sewer upgrades and system expansions would be needed to serve the proposed workforce housing facilities.

The financial and technical capabilities of GWA are deemed marginal and may not allow GWA to successfully prepare the infrastructure to provide adequate wastewater service to some of the proposed workforce housing facilities. For these reasons, the impacts of workforce housing and civilian induced population growth on the wastewater utility are assessed as significant. Mitigations could include 1) the Government of Japan providing funding to repair and upgrade selected water and wastewater infrastructure, 2) U.S. Government funding of needed utility infrastructure repairs and upgrades through the efforts of the EAC, and/or CEQ facilitated discussions with various federal agencies, 3) an adaptive program management approach to alter construction tempo to reduce peak construction workforce requirements, and 4) force flow modifications. Adaptive program management and force flow modifications are described in more detail in Volume 7.

Solid Waste

Implementation of the preferred solid waste alternative would be able to adequately serve all the various proposals for workforce housing. Currently, most civilian solid waste on Guam continues to be disposed at the Ordot Landfill. The new GovGuam Landfill at Layon is currently in construction and scheduled for opening July 2011. The proposed workforce housing facilities would not be expected to generate a significant increase in solid waste between now and when the new landfill would open. Thus, the impact to the solid waste utility from the currently proposed workforce housing facilities would be less than significant.

Roadways

There would be impacts to roadways and traffic from workforce housing, although these impacts would be minimized by GovGuam's requirements for employers to provide transportation to and from worksites and contract requirements imposed by the DoD. The DoD requires Contractors to provide "means and methods to reduce vehicle travel to and from worksites..." that could be met using bus transportation. The majority of the workforce would be housed in the North Region (Areas 1 and 2), allowing for a relatively short commute to Finegayan where most of the proposed construction activity would occur. Table 4.15-3 identifies the expected travel routes between the various workforce housing sites and NCTS Finegayan.

DoD contract requirements allowing for multiple work schedule/or non-standard work shifts would further reduce impacts to traffic and roadways by shifting work force travel to off peak hours. BMPs and mitigation measures identified in Volume 6, Chapter 4 (Roadways) during construction would also reduce impacts from the workforce housing areas. Incorporation of BMPs and mitigation measures, including use of bus transportation, into the provision for workforce housing would reduce impacts to traffic and roadways.

4.15.5.13 Hazardous Materials and Waste

Construction activities associated with the workforce housing areas would require the use of various hazardous materials and waste. However, construction contractors would be required to implement BMPs and standard operating procedures (SOPs) to ensure that impacts from these substances are minimized. Anticipated hazardous materials and waste may include fuels, lubricants, solvents, paints, adhesives, pesticides, herbicides, and other hazardous substances.

When using hazardous substances, various federal and local environmental laws and regulations (e.g., RCRA) must be followed by the developer and operators of the proposed workforce housing sites that are designed to be protective of human health, welfare, and the environment. In order to implement these laws and regulations, various procedures, protocol, and directives should be developed that are designed to proactively eliminate or minimize pollutants to the environment. These actions involve the use of comprehensive administrative, engineering, and operations mandates, BMPs, and SOPs to prevent or minimize the inadvertent leakage, spill, or release of hazardous substances. Enforcement of these protection measures should be part of the federal and GovGuam's regulatory oversight.

Table 4.15-3. Travel Paths to NCTS Finegayan from Proposed Workforce Housing Sites

<i>Area</i>	<i>Applicant</i>	<i>Capacity</i>	<i>Village</i>	<i>Path from Area to NCTS Finegayan</i>	<i>Notes</i>
1	Younex Enterprises, LLC	18,000	Dededo	Option 1: Finegayan Connection ----- Option 2: Local Road to Route 3 Route 3 to NCTS Finegayan	Alternative route, no Finegayan connection.
2	Pacific International Guam, Inc.	1,176	Yigo	Route 15 to Chelan Laguna Chelan Laguna to Route 1 Route 1 to Route 9 Route 9 to Route 3 Route 3 to NCTS Finegayan	
3	DDT Konstract	390	Barrigada	Bello Street to Alageta Road Alageta Road to Route 25 Route 25 to Route 16 Route 16 to Route 27 Route 27 to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	
4	Black Construction Corp.	1,200	Tamuning	Harmon Metal Lane to A. Sanchez Street A. Sanchez Street to Route 16/Route 27 Route 27 to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	
5	S.K. Construction Inc.	350	Tamuning	Local Road to Ilipog Drive Ilipog Drive to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	

<i>Area</i>	<i>Applicant</i>	<i>Capacity</i>	<i>Village</i>	<i>Path from Area to NCTS Finegayan</i>	<i>Notes</i>
6	Chugach World Services	696	Tamuning	Route 10A to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	Adjacent to Home Depot on Route 10A.
7	Core Tech International	856	Tamuning	Route 1 to Route 3 Route 3 to NCTS Finegayan	
8	Bob Salas	64	Mangilao	Route 15 (Diary Road) to Route 10 Route 10 to Route 16 Route 16 to Route 27 Route 27 to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	Near correctional facility.
9	Bascon Corp.	30	Ordot	Route 19 (Dero Road) to Route 4 Route 4 to Route 1 Route 1 to Route 3 Route 3 to NCTS Finegayan	

4.15.5.14 Public Health and Safety

No impact to workforce housing areas is anticipated from operational safety concerns (i.e., aircraft mishaps, BASH, explosive safety, electromagnetic safety, and construction safety). Potential increases in air emissions from workforce housing areas would be less than significant and the potential increase in disease occurrences and mental illness cases would be low; however, it is anticipated that Guam clinics and hospital would not be able to increase staffing to meet current health care service ratios and would not be capable of handling potential increases in illnesses (e.g., air quality-related illnesses, water-related illnesses, notifiable diseases, and mental illness). With large numbers of workers living in close proximity to each other, the potential for an increase in communicable diseases such as TB could result. As discussed above, construction contractors that have significant expertise in the areas of workforce housing and logistics to support temporary foreign workers would be engaged. Contract provisions would include requirements to provide workforce medical, dining, transportation, and safety/security. There would also be health screening of all workers. Contractors would be required to provide health care either by supplementing local Guam staff and resources or building their own clinic; therefore, less than significant impacts to health care services from workforce housing would be anticipated.

Based on the potential locations for workforce housing, it is anticipated that protective services (i.e., Guam police and fire departments) would be able to respond to workforce housing areas in a timely manner. In addition, contractors would provide safety and security for their employees; therefore, no impact to police and fire service is anticipated. Compliance with statutes and regulations on hazardous materials and wastes would be adhered to; therefore, no impacts to public health and safety are anticipated from management of hazardous substances within workforce housing areas (primarily household cleaning supplies). Grading for workforce housing building foundations, access roads, underground utilities, infrastructure or other ground disturbing activities could encounter unexploded ordnances (UXO). The identification and removal of UXO prior to initiating workforce housing construction activities and occupation of the workforce housing areas should occur to ensure that potential impacts would be minimized and less than significant. Although additional workers could result in more vehicles on the roads, construction contractors would be required to provide transportation for their workers and the actual potential for increased traffic incidents is small; therefore, a less than significant impact on the health and safety of the citizens of Guam from workforce housing traffic incidents is anticipated.

4.15.5.15 Environmental Justice and the Protection of Children

The proposed workforce housing would be located on an island with high percentages of minority and low-income population and children as compared with the U.S. population. Potentially significant impacts related to workforce housing that may result in disproportionately high and adverse impacts to minority and low-income populations include cultural resources, socioeconomics, potable water, and wastewater impacts. Potentially significant health and safety risks associated with socioeconomics, potable water, and wastewater impacts may also disproportionately affect children. The potential impacts and mitigation measures to reduce those impacts are described in the corresponding sections above. With implementation of mitigation measures, the severity of the impacts would be reduced.

4.16 INDUCED GROWTH ASSOCIATED WITH PROPOSED MILITARY RELOCATION PROGRAM

In response to regulatory agency requests and public comments on the Draft EIS, further analysis of induced growth associated with the proposed military relocation program is presented in this section. Volume 2, Chapter 16 of the Draft EIS, Socioeconomics and General Services, included some information on population and housing related to induced growth; this section expands on that information and assumes the full magnitude of population growth between 2010 and 2016 as addressed in this Final EIS. Additionally, Volume 6 includes analysis of induced population growth impacts on utilities on Guam.

Induced impacts would result from the economic growth associated with the additional people, potential development and activities that are created by the increased short and long-term spending associated with the proposed military relocation program. This is similar to the induced growth that may be created as a consequence of improvements, particularly expansions, in transportation or other infrastructure that makes land more accessible and so increases the likelihood that this land would be developed or redeveloped. This land development and activities associated with induced growth could then contribute to undesired environmental impacts if local regulations to protect natural and cultural resources are not followed.

To address what would be considered induced growth on Guam as a result of the proposed military relocation program, information from the project specific economic impact model was used to estimate and depict the number of people that would be attracted to Guam over and above the military, their dependents, and the H-2B construction workers who are projected to stay in workforce housing. The remaining populations are those that would be seeking housing in non-workforce housing sites throughout Guam. The methodology used estimates the number of new workers and dependents, and translates this population into required housing and new commercial development generated by spending. Details of the direct, indirect and induced economic impacts, including population projections, are in Volume 2, Chapter 16 and the SIAS, Volume 9 Appendix F of this Final EIS.

4.16.1 Induced Housing Units

4.16.1.1 Peak Demand

Uniformed military personnel and military dependents would live on-base; and H-2B workers would live in construction workforce housing. Additional housing units would be required for the remaining population - these additional required housing units are considered induced housing units. At the projected population peak in 2014, an estimated 46,300 people would require housing that would be considered induced housing units. This population includes civilian military workers and their dependents, non-H-2B construction workers (working on DoD projects) from off-island and their dependents and workers (and their dependents) who migrate to Guam for non-DoD jobs created by spending related to the proposed action. This translates into a demand of about 11,900 housing units based upon an occupancy rate of 3.9 persons per unit.

Using data from of the Guam Comprehensive Housing Study (PCR Environmental 2009), the estimated number of currently available, livable, housing units on Guam is estimated to be about 2,900. This results in the need for about 9,000 additional housing units at the peak demand.

4.16.1.2 Induced Housing Demands – Steady State

After the population peak is reached due to the construction activities related to the proposed actions, the population declines every year until a steady-state population of approximately 12,500 would be in

induced housing. Using the same methodologies as above, the incremental housing units required at steady-state would be only 272 in contrast to the peak demand of 9,000 units.

4.16.1.3 Housing Glut or Deficit

If enough housing is constructed to meet peak demand then it is likely that there would be an oversupply (glut) of housing during the steady-state timeframe, if demand is not met during the peak then a housing deficit is implied. Likely outcomes of this situation are discussed in Sections 4.3.3.2 and 4.3.3.3 of the SIAS and are summarized below:

It is unlikely that construction of new housing would fully respond to the demand to eliminate a housing deficit. The most likely outcome is a partial response of housing construction to demand. Housing construction companies would have general knowledge of the housing demands projected as long-run consequences of the proposed action's operational component, and general knowledge of the status of their competition. Building to long-run (rather than the larger, temporary, construction-period) demands would likely make financial sense to most housing providers. This implies only a partial response to construction-period housing demand. If sufficient housing is not supplied, this could prove problematic.

4.16.1.4 Reduction of Induced Housing Demand

In response to comments on the Draft EIS, the DoD has evaluated ways to reduce impacts from the anticipated pace of the proposed military relocation program and associated construction projects. Induced housing demand peak is sensitive to the pace of growth. Section 4.17.2, below, discusses how the pace of growth could be managed using adaptive program management and force flow reduction. These two notional examples do not represent a current DoD proposal and should not be viewed as the only possible manner reduce the pace of growth and its effects on the peak demand for induced housing. The potential effects of the notional examples on reducing the housing demand are shown in Figure 4-16.1.

In addition to the current DoD proposals to reduce the pace of the proposed action, other factors may reduce the requirements discussed above. For instance, some non-H-2B construction workers who would move to Guam for short time during the construction phase of the proposed military relocation program may choose to reside in workforce housing. Once available, these work force housing units may be appealing and convenient to live and commute to construction sites on planned shuttle buses. The estimates (above), of induced housing units required, assume all non-H-2B construction workers (DoD projects) would require housing units from the Guam housing market; however, based on information depicted in Table 4.15-1, there is planned development for workforce housing totaling a population of approximately 22,800 workers while there are only an estimated 13,300 H-2B workers expected at peak. This additional workforce housing units would be available to a portion of the non-H-2B in-migrant construction workers (DoD projects).

If the workforce housing absorbs a portion of these workers rather than the Guam housing market, then the number of housing units, at peak, would be lower than estimated above. If it assumed that all the proposed workforce housing is completed and has 80% occupancy by both non- and H-2B workers then, at peak, the number housing units required would decline by 1,264.

The additive effects of these various scenarios can significantly reduce the peak demand for housing. The effects of the scenarios are illustrated in the figure below.

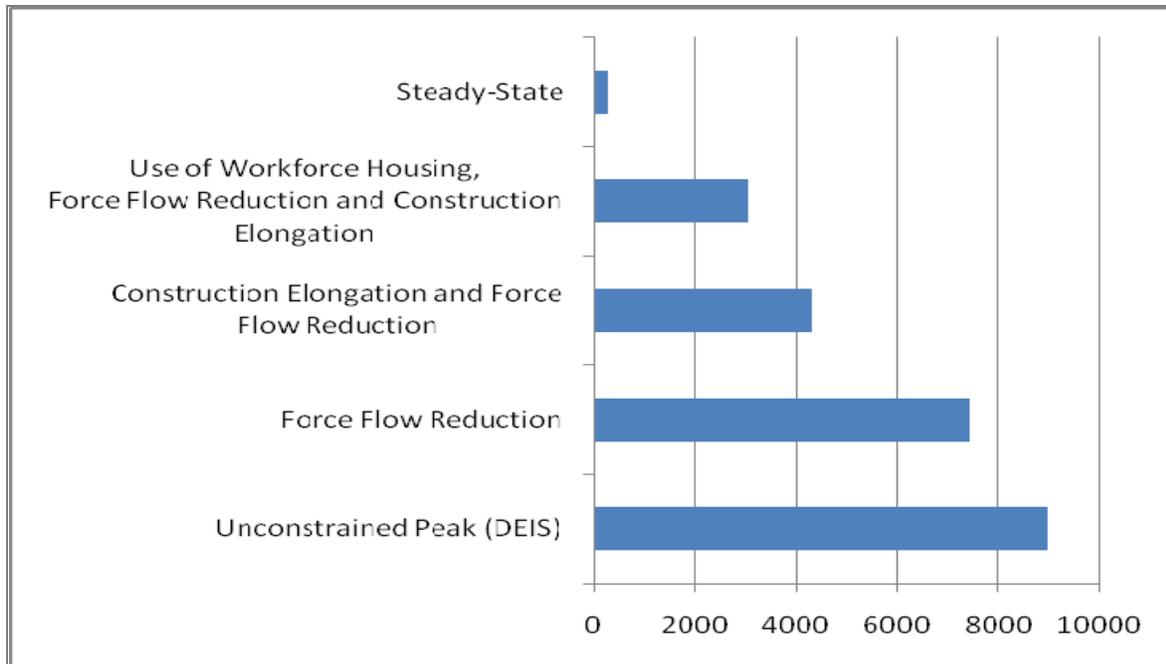


Figure 4.16-1 Induced Housing Unit Demand

4.16.2 Induced Business Establishments and Jobs

4.16.2.1 Induced Business Establishments and Jobs – Peak

The proposed actions are expected to induce development of business establishments and employment. Construction spending, operational base spending and personal spending related to the proposed actions would generate increased demand for goods and services. To meet that demand, new business establishments would be developed. Based on data from Table 4.3-4 in the SIAS, presented in the Appendix (Volume 9 of Final EIS), approximately 1,295 business establishments with 18,727 full time equivalent (FTE) jobs would be induced by the proposed actions. Induced business establishments do not include growth in the number of on-base business establishments – only establishments that would be off-base are considered.

4.16.2.2 Induced Business Establishments and Jobs – Steady State

After the peak in induced economic activity is reached, the number of business establishments and jobs would decline until a steady-state is reached. The steady-state would induce 220 business establishments with 3,187 induced FTE jobs; while the steady-state levels of business establishments and jobs are lower than peak, they are higher than projected without the project. (Please see Figure 4.3.1 of the SIAS for an example of economic activity, at steady-state, exceeding economic activity without the proposed actions.)

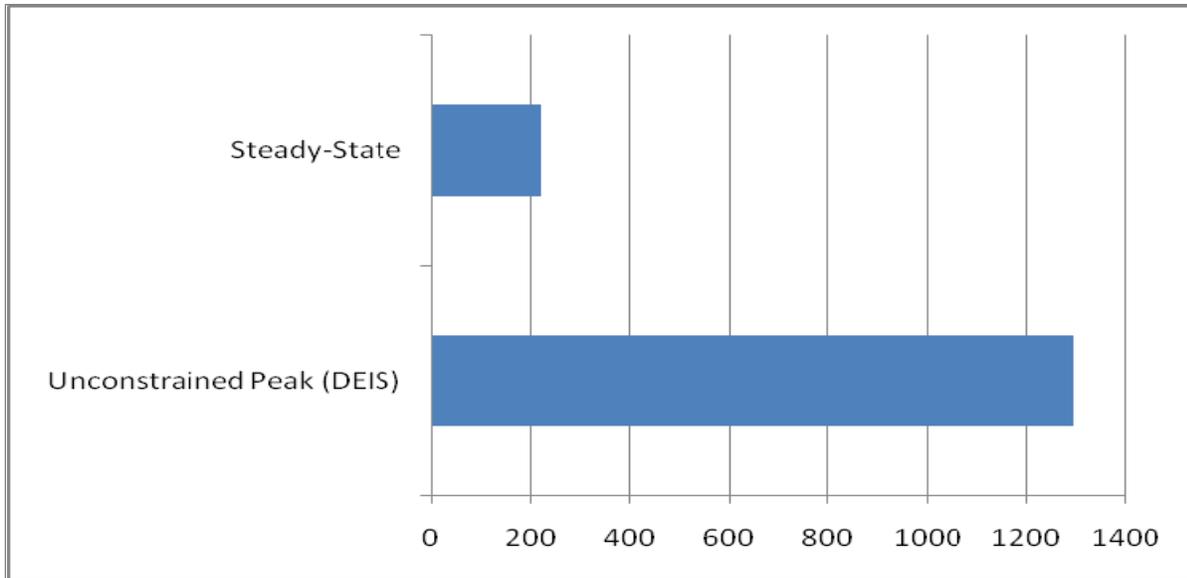


Figure 4.16-2 Induced Business Establishments

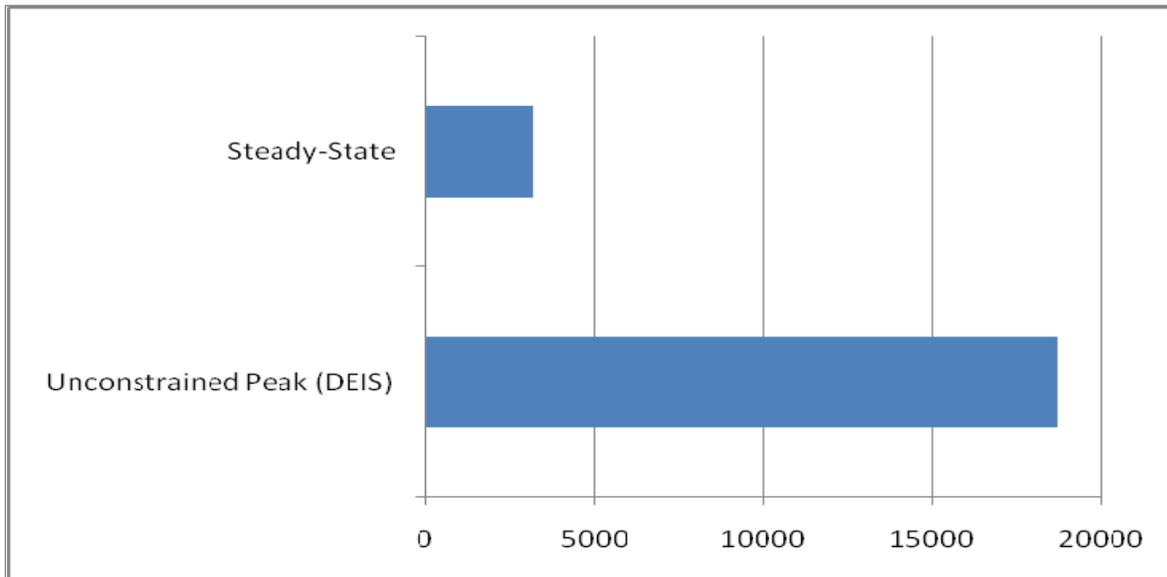


Figure 4.16-3 Induced Employment – FTE Jobs

4.16.3 Environmental Impacts of Induced Growth

There would be environmental impacts of the anticipated induced development, population growth and activities associated with the proposed military relocation program. The impacts would be to both Guam’s natural and built resources from the new buildings required for housing and/or business establishments. Based upon having the most available zoned and undeveloped land, it would be anticipated that much of the induced development would be located in the central and northern sections of Guam. However, an induced population could certainly live anywhere on Guam and therefore, the effects would be islandwide. Any new construction would be controlled and managed by GovGuam regulatory authorities. The reduction of any adverse environmental effects from construction would be dependent upon adherence to these regulatory controls by private developers. The induced population would add to local traffic and utility demands and also be dependent upon local schools and other public services. The reason

that the additional people would be induced to live on Guam would be new employment opportunities. With these new jobs, the induced population would contribute to the local tax base that would offset most the fiscal impacts of their arrival.

Impacts on utilities from induced population growth are provided in Volume 6.

4.17 CONSTRUCTION-PHASE MITIGATION MEASURES TO REDUCE IMPACTS OF PROPOSED MILITARY RELOCATION PROGRAM

In response to comments on the Draft EIS, the DoD has evaluated ways to reduce impacts from the anticipated pace of the proposed military relocation program and associated construction projects. The Final EIS (Volume 7) includes discussion of two mitigation measures. The first mitigation measure is force flow reduction and the second is adaptive program management. These mitigation measures would not apply to Tinian.

4.17.1 Force Flow Reduction

The first mitigation measure is rescheduling the arrival time of Marines and their dependent to Guam. The proposed relocation of the Marines to Guam is referred to as “force flow.” Force flow is the rate at which the military population, including military personnel, their dependents, and civilian workers for the military, would arrive on Guam. Extending the arrival of the military population over a greater period of time (e.g. beyond 2014) would lessen the need for various infrastructure upgrades to meet peak loading demands in 2014. The proposed force flow reduction mitigation measure would both lower the overall peak population and decrease the rate of short-term population increase resulting from the proposed action, thereby reducing demands on utilities and many island services.

Project-related construction work is expected to begin in 2010, reach its peak in 2014, and end in 2016. It is assumed in this table that arrival of the military population on Guam would be complete by 2014. Since the peak in construction activities and expenditures would coincide with the completed arrival of Marines and their families, 2014 represents the peak year for population increase. At this peak, the total increase in Guam population from off-island would be an estimated 79,178 people, representing a temporary increase of the total island population by approximately 44%. After the 2014 peak, project-related construction expenditures and the associated construction workforce would decline rapidly as contracts awarded in 2014 are completed in 2015 and 2016. At the completion of construction, and implementation of full military operational capabilities, the population increase from off-island is projected to level off to an estimated 33,608 persons, approximately 19% above the current island population.

There are numerous scenarios that could be developed for adjusting force flow. One notional scenario is provided in Table 2.3-2 of Volume 7. This scenario does not represent a current DoD proposal regarding force flow reduction nor should it be viewed as the only possible manner in which Marine Corps force flow to Guam could be managed. Other scenarios, with differing assumptions regarding arrival rates and the ultimate completion of the arrival of the Marine Corps military population would certainly lead to different results. Any actual force flow reduction would be decided in the future and would be dependent upon a number of factors including, but not limited to funding for necessary construction, mutual defense treaty obligations with the Government of Japan, ongoing military operations worldwide, and Congressional direction. The notional scenario is presented simply to show the possible mitigative impacts to population growth, and thus likely mitigative impacts to population sensitive resources, that could occur should the force flow projection noted in this example be implemented.

Force flow reductions, in this scenario, associated with delaying the complete arrival of the Marine Corps military population until 2017 would lower the rate of arrival per year of the entire operations-related force flow reduction and decrease the current total peak population from 79,187 to 57,593 in 2014. Force flow reduction in and of itself does not affect the proposed action's construction schedule. Therefore, the estimated population growth and shrinkage rate of off-island construction workers and their dependents on Guam would be unaffected by implementation of the force flow reduction mitigation measure.

4.17.2 Adaptive Program Management

The second mitigation measure which would alter the short-term population growth associated with the proposed actions is adaptive program management. This additional mitigation measure would be implemented by DoD to potentially reduce and avoid environmental impacts sensitive to construction tempo and sequencing. It involves the creation and support of a Civil-Military Coordination Council, consisting of, but not limited to participation by DoD, GovGuam agencies, and federal agencies as required to monitor impacts and advise DoD on the tempo and sequencing of proposed construction in order to avoid and reduce environmental impacts.

Information is provided in Volume 7 that introduces the concept of adaptive program management, describes the formation and responsibilities of the proposed Council, and specifies how the Council would apply adaptive program management to the proposed action. The military construction program proposed on Guam lends itself to an adaptive program management approach because of the potential to avoid and reduce impacts, particularly to utility systems, with effective monitoring of conditions and implementation of response measures.

Existing utilities infrastructure systems on Guam, especially those that affect ground and surface water resources for drinking water and ocean waters for discharge of wastewater, have known limitations and would be most sensitive to the short-term peak increases in population during construction. There is a direct relationship between the amount of construction, the number of people who would be on Guam to support the proposed construction, and demand on utilities, all of which would peak in 2014 under the proposed action.

With implementation of adaptive program management, DoD would slow construction tempo and adjust sequencing of construction activities to directly influence work force population levels associated with the proposed action before unacceptable conditions that exceed infrastructure capabilities arise:

Slowing construction tempo. Construction tempo refers to the overall pace of proposed DoD construction on Guam and regions of Guam (i.e., Apra Harbor, Andersen AFB, and Finegayan). DoD would slow the timing and execution of short-term (0 to 3 months), mid-term (3 to 12 months), or long-term (12 to 24 months) construction contract awards in response to monitoring data of impacted resources in order to reduce construction-related population increases and avoid or lessen impacts to resources served by utilities systems (i.e. groundwater, surface waters, and ocean waters).

Adjusting construction sequencing. Construction sequencing involves redirecting the sequence of construction to projects that require fewer construction workers, thus controlling the workforce population rate of increase. Construction sequencing would also include the regional redistribution of construction projects to avoid the concentration of construction activities with the potential to overburden local utilities systems at a particular location.

There are numerous scenarios that could be developed for implementation of adaptive program management to construction tempo and sequencing. Table 2.4-1 in Volume 7 and the figure below

provides one notional scenario of how adaptive program management could be applied in the context of construction tempo. This notional scenario also identifies a reduction in force flow because arrival of military personnel and their families would occur as adequate facilities are available. Managing the force flow so that the military population would arrive only after the construction necessary to support them is completed would delay arrival of a majority of the military population beyond 2014. The adaptive program management notional scenario is presented below only to show the possible mitigative impacts to population growth, and thus likely mitigative impacts to infrastructure and resources, that could occur should adaptive program management be implemented. Other models, with differing assumptions regarding factors that affect construction tempo, would lead to different results.

Any actual implementation of adaptive program management relative to construction tempo will be decided in the future and would be dependent upon a number of factors including, but not limited to funding for necessary construction; the implementation of improvements to the Port of Guam; utility systems upgrades for water, wastewater, and power; labor availability on Guam and in the region; material and supply prices; occurrences of natural disasters; Congressional direction, and most importantly, the monitoring of affected resources.

Figure 4.17-1 compares the proposed action, with its target completion date of 2010; force flow reduction; and the adaptive program management mitigation measure for construction tempo (including corresponding force flow reduction). In the scenario, the estimated population of off-island construction workers and their dependents that arrive on Guam is modified and spread out over a period beyond 2014. The result of implementing both the force flow reduction mitigation measure and the use of adaptive program management of construction tempo would be that the peak population would be reduced from 79,187 to 41,178 in 2014. This reduction associated with slowing construction tempo shows additional population reduction from the peak 57,593 population described for the notional force flow mitigation measure. Under the notional adaptive program management scenario presented below, the full complement of DoD population would not be relocated to Guam until after 2014. However, as noted above, this is not a current DoD proposal and should not be taken as a change in the proposed action.

For both force flow and adaptive program management scenarios the construction budget (and corresponding workforce population) is reduced on Figure 4.17-1 to reflect the recent (May 2010) funding program. This slower than anticipated construction schedule impacts subsequent years' projected construction population. It was included in both scenarios as a reflection of most the recent budget data. Effective adaptive program management would require the participation of multiple agencies, including GovGuam and federal agencies acting through the Council, to advise DoD on measures such as adjusting the construction pace and sequencing. Volume 7 provides more detail as to how adaptive program management would be effective.

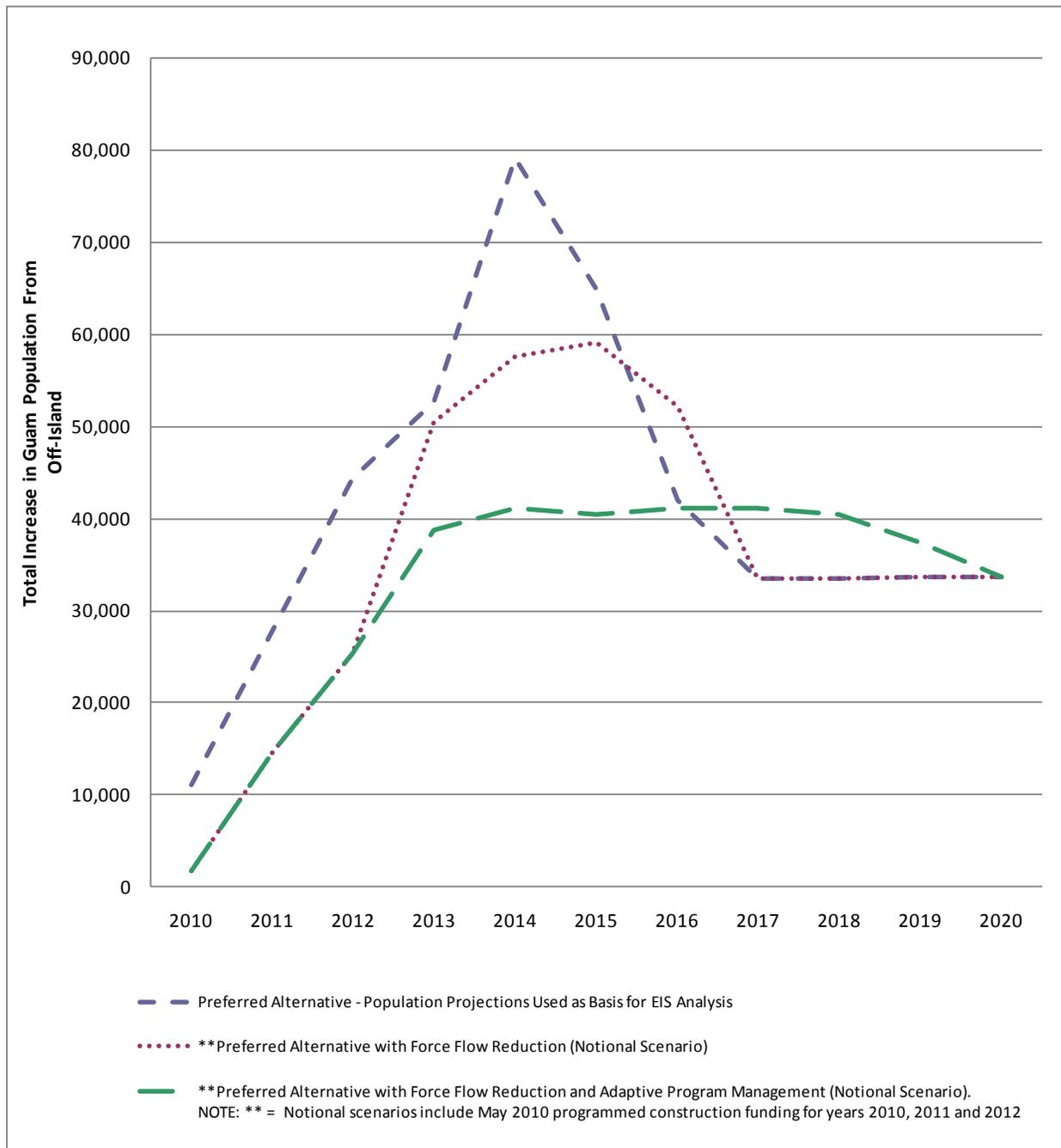


Figure 4.17-1. Population Comparison – Preferred Alternatives vs. Force Flow Reduction vs. Adaptive Program Management

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