# CHAPTER 19. PUBLIC HEALTH AND SAFETY

## 19.1 INTRODUCTION

This chapter discusses the potential effects to public health and safety (i.e., disease, mental illness, traffic incidents, unexploded ordnance [UXO], and power plant fuel sources [i.e., Liquefied Natural Gas, Diesel Fuel No. 2, and/or No. 6 Fuel Oil]) from implementation of the alternatives within the region of influence as they relate to utilities and roadways.

## 19.2 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential effects to public health and safety (i.e., disease, mental illness, traffic incidents, UXO, and fuel sources) from implementation of the alternatives within the region of influence (i.e., on Guam).

### 19.2.1 Approach to Analysis

19.2.1.1 Methodology

Utilities

Proposed utility projects are considered "related actions" in that they would be implemented as a result of the overall proposed action (i.e., relocation of Marines to Guam [Volume 2], Navy aircraft carrier berthing [Volume 4], and Army Air and Missile Defense Task Force [Volume 5]).

The analysis of potential public health and safety impacts identified for proposed utility improvements are driven primarily by anticipated population increases on Guam; therefore, potential impacts would be the same if any of the alternatives were implemented, and the term "All Alternatives" is used during the presentation of the analysis in this chapter.

The U.S. Department of Defense (DoD) acknowledges the existing sub-standard conditions of utility infrastructure systems on Guam and the desire by many for the DoD to fund improvements to these systems and services. The DoD also recognizes the constraints on the Government of Guam (GovGuam) to be able to address these indirect impacts of the proposed military relocation. The GovGuam has identified the need for $1.3 billion (B) in funding to implement necessary water and wastewater infrastructure improvements that must be accomplished in the first 5 years to accommodate the military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The DoD is seeking approximately $580 million from the Government of Japan (GoJ) for water and wastewater improvement projects pursuant to the terms of the Realignment Roadmap Agreement, described in Volume 1. The Economic Adjustment Committee (EAC) is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. As part of this evaluation the EAC is specifically examining federal funding options for water and wastewater infrastructure improvements that may not be funded through GoJ financing.

Potential effects to public safety from implementation of the proposed utility projects were derived based on information detailed in the descriptions of each alternative. Regarding personnel relocation to Guam, public health and safety concerns were addressed based on anticipated changes in the population of

Guam, both from natural increases and from military personnel and their dependents moving to Guam. Average per capita incidents of notifiable diseases, mental illness, and traffic accidents were used to calculate the potential increase in these incidents as a result of the utility projects. Safety of construction workers would be the same as outlined in Volume 2. Proposed construction activities supporting utilities improvements would be conducted in accordance with federal and local safety guidelines to ensure a safe work environment.

With construction activities, there is a potential for standing water and water based vectors, such as mosquitoes and related diseases. Most mosquitoes require standing water or moist soil where flooding occurs to lay their eggs. Removing standing water sources and promoting drainage would eliminate potential breeding sites. In compliance with Guam Code Annotated (10 GCA 36-Mosquito Control), the following Best Management Practices (BMPs) would be implemented: limit standing water at construction sites, stagnant water pools, puddles, and ditches would be drained or filled; containers that catch/trap water (e.g., buckets, old tires, cans) would be removed; and if necessary, pesticide application (e.g., *Bacillus thuringensis*) could be used to help control mosquitoes. Implementing these BMPs would reduce the opportunities for an outbreak of water-related diseases.

Analysis of the public health and safety concerns that are directly associated with the overall proposed action (i.e., relocation of Marines to Guam [Volume 2], Navy aircraft carrier berthing [Volume 4], and Army Air and Missile Defense Task Force [Volume 5]) can be found in those respective Volumes. This chapter analyzes potential health and safety impacts that are specific to proposed utility projects that would be implemented to support the military relocation.

Both direct impacts (i.e., effects from the construction and operation of utilities provided for the new military facilities on base) and indirect impacts (i.e., effects that occur off base from the influx of construction workers and an induced population) are described in this chapter. For more information on direct and indirect impacts, see Volume 6, Chapter 1.

Potential health and safety concerns from direct impacts of proposed utilities projects result primarily from ground-disturbing activities and from demands on public utility systems and their associated operations. Information regarding the possible presence of UXO was obtained from various military (e.g., various Navy and U.S. Army Corps of Engineers UXO records) and public sources (e.g., newspaper accounts). Information specific to the proposed movement of Marines to Guam was obtained from military sources.

Potential health and safety concerns from indirect impacts of proposed utilities projects result primarily from the demands placed on public utility systems and their associated operations from construction workforce housing and from housing and development resulting from the induced population that is expected to migrate to Guam because of the economic growth brought about by the military relocation.

Roadways

Public health and safety concerns associated with the proposed roadway projects were identified based on the potential for the improved roadway network to have the following effects:

- Substantially increase the risk of exposure to air pollutants from increased use of roadways
- Affect the frequency of automobile accidents
- Increase the risk of exposure to UXO

The risk of exposure to air pollutants from vehicular sources that would use the new roadways is a health concern. Impacts of the Guam Road Network (GRN) project on air quality are addressed in Volume 6,

Chapter 7. Air pollutant emissions from the GRN project were evaluated in comparison to primary national ambient air quality standards established to protect human health, as well as secondary standards to protect the environment.

#### 19.2.1.2 Determination of Significance

Factors considered in determining whether an alternative would have a significant public safety impact include the extent or degree to which implementation of the utility projects would subject the public to increased risk of contracting a disease or experiencing personal injury. The significance determination evaluated the overall ability to mitigate or control potential public health and safety impacts and consequences from proposed utility infrastructure improvements. Significant impacts that cannot be avoided would be mitigated to less than significant levels to the extent possible.

Public health and safety impacts as a result of the proposed roadway improvement projects are assessed following Federal Highway Administration Guidance for Preparing and Processing Environmental and Section 4(f) Documents (Federal Highway Administration 1987).

#### 19.2.1.3 Issues Identified during Public Scoping Process

The following analysis focuses on possible effects to public health and safety that could be impacted by the proposed utility and roadway projects. As part of the analysis, concerns related to public health and safety that were mentioned by the public, including regulatory stakeholders, during the public scoping meetings were addressed. The following public health and safety concerns were raised during public scoping meetings regarding the proposed relocation of military and civilian personnel to Guam:

- Acquired Immune Deficiency Syndrome
- Cholera
- Dengue
- Hepatitis C
- Malaria
- Measles
- Rubella
- Sexually Transmitted Diseases other than Acquired Immune Deficiency Syndrome
- Tuberculosis
- Typhoid fever
- Potential increases in mental illness
- Potential increases in traffic incidents
- Potential contact with UXO

### 19.2.2 Power

As discussed in Volume 6, Chapters 2 and 3, implementation of the proposed action would require additional power generation at Guam Power Authority (GPA) facilities to meet the power demands of the new base, resulting in direct impacts.

**Direct Impacts.** Additional power generation demands from new DoD facilities can be met using current capacities at existing power plants, which are currently permitted under the Clean Air Act to allow for resulting increased emissions. The DoD proposes to recondition existing GPA Combustion Turbines (CTs) that serve as peaking units and as backup facilities to ensure a reliable power supply is available on Guam. No monitoring data for ambient background air quality exists for Guam that could be used to compare against expected changes in air quality from the military relocation. Therefore, the existing

background air quality conditions around Guam are defined based on the current ambient air quality attainment status condition applicable for Guam:

- Attainment for all criteria pollutants, except for sulfur dioxide ($SO_2$)
- Two $SO_2$ nonattainment areas with a 2.2 mile (3.5 kilometers) radius around the Piti and Tanguisson power plants

Guam is exempt from using fuel with a low sulfur content. Therefore, the power generation facilities' use of fuel with a high sulfur content is anticipated to be the primary cause of the current $SO_2$ nonattainment designation for the two areas. The Cabras/Piti power plant maintains an automated system to switch to low sulfur fuel when the wind direction is from the west (onshore). Once the wind direction has shifted, the fuel source is switched manually back to high sulfur fuel. There is a stakeholder effort led by the Guam Environmental Protection Agency (GEPA) and U.S. Environmental Protection Agency (USEPA) Region 9 to switch from high sulfur diesel (5,000 parts per million [ppm]) to ultra low sulfur diesel (ULSD) (10 to 15 ppm) for use in diesel vehicles and in CTs on Guam. This move to ULSD would result in cleaner emissions from CTs and other applications using diesel. This effort is supported by the GPA and the DoD. However, several logistics, economics, contracts, and regulatory issues are ongoing and must be resolved before an islandwide switch to ULSD can be accomplished by the end of 2012. The stakeholders are also considering an interim move to low sulfur diesel (500 ppm). Until this happens, this chapter assumes the continued use of high sulfur diesel. This chapter does not include a detailed assessment of the benefits that could be realized to public health from a transition in the type of diesel.

The air quality analysis provided in Volume 6, Chapter 7 indicates that the overall permitted capacity and the reconditioning of the existing CTs at the power plants would not change to meet the increased power demands for the direct or indirect effects of the proposed military relocation. The resulting potential air quality impact would remain the same as the current permitted conditions established previously during each facility permitting process. Power generation requirements would be met by operating existing generation facilities within their current permit limitations. Thus, the air emissions at the power plant facilities would remain as predicted under their current permits. Permitted sources would then remain in compliance with applicable Clean Air Act air quality standards in effect at the time of their most recently issued permits and would result in less than significant air quality impacts. Additionally, Volume 6, Chapter 7 indicates that proposed reconditioning of existing CTs is not expected to result in a change in air emissions above what is currently allowed in the CT permits.

Although power plant and CT operations would result in a less than significant increase in emissions, air pollutants generated during power plant and CT operations could affect the health of some individuals on Guam. Air pollution can harm individuals when it accumulates in the air in high enough concentrations. People exposed to high enough levels of certain air pollutants may experience:

- Irritation of the eyes, nose, and throat
- Wheezing, coughing, chest tightness, and breathing difficulties
- Worsening of existing lung and heart problems
- Increased risk of heart attack

In addition, long-term exposure to air pollution has been linked to certain types of cancer and damage to the immune, neurological, reproductive, and respiratory systems.

Some groups of people are especially sensitive to common air pollutants, such as particulates and ground-level ozone. Sensitive populations include children, older adults, people who are active outdoors, and people with heart or lung diseases, such as asthma. Because air emission increases would be less than

significant, it is anticipated that Guam clinics and hospital would have adequate staffing to handle illnesses related to air quality. Therefore, less than significant impacts on health care services would be anticipated as a result of emissions from construction and operational activities.

**Indirect Impacts.** Data provided by the GPA indicates that there is sufficient power capacity at power plants to meet the power demands from workforce housing and the induced population. Increased power demands and air emissions that may result from the workforce housing and induced population would be the same as described for direct impacts. It is anticipated that Guam clinics and hospitals would have adequate staffing to handle illnesses related to air quality. Therefore, less than significant, indirect impacts on health care services would be anticipated as a result of emissions from power plant operations.

### 19.2.3 Potable Water

As discussed in Volume 6, Chapter 3, existing off-base GWA water system infrastructure is considered by USEPA Region 9 to be substandard in terms of water quantity, water quality, and overall condition and reliability of the supply and distribution system. In its comments on the Draft Environmental Impact Statement (EIS), USEPA Region 9 stated that Guam's environmental and public health problems exceed those of most U.S. communities, with its population experiencing boil water notices, sewage spills, exposures to waterborne disease, and illegal dumping that can result in public health problems associated with its water supply. Over the last 7 years, USEPA Region 9 has issued fines and enforcement orders to the GovGuam in an effort to address these problems and bring the potable (drinking) water system infrastructure into compliance with federal environmental laws and public health standards.

There have been improvements to the potable water system as a result of these enforcement actions, and boil water notices have declined and water quality has improved in recent years. Still, the GWA potable water system continues to suffer from decades of deferred maintenance and upgrades because of a lack of funding and limits on user fees paid by the customers they service. Not all of GWA's water supply wells and surface water reservoirs are fully operational, resulting in a shortage of available water and an inability to meet basic flow and pressure standards required of public water suppliers. These conditions can result in intermittent loss of water or water pressure to some customers and in microbiological and other contaminants entering the distribution system, potentially resulting in illness. In addition to basic flow and pressure problems, GWA's water distribution system (i.e., water storage tanks, treatment systems, and distribution piping and pumps) is not fully functional because of corrosion, leakage, age, and vandalism. These conditions can potentially lead to unreliable water supply, poor water quality, and ultimately to illness.

#### 19.2.3.1 Potable Water Health Problems

The following text provides a discussion of the types of contaminants and potential health problems related to potable water systems.

**Contaminants Affecting Drinking Water.** The levels of contaminants in drinking water are seldom high enough to cause acute (immediate) health effects (North Carolina Cooperative Extension Service 1996). Examples of acute health effects are nausea, lung irritation, skin rash, vomiting, dizziness, and even death. Contaminants are more likely to cause chronic health effects (i.e., effects that occur long after repeated exposure to small amounts of a chemical). Examples of chronic health effects include cancer, liver and kidney damage, disorders of the nervous system, damage to the immune system, and birth defects.

**Microbial Pathogens.** Pathogens in drinking water are serious health risks. Pathogens are disease-producing micro-organisms such as bacteria, viruses, and parasites (such as *Giardia lamblia*). They get

into drinking water when surface water sources are contaminated by sewage or animal waste, or when wells are improperly sealed and constructed. Pathogens can cause gastroenteritis, salmonella infection, dysentery, shigellosis, hepatitis, and giardiasis. The presence of coliform bacteria, which is generally harmless, may indicate other contamination to the drinking water system.

**Organics.** People worry the most about potentially toxic chemicals and metals in water. Only a few of the toxic organic chemicals that occur in drinking water are regulated by drinking water standards. This group of contaminants includes:

- Trihalomthanes, which are formed when chlorine in treated drinking water combines with naturally occurring organic matter.
- Pesticides, including herbicides, insecticides, and fungicides.
- Volatile organic compounds, which include solvents, degreasers, adhesives, gasoline additives, and fuel additives. Some of the common volatile organic compounds are benzene, trichloroethylene, styrene, toluene, and vinyl chloride. Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

**Inorganics.** These contaminants include toxic metals like arsenic, barium, chromium, lead, mercury, and silver. These metals can get into drinking water from natural sources, industrial processes, and the materials used in plumbing systems. Toxic metals are regulated in public water supplies because they can cause acute poisoning, cancer, and other health effects. Nitrate is another inorganic contaminant. The nitrate in mineral deposits, fertilizers, sewage, and animal wastes can contaminate water. Nitrate has been associated with "blue baby syndrome" in infants.

**Funding Improvements.** The DoD acknowledges the existing sub-standard conditions of utility infrastructure systems on Guam and the desire by many for the DoD to fund improvements to these systems and services. The DoD also recognizes the constraints on the GovGuam to be able to address these indirect impacts of the proposed military relocation. The GovGuam has identified the need for $1.3 B in funding to implement necessary water and wastewater infrastructure improvements that must be accomplished in the first 5 years to accommodate the military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The DoD is seeking funding from the GoJ for water and wastewater improvement projects pursuant to the terms of the Realignment Roadmap Agreement, described in Volume 1. The EAC is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. As part of this evaluation the EAC is specifically examining federal funding options for water and wastewater infrastructure improvements that may not be funded through GoJ financing. Because it is doubtful that GWA could fund and implement required upgrades in time for the start of the proposed DoD relocation, public health and safety impacts from increased demand on potable water are anticipated to be significant until the necessary off-base infrastructure improvements could be completed.

**Direct Impacts.** As described in Volume 6, Chapters 2 and 3, the DoD proposes to supply potable water to new facilities associated with the proposed action by using existing DoD water supplies on Guam, coupled with the installation of new water supply wells on Andersen Air Force Base. These new on-base systems would comply with Safe Drinking Water Act requirements for supply, pressure, and water quality. Therefore, no significant, anticipated, direct public health impacts are expected from these new facilities.

**Indirect Impacts.** As described in Volume 6, Chapters 2 and 3, the DoD relocation would result in indirect impacts on the off-base GWA water system from the potable water needs of the construction workforce and from the DoD relocation induced population that is expected to migrate to Guam. These indirect effects of the DoD relocation would place an increased demand and strain on the existing GWA water system. In their comments on the Draft EIS, the GWA, USEPA Region 9, GEPA, and various GovGuam agencies raised serious concerns over potential environmental and public health impacts on the already non-compliant GWA system from these indirect off-base demands. GWA must replace much of its infrastructure to meet current demand from the existing Guam population and to meet regulatory requirements imposed through ongoing enforcement actions. Concurrently, GWA must plan for, fund, and execute upgrades to meet new demands that are indirectly brought about by the proposed military relocation. Without these repairs and upgrades, environmental and public health impacts would be significant. Indirect impacts on the potable water system related to the military relocation fall into two broad categories: water quantity and water quality.

***Water Quantity:*** As discussed in Volume 6, Chapter 3, implementation of the overall proposed action could result in shortfalls of off-base potable water in GWA's system from 2010 until 2015. This shortfall would result because the current GWA system cannot supply the amount of water needed for the expected population increase. According to GWA's Water Resources Master Plan (WRMP) (GWA 2007), the existing GWA system has enough capacity in its inventory of wells and surface water sources to meet the current and projected demand, but the failing condition of the systems does not allow for the system to produce its full potential. As described in Volume 6, Chapter 3, this shortfall would be at its highest in the peak construction year of 2014. GWA cannot sustain its current water demands without DoD assistance (currently up to 4 million gallons per day (MGd) (15 million liters per day [MLd]) of water from Fena reservoir is provided to GWA). The GWA water system is already experiencing high chlorides (an indication of over pumping) in some wells and is being encouraged to reduce production in the affected wells by the GEPA.

As described in Volume 6, Chapter 3, the DoD proposes to help mitigate the shortfall of off-base water by providing excess water capacity to GWA from its existing system and from the early installation of proposed new DoD wells. A Memorandum of Understanding is being developed between the DoD and GWA that would address procedures to cooperate in the overall management of the Northern Guam Lens Aquifer, the source of water for the new DoD wells. In addition, a Customer Service Agreement is expected to be created to address the exchange of water between the Naval Facilities Engineering Command, Marianas, and GWA. The best potential sites for future wells in the Northern Guam Lens Aquifer are presumed to be located beneath DoD lands. Meeting future water demands on Guam would require utilizing those water resources under DoD land to benefit all of Guam. In this way, the DoD would mitigate the indirect impacts on water quantity to less than significant.

***Water Quality:*** As discussed in Volume 6, Chapter 3, water quality is related to water treatment and the condition of the water system infrastructure. Increasing the quantity of water alone would not mitigate potential public health impacts associated with low pressure, insufficient treatment, and corrosion of tanks and piping and from failing infrastructures. In the absence of water system repairs and upgrades, the GWA system would continue to be at risk for significant impacts on public health, and the additional demands on the system from the construction workforce and induced population associated with military relocation would make this already significant risk even worse.

### 19.2.4 Wastewater

Micro-organisms are present in large numbers in sewage treatment plant (STP) effluent, and waterborne disease outbreaks have been associated with sewage-contaminated water supplies or recreational waters. Wastewater discharged from a treatment plant can enter the environment where human exposure may occur through the potable water supply, recreation (e.g., swimming, snorkeling), or eating shellfish.

As discussed in Volume 6, Chapter 3, existing off-base GWA wastewater system infrastructure is considered by USEPA Region 9 to be sub-standard. Problems with the wastewater system include inadequate treatment of sewage at treatment plants, frequent sewage spills and overflows from collection piping and treatment systems, poor quality of water discharged from treatment plants, inadequate wastewater connection service on Guam, and poor condition and reliability of the system. In its comments on the Draft EIS, USEPA Region 9 stated that Guam's environmental and public health problems exceed those of most U.S. communities, with its population experiencing frequent sewage spills, exposures to waterborne disease, and illegal dumping that can result in public health problems associated with its wastewater collection and disposal systems. Over the last 7 years, USEPA Region 9 has issued fines and enforcement orders to the GovGuam in an effort to address these problems and bring the wastewater system infrastructure into compliance with federal environmental laws and public health standards.

There have been some improvements to the wastewater system as a result of these enforcement actions, and at least one treatment plant, the Hagatna Wastewater Treatment Plant (WWTP), has undergone repairs and upgrades. Still, the wastewater system continues to suffer from decades of deferred maintenance and upgrades because of a lack of funding and limits on user fees paid by the customers they service. All of the seven treatment plants are routinely in non-compliance with their discharge permits; many because a significant portion of the treatment processes at individual plants are inoperable. The condition of the sewage collection system is largely unsurveyed and unknown. Piping is suspected to be undersized and broken in much of the system, and pump stations undersized or failing. These issues lead to frequent sewage overflows into streets and neighborhoods, resulting in exposure to micro-biological and other contaminants and leaching of sewage and contaminants into the groundwater aquifer used as a drinking water source, potentially resulting in illness. Lack of maintenance, corrosion, leakage, bypassed treatment processes, age, and vandalism all contribute to the substandard condition of the system.

**Direct Impacts.** As described in Volume 6, Chapters 2 and 3, the DoD proposes to use the existing GWA Northern District Wastewater Treatment Plant (NDWWTP) to treat and dispose of wastewater directly generated from new DoD facilities in northern Guam and to use the Navy's Apra Harbor WWTP to treat sewage from additional visiting ships at Naval Base Guam.

*Northern District Wastewater Treatment Plant.* Volume 6, Chapter 3, describes the DoD's proposal to collect and convey sewage from the new DoD facilities in northern Guam to the NDWWTP. The DoD proposes to construct a dedicated force main that would deliver wastewater from the new facilities to the NDWWTP and proposes to upgrade the NDWWTP to bring it into compliance with both current and future flow and treatment requirements. Wastewater flows to the NDWWTP from military and civilian sources are projected to increase to a peak of 12.1 MGd (45.9 MLd) in 2014, which is somewhat more than the design capacity of 12 MGd (45 MLd). Adding chemical coagulants or increasing the surface overflow rate (within the normal design range) of the clarifier would be implemented to improve plant operations so that the primary clarifier would be able to treat the additional 0.1 MGd (0.4 MLd) without adverse effects on the NDWWTP. The DoD would coordinate with GWA to expedite the planned improvements and request for a National Pollutant Discharge Elimination System permit modification to

increase the effluent discharge limitation from 6.0 MGd (22.7 MLd) to 12.0 MGd (45.4 MLd), then comply with its modified National Pollutant Discharge Elimination System permit requirements.

The DoD is working to arrange funding for the primary treatment repairs and upgrades to the NDWWTP. These upgrades would significantly improve the quality of wastewater from the plant and reduce the risk to public health from waterborne diseases. While the DoD would continue to coordinate with GWA and USEPA Region 9 to ensure that GWA implements planned Capital Improvements Program (CIP) projects designed to refurbish the existing primary treatment capability of the NDWWTP and expand it to meet the needs associated with the proposed Marine Corps relocation and associated civilian population growth, the ability of GWA to secure necessary funding for the required CIP projects remains a key concern and potential impediment to the Guam military relocation effort and the return of GWA to full compliance with the requirements of the Clean Water Act (CWA). In the underlying agreements with the GoJ covering the relocation of Marine Corps forces from Okinawa to Japan, the GoJ agreed to provide funding to develop facilities and infrastructure on Guam to support the relocation of Marine Corps forces. These agreements further recognize that necessary infrastructure improvements would cover not only improvements on military installations, but also improvements to the civilian infrastructure. Therefore, the U.S. Government, through the DoD, is currently seeking approximately $50 million in Japanese Fiscal Year 2011 funding from the GoJ to cover required CIP projects necessary for refurbishment and expansion of primary treatment capabilities at the NDWWTP. Such funding would allow necessary improvements to be made by the 2013 required date noted in Volume 6, Chapter 2. If the DoD fails to secure the necessary funding from the GoJ, significant human health impacts would occur from improperly treated wastewater. Furthermore, consistent with the Navy's commitment to apply adaptive program management discussed in Volume 7, failure to secure necessary funding would severely impact construction pace and the ability of the Navy to complete required construction to support the Marine Corps relocation.

The USEPA Region 9 denied GWA's application for a renewed variance from full secondary treatment on September 30, 2009, and concluded that the CWA 301(h) criteria have not been met at the NDWWTP and the Hagatna WWTP. GWA has appealed this ruling, but the results of that appeal are not determined at this time. The NDWWTP discharges into coastal waters on the northwestern shoreline of Guam. The coastal waters in the area of NDWWTP's new deep ocean outfall are considered "Category M-2 Good" marine waters (USEPA 2009).

The previous outfall discharged effluent directly into the Philippine Sea at 2,160 feet (ft) (655 meters [m]) from shore at a depth of 60 ft (18.2 m), and 545 ft (166 m) beyond the reef line. The total length of the previous outfall was approximately 7,272 ft (2,216 m); including a diffuser that was 422 ft (129 m) long at the terminal end of the outfall. The previous outfall consisted of a 5,500-ft (1,676-m), 30-inch (76.2-centimeter) diameter pipe made mainly of Techite piping encased in concrete. The previous diffuser was oriented north to south and located parallel to the shoreline (USEPA 2009).

The new outfall was completed and went into operation in January 2009. The new outfall currently discharges 1,900 ft (580 m) from shore, and at a depth of 140 ft (42.6 m). A 400-ft (121-m) multiport diffuser was to be added to the end of the outfall; however, the diffuser has not yet been added to the new outfall. Because the proposed discharge would be farther away from shore and at a greater depth, and incorporates additional diffuser ports, the USEPA Region 9 predicts that it would have higher dilution (USEPA 2009).

Based on available information, the USEPA Region 9 has concluded that discharge of primary treated effluent through the new deep ocean outfall would not ensure compliance with the requirements of 40

CFR 125.62(a) through (d). The USEPA Region 9 has determined that the proposed discharge would not comply with all Guam water quality standards; and may not provide for the attainment or maintenance of water quality that would ensure the protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife. Concentrations of lead have been predicted to exceed water quality criteria at the zone of initial dilution (ZID) for the proposed discharge. Furthermore, the USEPA Region 9 has determined that the proposed discharge would not meet water quality criteria for bacteria at the ZID; thus, the proposed discharge may adversely affect recreational activities (USEPA 2009).

Ocean waters near the NDWWTP discharge are not considered a source of public water supply. Drinking water has not been established as a designated use for Category M-2 marine waters of Guam. Currently, drinking water supplies are derived from surface and groundwater sources. Therefore, the USEPA Region 9 has concluded that the WWTP discharge would not affect public water supplies (USEPA 2009).

*Apra Harbor WWTP*. Volume 6, Chapter 3 describes the DoD's proposal to use the existing Navy-owned Apra Harbor WWTP to treat sewage generated from new visiting ships to Naval Base Guam. The Apra Harbor WWTP is currently in non-compliance for aluminum, copper, and nickel in its discharge; however, the expected flows from the visiting ships are not expected to increase or change the metals concentrations at the treatment plant. Volume 6, Chapter 3 describes the efforts underway to modify the permit to allow for a ZID for this discharge. The plants current permit capacity allows for these additional flows and the resulting ZID is expected to be issued to account for this full permitted flow.

Ocean waters near the Apra Harbor WWTP discharge are not considered a source of public water supply. Drinking water has not been established as a designated use for Category M-2 marine waters of Guam. Currently, drinking water supplies are derived from surface and groundwater sources. Therefore, WWTP discharge would not affect public water supplies.

**Indirect Impacts.** As described in Volume 6, Chapters 2 and 3, the DoD relocation would result in indirect impacts to the off-base GWA wastewater system from the wastewater collection and disposal needs of the construction workforce and from the induced population that is expected to migrate to Guam. These indirect effects of the DoD relocation would place an increased demand and strain on the existing GWA wastewater system. In their comments on the Draft EIS, the GWA, USEPA Region 9, GEPA, and various GovGuam agencies raised serious concerns over potential environmental and public health impacts on the already noncompliant GWA system from these indirect off-base demands. GWA must repair, replace, and upgrade much of its infrastructure to meet current demand from the existing Guam population and to meet regulatory requirements imposed through ongoing enforcement actions. Concurrently, GWA must plan for, fund, and execute upgrades to meet new demands that are indirectly brought about by the proposed military relocation. Without these repairs and upgrades, environmental and public health impacts would be significant. Pathogens commonly found in wastewater effluent are *Escherichia coli*, Streptococcus, Salmonella, Shigella, mycobacterium, *Pseudomonas aeroginosa*, *Giardia lamblia*, and enteroviruses. Tacnia, Ascaris, and hookworm ova may also be present in raw sewage.

Increased sewage flows in the wastewater collection system may result in more sewage overflows into streets and neighborhoods and more exposure of the population to sewage-borne disease. Additionally, sewage overflows could result in a greater risk of contamination of the groundwater aquifer, which is used as a drinking water source. Increased flows to already failing WWTPs would simply exacerbate an already serious public health problem.

According to GWA's WRMP (GWA 2007), of the seven GWA WWTPs on Guam, four are small onsite plants in the southern portions of the island that are routinely out of compliance and treatment processes are largely bypassed. Some of these smaller plants are non-discharge plants where the plant effluent is dispersed into the soils on site near where people live and recreate. These are the Umatac-Merizo WWTP, the Inarajan WWTP, and Pago Socio WWTP. Since publication of the WRMP (GWA 2007), the very small Pago Socio WWTP was converted to a pumping station sending its wastewater to the Hagatna WWTP. These WWTPs are described in further detail in Volume 6, Chapter 3. The fourth plant, the Baza Gardens WWTP, is a secondary treatment plant that discharges to a small surface water stream. The Agat-Santa Rita WWTP is a secondary treatment plant that discharges to the ocean through an ocean outfall in Tipalao Bay.

Properly designed, installed, and operated, onsite systems can be as effective as municipal WWTPs in reducing the public health risks associated with wastewater; however, contamination of drinking water and surface water caused by onsite systems does occur and people can contract gastrointestinal and other illnesses from drinking groundwater or by coming in contact with surface water affected by wastewater.

In addition to the four remaining small WWTPs in southern Guam, GWA has a large WWTP in the central part of Guam, the Hagatna WWTP. This plant is similar in size and operation to the NDWWTP and is described in Volume 6, Chapter 3. According to GWA's WRMP (GWA 2007) and recent GWA Stipulated Order progress reports, this treatment plant has undergone significant upgrades to address historical compliance problems. The main collection system and pump station for this plant is also slated for upgrades to address chronic problems with sewage overflows. Workforce housing areas are proposed for construction within the collection system of this plant, and induced population is expected to also result in increased flows to this plant. The potential exists for significant public health impacts from the connection of workforce housing and induced population areas to this plant if the upgrades to the collection system and main pump station are not funded.

Likewise, workforce housing areas are proposed for construction within the collection system of the NDWWTP plant. Induced population is expected to also result in increased flows to this plant. The upgrades that are proposed by the DoD to the NDWWTP would mitigate any public health impacts from these additional flows.

The DoD acknowledges the existing sub-standard conditions of key public infrastructure systems and social services on Guam and the desire by many for the DoD to fund improvements to these systems and services. The DoD also recognizes the constraints on the GovGuam to be able to address these indirect impacts of the proposed military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The EAC is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. It is anticipated that Guam clinics and hospitals would not be able to increase staffing to meet current health care service ratios and would not be capable of handling a potential increase in wastewater-related illnesses unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct these deficiencies. In the event increases in health care staffing do not occur, the following impacts on medical treatment would likely arise:

- Longer wait/response times for patients
- Fewer or no available providers on island for chronic or acute issues
- Complications or death from delayed treatment
- Requirements for patients to travel off island to receive adequate treatment

Therefore, at this time, significant impacts on health care services would be anticipated as a result of potential increased wastewater treatment and discharge activities.

### 19.2.5 Solid Waste

The DoD would continue to use the Navy Landfill at Apra Harbor for municipal solid waste (MSW) until the new GovGuam Layon Landfill at Dandan is available for use. Disposal of other waste streams excluded from Layon Landfill would continue at the Navy Landfill. Construction and demolition (C&D) debris would continue to be disposed at the Navy hardfill.

The Layon Landfill is being constructed in compliance with federal Resource Conservation and Recovery Act Subtitle D requirements. Because this landfill would be compliant with Resource Conservation and Recovery Act Subtitle D, no impacts to public health and safety are anticipated from the increase in solid waste disposal on Guam.

The Navy Sanitary Landfill is unlined; therefore, leachate has the potential to affect the underlying groundwater. Studies are currently underway to assess whether or not the underlying groundwater has been affected by leachate. Initial conclusions of these studies show that further evaluation may be required.

### 19.2.6 All Alternatives

#### 19.2.6.1 Construction Phase

Construction activities for all of the proposed utility projects would not be expected to have a significant impact on public health and safety. BMPs would be implemented to control work site safety, waterborne disease increases, and other potential impacts on public health and safety. No DoD construction activities would occur for solid waste management activities. During construction, there would be a less than significant impact on public health and safety.

#### 19.2.6.2 Notifiable Diseases

Volume 2, Chapter 2, Section 2.18 analyzes the potential increase in notifiable disease cases based on the population increase that would result from the implementation of the overall proposed action as well as the related actions, such as the proposed utility projects. The DoD acknowledges the existing sub-standard conditions of health services on Guam and the desire by many for the DoD to fund these services. The DoD also recognizes the constraints on the GovGuam to be able to address these indirect impacts of the proposed military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The EAC is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. Based on the potential for an increase in notifiable diseases, a significant impact on health care services is anticipated unless the federal inter-agency task force succeeds in finding funding or other assistance to help Guam correct health care service deficiencies.

#### 19.2.6.3 Mental Illness

Analysis of potential impacts on mental illness is provided in Volume 2. Utility related issues by themselves should not result in additional mental illness; thus, there should be no impacts from proposed utility actions on mental illness.

#### 19.2.6.4 Traffic Incidents

Analysis of potential increases in traffic incidents is provided in Volume 2. Based on the small potential for increase in traffic incidents, a less than significant impact on the health and safety of the citizens of Guam is anticipated.

#### 19.2.6.5 UXO

The island of Guam was an active battlefield during World War II. As a result of the invasion, occupation, and defense of the island by Japanese forces and the assault by Allied/American forces to retake the island, unexploded military munitions still remain. Excavation for foundations, underground utilities, and other infrastructure could encounter unexploded military munitions in the form of UXO, discarded military munitions, and/or materials potentially presenting an explosive hazard. Exposure to these munitions and explosives of concern (MEC) could result in the death or injury to workers or to the public.

To reduce the potential hazards related to exposure to MEC, in accordance with DoD Directive 6055.9 (DoD Ammunition and Explosive Safety Standard) and Naval Ordnance Safety and Security Activity Instruction 8020.15B, Explosives Safety Submission documentation would be prepared that outlines specific measures that would be implemented to ensure the safety of workers and the public. BMPs that would be implemented include having qualified UXO personnel perform surveys to identify and remove potential MEC prior to initiation of ground-disturbing activities, as necessary. Additional safety precautions would include providing UXO personnel supervision during earth-moving activities, and providing MEC awareness training prior to and during ground-disturbing activities to construction personnel who are involved in grading and excavations. These safety precautions would ensure that potential impacts are minimized; therefore, implementation of the proposed utility projects would result in less than significant impacts to public health and safety (from UXO).

### 19.2.7 Proposed Mitigation Measures

Mitigation measures for potable water would be a combination of the DoD providing excess water capacity to meet increased demands for water resulting from workforce and induced populations off base and for the federal inter-agency task force to succeed in finding funding and/or other assistance to help Guam repair their potable water distribution system. The combination of these actions would provide proper water pressure and leak control, reduce sewer overflows, and reduce the potential increase in potable water–related disease among the civilian population.

The Navy would continue to coordinate with GWA and USEPA Region 9 to ensure that GWA implements planned CIP projects. The CIP projects are designed to refurbish the existing primary treatment capability of the NDWWTP and expand it to meet needs associated with the proposed Marine Corps relocation and associated civilian population growth. However, the ability of GWA to secure necessary funding for the required CIP projects remains a key concern and potential impediment to the Guam military relocation effort and the return of GWA to full compliance with the requirements of the CWA.

In the underlying agreements with the GoJ covering the relocation of Marine Corps forces from Okinawa to Japan, the GoJ agreed to provide funding to develop facilities and infrastructure on Guam to support the relocation of Marine Corps forces. These agreements further recognize that necessary infrastructure improvements would cover not only improvements on military installations, but also improvements to the civilian infrastructure. Therefore, the U.S. Government, through the DoD, is currently seeking approximately $50 million in Japanese Fiscal Year 2011 funding from the GoJ to cover required CIP

projects necessary for refurbishment and expansion of primary treatment capabilities at the NDWWTP. Such funding would allow necessary improvements to be made by the 2013 date noted in Volume 6, Chapter 2. As with refurbishment and expansion of primary treatment, the ability of the GWA to secure necessary funding for CIP projects required to achieve secondary treatment at the NDWWTP remains a concern and potential impediment to the Guam military relocation effort and the return of the GWA to full compliance with the requirements of the CWA. As with efforts to secure funding for required primary treatment refurbishment and expansion, the DoD is working to secure necessary funding, including funding from the GoJ.

Implementation of mitigation measures for the other WWTPs on Guam are not within the control of the DoD. The DoD acknowledges the existing sub-standard conditions of utility infrastructure systems on Guam and the desire by many for DoD to fund improvements to these systems and services. The DoD also recognizes the constraints on the GovGuam to be able to address these indirect impacts of the proposed military relocation. The GovGuam has identified the need for $1.3 B in funding to implement necessary water and wastewater infrastructure improvements that must be accomplished in the first 5 years to accommodate the military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The DoD is seeking approximately $580 million from GoJ for water and wastewater improvement projects pursuant to the terms of the Realignment Roadmap Agreement, described in Volume 1. The EAC is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. As part of this evaluation the EAC is specifically examining federal funding options for water and wastewater infrastructure improvements that may not be funded through GoJ financing. Mitigation measures for providing adequate public health resources would also be for the federal inter-agency task force to succeed in finding funding and/or other assistance to help Guam upgrade their capacity to care for and help prevent increased incidence of illnesses.

### 19.2.8 Summary of Impacts

Table 19.2-1 summarizes the potential impacts of all alternatives. A text summary is provided below.

**Table 19.2-1. Summary of Potential Public Health and Safety Impacts**

| *Potentially Impacted Resource* | *Construction for All Alternatives (direct and indirect identical)* | *Operations for All Alternatives (direct with indirect in parentheses)* |
|---|---|---|
| Power | LSI | LSI (LSI) |
| Potable Water | LSI | LSI (SI) |
| Wastewater | LSI | LSI (SI) |
| Solid Waste | NI | NI (NI) |
| Notifiable Diseases | LSI | SI (SI) |
| Mental Illness | NI | NI (NI) |
| Traffic Incidents | LSI | LSI (LSI) |
| UXO | LSI | NI (NI) |

*Legend:* LSI= Less than significant impact; NI= No impact; SI = Significant impact; UXO = unexploded ordnance.

Based on the increased population of Guam (natural and military increases), requirements for power production, potable water generation, and wastewater treatment could result in an increase in illness from

airborne contaminants and water- and wastewater-related diseases. The DoD acknowledges the existing sub-standard conditions of social services on Guam and the desire by many for the DoD to fund improvements to these systems and services. The DoD also recognizes the constraints on the GovGuam to be able to address these indirect impacts of the proposed military relocation. The Council on Environmental Quality has facilitated interagency meetings with the DoD and appropriate federal agencies to identify funding sources to meet this need. The EAC is evaluating overall Guam civilian hard (e.g., facilities) and soft (e.g., manpower, operations & management) infrastructure needs, including those associated with the proposed DoD military relocation. It is anticipated that Guam clinics and hospitals would not be able to increase staffing to meet current health care service ratios and would not be capable of handling potential increases in utility-related illnesses unless the federal inter-agency task force succeeds in finding funding and/or other assistance to help upgrade the deficiencies in health care. In the event health care staffing increases do not occur, the following impacts on medical treatment would likely arise:

- Longer wait/response times for patients
- Fewer or no available providers on island for chronic or acute issues
- Complications or death from delayed treatment
- Requirements for patients to travel off island to receive adequate treatment

Therefore, significant impacts on health care services would be anticipated. No impacts are anticipated from increased solid waste disposal.

The potential impact on Guam health care services from increases in disease occurrences as a result of the proposed utility projects would be significant. There is no potential impact on Guam health care services from increases in mental health occurrences as a result of the proposed utility projects. The potential increase in the number of traffic accidents and fatalities would be minimal, resulting in a less than significant impact on the health and safety of Guam citizens.

Excavation for underground utilities and other infrastructure could encounter unexploded military munitions. To reduce the potential hazards related to the exposure to MEC, qualified UXO personnel would perform surveys to identify and remove potential items of MEC prior to the initiation of ground-disturbing activities. UXO supervision during earth-moving activities and providing MEC awareness training to construction personnel prior to and during ground-disturbing activities would also be undertaken. The identification and removal of MEC prior to initiating construction activities and training construction personnel regarding hazards associated with MEC would ensure that potential impacts would be minimized and would be less than significant. During operations, the potential exposure to MEC would be essentially non-existent, so no impacts would result.

### 19.2.9 Roadways

Construction activities would consist of intersection improvements, bridge replacements, pavement strengthening, road relocation, road widening, and construction of a new road. Typical activities associated with each of these types of projects are described in Volume 6, Chapter 2. Most projects would involve construction work in developed and paved areas, and some roadway projects require work in undeveloped locations. Construction activities would occur during a 7-year period from 2010 through 2016, with the peak roadway construction year of 2013/2014.

The proposed GRN project and associated construction haul roads would be designed in accordance with the American Association of State Highway and Transportation Officials standards and guidelines, with particular focus on improving safety and reducing traffic congestion. Construction of roadway segments

and bridge replacement projects would require the use of temporary detours, limited road closures, and alternate routes that would be established during localized road work. These temporary routes would represent alternate ways of reaching destinations. While such detours may be perceived as an inconvenience to the public, temporary roadways would be established with safety measures, such as proper signage and reduced speed limits, as appropriate for temporary construction zones. With implementation of these protective measures, potential impacts to public health and safety would be reduced to a less than significant level.

Potential impacts to public health and safety can occur during roadway construction activities (i.e., cut and fill operations, removal of vegetation, and use of heavy equipment) and as a result of leaks and spills onto soils during construction. Impacts from potential exposure to contaminated soil, use of hazardous materials, and generation of hazardous waste can also result in a public health concern (see Volume 6, Chapter 18). Direct impacts that result in physical injury could occur during construction, while indirect impacts can result from the completed project (e.g., accidents and injuries that would occur in the future). To evaluate the potential public health and safety impacts of roadway improvement projects, physical activities associated with each project type were identified as shown in Table 19.2-2.

**Table 19.2-2. Activities Associated with GRN Roadway Project Types**

| *Item* | *Project Type* | *Temporary Detours* | *Temporary Storage of Contaminants* | *Exposure to Unexploded Ordnance* |
|---|---|---|---|---|
| 1 | Intersection Improvement (including military access points) | • | • | • |
| 2 | Bridge Replacement | • | • | • |
| 3 | Pavement Strengthening | • | • | • |
| 4 | Road Relocation (Route 15 only) | • | • | • |
| 5 | Road Widening | • | • | • |
| 6 | Construction of New Road | • | • | • |
| 7 | Temporary placement of equipment laydown areas or storage areas for road demolition material | | • | • |

Based on the anticipated activities associated with each project type, it was determined that:

- Each of the roadway improvement project types would have the same degree of exposure to possible increased hazards from use of temporary road detours during the construction period. Temporary road detours would generally be required for all road work.
- The placement of temporary equipment laydown areas at any of the GRN project work sites would represent a moderate potential for impacts to public health and safety due to the potential storage of fuels, oils, and lubricants that would be used during the construction period. The health risk associated with this activity would only occur if the spill or leak is not addressed, contaminants leached into the soil, and petroleum products were to enter any drinking water supply. To avoid this impact, proper containment and use of these potential contaminants would be required at temporary construction staging areas. The potential for contaminants leaching into the soil would be prevented or managed through implementation of spill prevention and emergency spill response procedures. These procedures would reduce the possibility for leaks or spills of contaminants to occur at equipment staging areas.
- Contaminated soils may be present in the roadway work area. Exposure to contaminated soils may pose a health risk for construction workers. To avoid this impact, roadway design may include an evaluation of potential contamination. Final roadway design would avoid known

contaminated sites wherever possible and may include coordination with the responsible party to ensure that construction does not interfere with any ongoing remediation activities. These procedures would reduce the possibility for exposure to areas of contamination.

- Each of the roadway improvement project types would have the same degree of potential exposure to possible hazards from encountering UXO during the construction period. To avoid this impact, qualified UXO specialists would perform surveys to identify and remove potential ordnance from the work site prior to the start of construction. This procedure would reduce the possibility for public exposure to UXO.

Indirect impacts during operation of the new GRN roadway could also occur. These safety hazards would be limited to those associated with the lack of familiarity to the road system, the effects of improper maintenance, and the potential for contaminants leaching into the soil.

- Safety hazards from initial use of the new roadway network could occur if there is a lack of familiarity with the road system. Because the GRN project would result in a 7-year process of roadway improvements, safety hazards would not be expected because of improved signalization, signage, and lighting that would be installed on the existing roadway configuration. Pavement improvements to reduce accidental skidding would also improve safety. The GRN project includes only one roadway relocation (Route 15) and one new roadway (Finegayan Connection). The new GRN system would include comprehensive improvements designed to prevent accidents or injury and improve congestion management. With ongoing and planned traffic safety programs, the new GRN system would not be expected to affect the frequency of automobile accidents. The new roadway network would be expected to result in a decrease in safety hazards.
- Improper maintenance can lead to road deterioration from erosion and pavement damage that can result in localized safety hazards. The maintenance of roads on Guam would continue to be the responsibility of the Guam Department of Public Works.
- The potential for spills of fuels, oils, and lubricants that could occur on the new roadway network would be increased due to the number of additional heavy vehicles that would use the new roads and bridges. The health risk associated with this activity would only occur if the spill were not contained, contaminants were leached into the soil or water body, and contaminants were to enter a drinking water supply or water body that is used for edible fish. To avoid this impact, spill prevention and emergency spill response procedures would be implemented.

Projects with the most potential for increased vulnerability to safety hazard would be those located in areas of high liquefaction potential and those in or near karst geological formations (nearest to known sinkholes or caves). In general, the potential vulnerability to effects from seismic activity is consistent throughout the island because of the presence of known and inferred earthquake faults that transect Guam. The potential for safety hazard due to geologic considerations would be addressed by proper roadway or bridge design, as discussed in the geology and soils chapter in Volume 6.

#### 19.2.9.1 Alternative 1

Alternative 1 would result in direct potential impacts to public health and safety during the construction period as a result of exposure to possible increased hazards from the use of temporary road detours and possible hazards from encountering UXO. Impacts on geological resources could include soil disturbance and soil loss, localized erosion, and particulate emissions. Ground disturbance for roadway improvements would be conducted in accordance with standard construction BMPs, general requirements in accordance

with the GovGuam Soil Erosion and Sediment Control Regulations, and associated permit conditions, including applicable stormwater pollution prevention plans. With implementation of BMPs, impacts to public health and safety would be less than significant.

North

GRN projects in the North Region would be designed and constructed with safety principles to ensure that exposure to hazards is prevented or minimized. With implementation of BMPs, impacts to public health and safety would be less than significant.

Central

GRN projects in the Central Region would be designed and constructed with safety principles to ensure that exposure to hazards is prevented or minimized. As stated in the geology and soils chapter, roadway improvements near known caves and sinkholes would be designed in accordance with recommendations of the site-specific geotechnical investigation. With implementation of BMPs, impacts to public health and safety would be less than significant.

Apra Harbor

GRN projects in the Apra Harbor Region would be designed and constructed with safety principles to ensure that exposure to hazards is prevented or minimized. With implementation of BMPs, impacts to public health and safety would be less than significant.

South

GRN projects in the South Region would be designed and constructed with safety principles to ensure that exposure to hazards is prevented or minimized. With implementation of BMPs, impacts to public health and safety would be less than significant.

Proposed Mitigation Measures

No mitigation measures would be required. In addition to the proposed mitigation measures identified for Hazardous Materials and Waste (see Volume 6, Chapter 18), the following BMPs would be implemented for activities that could impact public health and safety in the project area:

- Design and construct individual roadway projects in accordance with American Association of State Highway and Transportation Officials standards and guidelines.
- Ensure that contaminants (i.e., oils, greases, lubrication fluids for heavy equipment) are properly stored at the work site and at temporary construction staging areas to avoid spills and leaks.
- Ensure that emergency response plans are in place for responding to leaks or spills of construction contaminants.
- Conduct surveys by qualified UXO specialists before construction starts to identify and remove potential ordnance from the work site. As an added precaution, UXO personnel would conduct munitions and explosives training of construction crews, and be assigned to monitor earthmoving activities.

19.2.9.2 Alternative 2 (Preferred Alternative)

North

Impacts would be similar to Alternative 1.

Central

Impacts would be similar to Alternative 1.

Apra Harbor

Impacts would be similar to Alternative 1.

South

Impacts would be similar to Alternative 1.

Proposed Mitigation Measures

No mitigation measures would be required. BMPs would be identical to Alternative 1.

19.2.9.3 Alternative 3

North

Impacts would be similar to Alternative 1.

Central

Impacts would be similar to Alternative 1.

Apra Harbor

Impacts would be similar to Alternative 1.

South

Impacts would be similar to Alternative 1.

Proposed Mitigation Measures

No mitigation measures would be required. BMPs would be identical to Alternative 1.

19.2.9.4 Alternative 8

North

Impacts would be similar to Alternative 1.

Central

Impacts would be similar to Alternative 1.

Apra Harbor

Impacts would be similar to Alternative 1.

South

Impacts would be similar to Alternative 1.

Proposed Mitigation Measures

No mitigation measures would be required. BMPs would be identical to Alternative 1.

2013/2014 (Peak Construction)

The year 2013/2014 represents the roadway network without any future plans for improvements for the military relocation. While no construction associated with the planned military relocation would occur,

the GovGuam would have initiated construction of road segment and intersection improvement projects along segments of Routes 1, 7, 10A, and 27 (extension), and the Tiyan Parkway, as identified in Volume 6, Chapter 2.

2030

The year 2030 represents the roadway network without any future plans for improvements for the military relocation. While no construction associated with the planned military relocation would occur, the GovGuam would have completed construction of road segment and intersection improvement projects along segments of Routes 1, 2, 4, 7A, 16, 25, and 26, as identified in Volume 6, Chapter 2.

### 19.2.9.5 Summary of Impacts

Table 19.2-3 summarizes the potential impacts of each interim alternative. An analysis of long-term alternatives was not developed because the alternatives are not ready for project-specific analysis. A text summary is provided below.

**Table 19.2-3. Summary of Potential Impacts to Public Health and Safety-Roadway Project**

| *Potential Impacts* | *Alternative 1* | *Alternative 2** | *Alternative 3* | *Alternative 8* |
|---|---|---|---|---|
| Temporary Detours – Exposure of public to traffic hazards during roadway construction. | LSI | LSI | LSI | LSI |
| Exposure to contaminants that have leached into the soil. | LSI | LSI | LSI | LSI |
| Increased exposure to hazards from UXO. | LSI | LSI | LSI | LSI |
| Improper maintenance resulting in road deterioration from erosion and pavement damage. | LSI | LSI | LSI | LSI |

*Legend:* LSI = Less than significant impact; UXO = unexploded ordnance. *Preferred Alternative.

Construction activities would consist of intersection improvements, bridge replacements, pavement strengthening, road relocation, road widening, and construction of a new road. Each type of roadway construction project would require the use of temporary road detours. Improper storage of construction materials could result in spills or leaks that could result in contaminants leaching into the soil and water bodies. There would be a potential for encountering UXO in the construction zone. For these reasons, specific BMPs would be implemented to avoid or minimize these potential effects on public health and safety. Roadways and bridges would be designed in accordance with specific geotechnical considerations to prevent risk from geologic hazards. The proposed GRN project would not be expected to subject the public to an increased risk of personal injury from automobile crashes or from exposure to UXO. With implementation of BMPs for roadway construction, potential impacts to public health and safety would be less than significant.

### 19.2.9.6 Summary of Proposed Mitigation Measures

No mitigation measures above those of identified BMPs and Standard Operating Procedures are proposed for roadway projects impacts to public health and safety.