4.16 HAZARDOUS MATERIALS AND WASTE

Section 4.16 evaluates potential direct and indirect impacts resulting from hazardous materials, toxic substances, hazardous waste, and contaminated sites associated with the proposed action. Section 3.16, *Hazardous Materials and Waste* and Appendix R, *Hazardous Materials and Waste Technical Memo,* provide definitions for the terms used in this section (e.g., hazardous materials, hazardous waste, toxic substances) and general background information on the hazardous materials and waste resource category. Information from this section is also used in the impact analysis in Section 4.3, *Water Resources*; Section 4.9, *Terrestrial Biology*; Section 4.10, *Marine Biology*; Section 4.13, *Transportation*; and Section 4.17, *Public Health and Safety*.

4.16.1 Approach to Analysis

The methodology for identifying and evaluating impacts to hazardous materials and waste as they relate to the proposed action and alternatives includes the assessment of transport, storage, dispensing, handling, and disposal of hazardous materials, toxic substances, and/or hazardous waste (i.e., hazardous substances) on and to and from Tinian and Pagan and the potential for increased human health risk or environmental exposure, as well as changes in the quantity and types of hazardous substances transported, stored, used, and disposed of during construction and operation. Existing contaminated sites were also identified and the locations of these sites were compared with the locations of the proposed construction and operation activities associated with the proposed action, and the existing and proposed avoidance measures.

Knowledge of existing processes and available data were used to predict the type and quantity of hazardous materials, toxic substances, and hazardous waste that would likely be used, encountered, or generated through implementation of the proposed action. These estimates were compared with current usage and generation rates, waste types, and the capability for managing hazardous materials, toxic substances, and hazardous waste. Quantitative impact criteria are not available, so the significance of impacts is determined qualitatively based on the degree of change as well as compliance with regulatory standards, where applicable.

The Comprehensive Environmental Response, Compensation, and Liability Act and CNMI regulations establish the process for responding to releases of hazardous materials. Toxic substances are regulated by the Toxic Substances Control Act. The Resource Conservation and Recovery Act and CNMI regulations establish a process for storage, handing, and disposal of hazardous waste as well as requirements for underground storage tanks. Pesticide application and handling requirements are established under the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Environmental Pesticide Control Act. U.S. Department of Transportation regulations establish the requirements for transporting hazardous substances. The CNMI has adopted rules of the Military Munitions Program. See Appendix R, *Hazardous Materials and Waste Technical Memo,* for an in-depth description of applicable federal and CNMI specific regulations on Tinian and Pagan.

4.16.2 Resource Management Measures

Resource management measures that are applicable to hazardous materials and waste include the following:

4.16.2.1 Avoidance and Minimization Measures

- As part of the planning process, hazardous materials and waste storage facilities were specifically sited away from areas prone to flooding or geological hazards. In addition, encroachment and intersection with known contaminated sites was minimized to the maximum extent practicable.

4.16.2.2 Best Management Practices and Standard Operating Procedures

Best management practices and standard operating procedures that are applicable for hazardous materials and waste are listed below and described in Appendix D, *Best Management Practices*.

- Erosion Control Measures. The erosion control measures such as retention ponds, swales, silt fences, fiber rolls, gravel bag berms, mulch, and erosion control blankets would be implemented during construction and operations to eliminate and/or minimize nonpoint source pollution in surface waters due to sediment.
- Spill Prevention, Control, and Countermeasures. Spill Prevention, Control, and Countermeasures such as the preparation of a Spill Prevention Control and Countermeasure Plan would be implemented to ensure that personnel are trained as to proper labeling, container, storage, staging, and transportation requirements for hazardous substances and to ensure personnel are properly trained with regards to spill prevention, control, and cleanup methods.
- Facility Response Programs. Facility Responses Programs such as the preparation of a Facility Response Plan would be implemented to outline the procedures to assess, respond, and report releases, leaks, or spills of hazardous substances.
- Hazardous Waste Management Programs. Hazardous Waste Management Programs would include waste minimization plans that provide protocols designed to encourage and promote the efficient use of hazardous waste, substitute products that are less toxic whenever feasible, minimize their use, and promote recycling and reuse of hazardous waste.
- Hazardous Materials Management Programs. Hazardous Material Management Programs would implement procedures for the transportation, storage, use, and disposal of hazardous materials. Procedures would also include waste minimization plans that provide protocols designed to encourage and promote the efficient use of hazardous materials, substitute products that are less toxic whenever feasible, minimization of their use, and promote recycling and reuse of hazardous materials.
- Occupational Health and Safety Administration Compliance. Occupational Health and Safety Administration Compliance would include the preparation and implementation of a construction health and safety program that complies with federal and local health and safety regulations.
- Pest Control Measures. Pest Control Measures would include the development and implementation of a comprehensive Integrated Pest Management Plan. This Plan would

encompass all activities regarding the importation, handling, storage, use, and application of pesticides.

- Munitions and Explosives of Concern Protocol, Procedures, and Guidance. Munitions and Explosives of Concern Protocol, Procedures, and Guidance would include compliance with Naval Ordnance Safety and Security Activity Instruction 8020.15D Explosives Safety Review, Oversight, and Verification of Munitions Responses and other directives to reduce the potential exposure to unexploded ordnance; implement routine firing range clearance operations; implement all applicable U.S. military munitions and explosives of concern operations guidance to minimize or eliminate potential hazards; implement land use controls, and provide training on identifying and responding to munitions and explosives of concern.
- Range Management Measures: Range management measures may include the use of impoundments, traps, or other structures to catch lead particles in sediments transported away from objective or target areas and engagement zones by runoff and the application of buffering agents such as limestone, gypsum, and dolomite to maintain a more neutral pH in areas where lead may come in contact with rainwater (e.g., berms in static ranges).
- Radon Control Measures. Radon Control Measures include radon resistant construction methods, installation of radon abatement systems, and periodic radon monitoring.
- Range Environmental Vulnerability Assessment Program as described below.

As discussed in Section 4.3.2, *Resource Management Measures* (for Water Resources), the Range Environmental Vulnerability Assessment program was developed to understand the current environmental conditions at all operational ranges and ensure range activities are not causing an adverse impact to human health and/or the environment. The Range Environmental Vulnerability Assessment program assesses the potential environmental impacts of military munitions use on existing operational ranges and determines whether there has been a release or a substantial threat of a release of munitions constituents to an off-range area. The primary pathways evaluated under the Range Environmental Vulnerability Assessment program include surface water, groundwater and sediment transport.

Operational ranges that are addressed under the Range Environmental Vulnerability Assessment program include target/impact areas, firing positions, small arms ranges, and training and maneuver areas. The Range Environmental Vulnerability Assessment program also assesses areas with historical training munitions use within operational range boundaries. The Range Environmental Vulnerability Assessment program does not evaluate future ranges or ranges that are covered under a separate program (e.g., cleanup of closed ranges under the Munitions Response Program, permitted Open Burning/Open Detonation sites under the Resource Conservation and Recovery Act). The Range Environmental Vulnerability Assessment program provides a snapshot of the current environmental conditions of operational ranges across the Marine Corps and a detailed assessment of potential munitions constituent migration from operational ranges to off-range areas. The Range Environmental Vulnerability Assessment program uses munitions expenditures data, sampling information, any changes to range use or operations along with data from previous assessments to conduct the analysis. Reevaluations occur at a minimum of every 5 years.

See Section 4.3, *Water Resources*, for discussion of impacts associated with hazardous materials to these resources.

4.16.3 Tinian

4.16.3.1 Tinian Alternative 1

4.16.3.1.1 Construction Impacts

4.16.3.1.1.1 Hazardous Materials

The majority of construction activities, including vegetation removal, grading, excavation, and construction, would take place in the Military Lease Area. There would also be construction activity at the Tinian International Airport, the Port of Tinian, and the proposed Primary Military Munitions Supply Route (Supply Route) from the Port of Tinian to the Munitions Storage Area on the northwestern end of Tinian International Airport (see Figures 4.16-1 and 4.16-2).

Construction activities would cause a short-term increase in the use of hazardous materials that would end when the construction is finished. Most of the hazardous materials expected to be used are common to construction (e.g., diesel fuel, gasoline, and propane; hydraulic fluids, oils, and lubricants; welding gases; paints and solvents; adhesives; and batteries). The increased volume and use of hazardous materials during the construction period would present a potential for increased accidental spills and releases of hazardous materials, resulting in potential impacts to human health and the environment. The hazardous materials would be handled, stored, and disposed according to applicable best management practices; standard operating procedures; and federal and CNMI regulations.

Hazardous materials would be brought to construction sites using existing or proposed public transportation routes. Transportation of all materials would be conducted in compliance with the U.S. Department of Transportation regulations and CFR Title 49. Following the best management practices and standard operating procedures and compliance with federal and CNMI regulations would reduce the likelihood and volume of accidental releases, allow for faster spill response times, and enable timely cleanup.

Construction of the amphibious landing area at Unai Chulu and Bulk Fuel Storage Facility at the Port of Tinian would have the potential for accidental fuel spills in marine and nearshore waters. However, best management practices and standard operating procedures to manage and minimize potential accidental releases of fuel, petroleum, oils, and lubricants would be followed.

The proposed Supply Route leading from the Port of Tinian to the Military Lease Area would not overlap sections of an above ground and underground pipeline that carries diesel from the Mobil bulk fuel storage tank at the Port of Tinian to the Commonwealth Utility Corporation Tinian power plant (Figure 4.16-3); therefore, there would be no impacts to the existing diesel pipeline.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, construction activities associated with Tinian Alternative 1 would not significantly increase the potential for impacts from hazardous materials. Therefore, Tinian Alternative 1 construction would result in less than significant direct and indirect impacts with respect to hazardous materials.

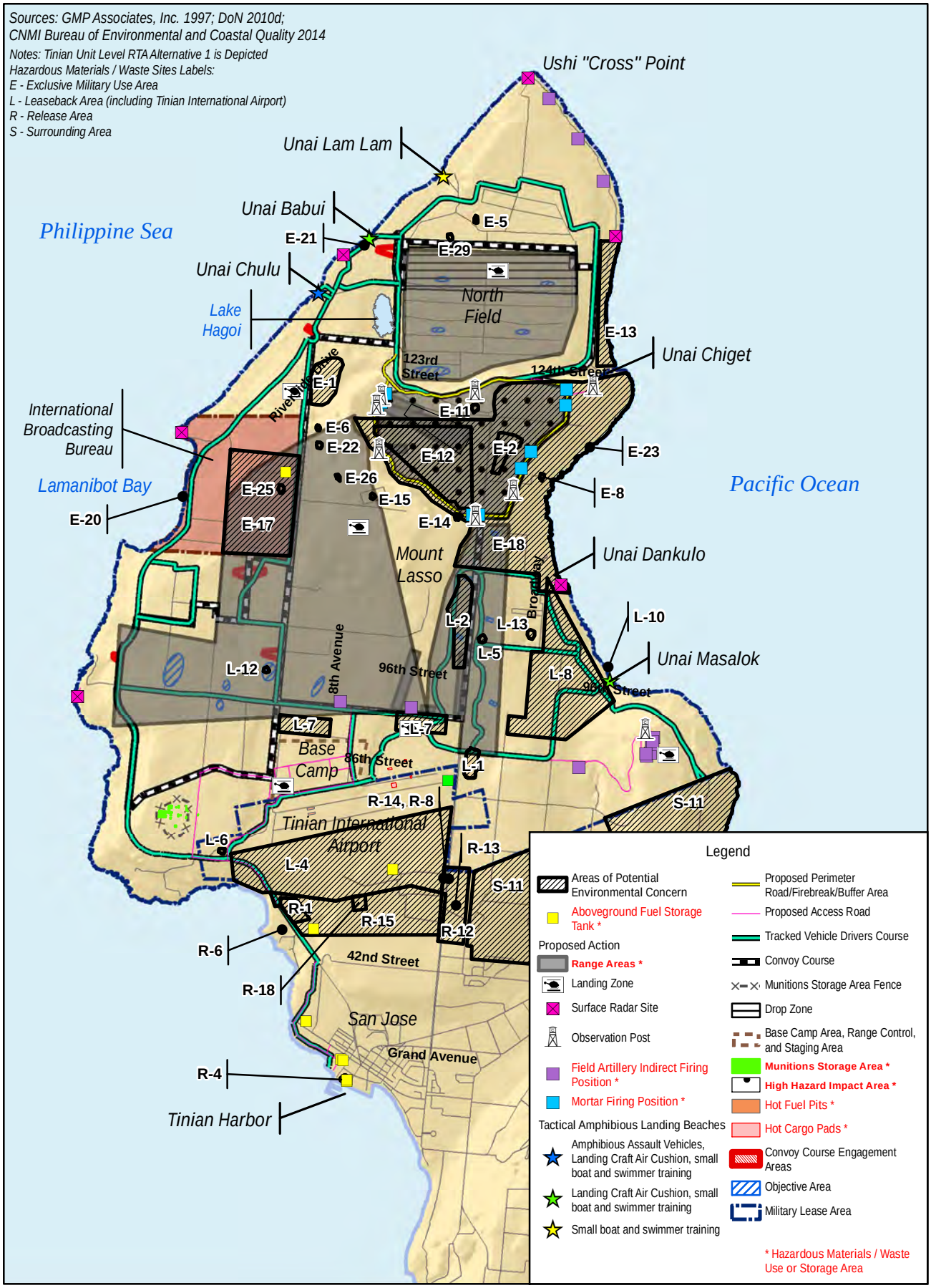


Figure 4.16-1
Tinian All Action Alternatives Hazardous Materials / Waste Use, Storage Areas and Contaminated Sites for Range Training Area

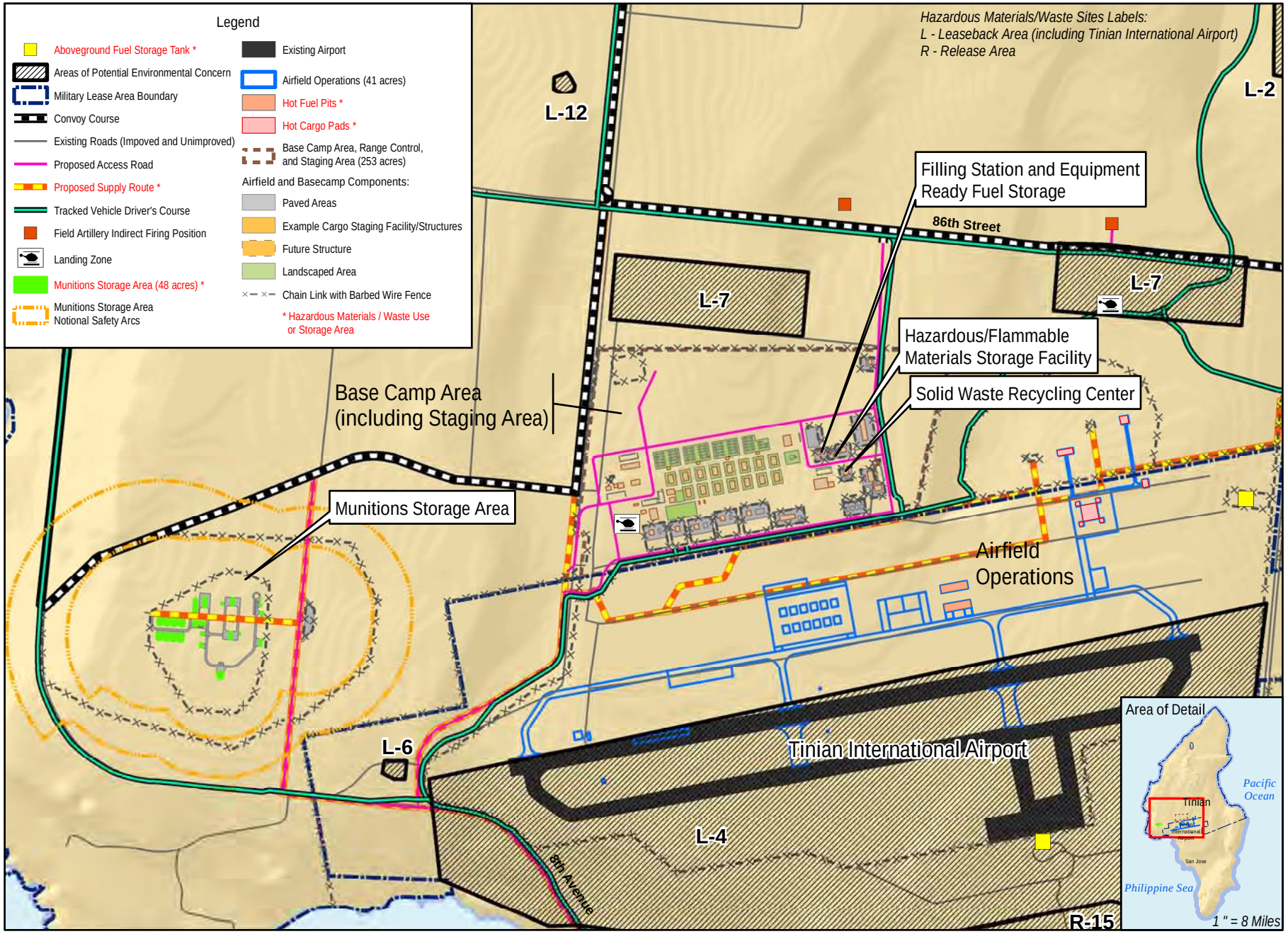


Figure 4.16-2
Tinian All Action Alternatives Hazardous Materials/Waste Use and Storage Areas Base Camp, Munitions Storage, and Airport Improvements

NORTH

Source: NAVFAC Pacific 2013

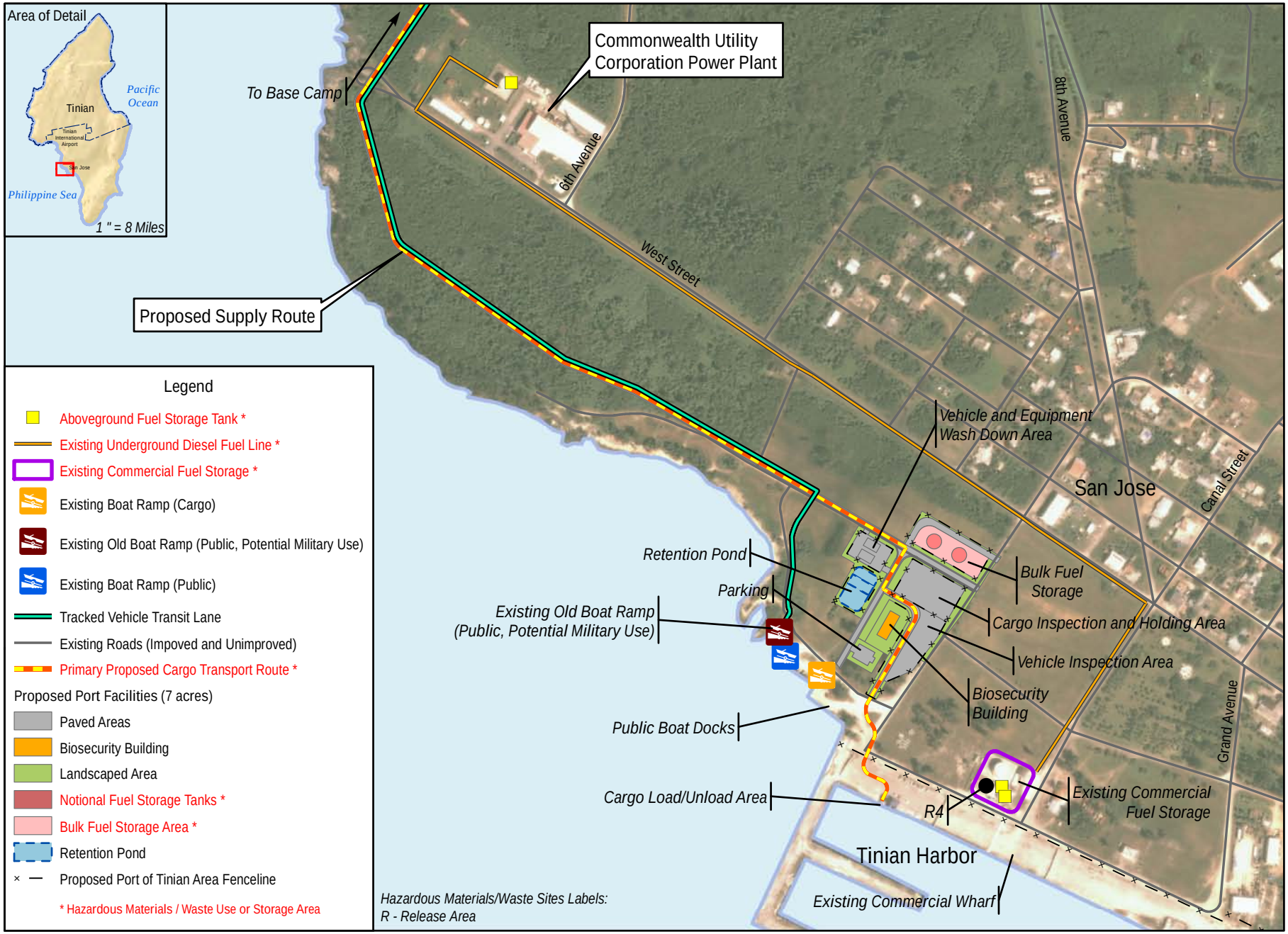


Figure 4.16-3
Tinian All Action Alternatives Hazardous Materials/Hazardous Waste Use and Storage Areas for Tinian Port and Supply Route

Source: NAVFAC Pacific 2013

4.16.3.1.1.2 Toxic Substances

Although unlikely, construction and demolition may reveal asbestos-containing materials, lead-based paint, or polychlorinated biphenyls that were used in building materials or electrical equipment at the time of original construction. If any of these toxic substances are encountered, properly trained and licensed contractors would be used to ensure that all U.S. military, federal, and CNMI hazardous waste testing, handling, and disposal procedures and requirements are followed for their collection and disposal. Because the U.S. Environmental Protection Agency banned lead-based paint in 1978, and banned most uses of polychlorinated biphenyls in 1979, these toxic substances would not be used to construct the proposed new facilities on Tinian; nor would asbestos-containing materials be used.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, construction activities associated with Tinian Alternative 1 would not significantly increase the potential for impacts from toxic substances. Therefore, Tinian Alternative 1 construction would result in less than significant direct and indirect impacts with respect to toxic substances.

4.16.3.1.1.3 Hazardous Waste

Construction activities would result in a short-term increase in the generation of hazardous waste that would end when construction is finished. Hazardous waste generated from construction activities includes pesticides, herbicides, solvents, adhesives, lubricants, corrosive liquids, batteries, and aerosols. Due to the projected increase in generation of hazardous waste, this alternative would have the potential to result in adverse impacts to human health and the environment (i.e., soils, surface water, groundwater, air, and biota). However, the hazardous waste would be handled and disposed per applicable best management practices and standard operating procedures (see Appendix D, *Best Management Practices*). Construction contractors would be required to comply with all applicable requirements concerning handling, storage, and disposal of construction-related hazardous waste. All hazardous waste would be shipped off the island to the appropriate disposal facility site. Existing public transportation routes, including shipping by commercial carrier, would be utilized for the conveyance of hazardous waste to the disposal facility site. Transportation of all hazardous waste would be conducted in compliance with U.S. Department of Transportation regulations and CFR Title 49.

Based upon the above analysis and through implementation of resource management measures described in Section 4.16.2, the temporary increase in the generation, transport, storage, and handling of hazardous waste during construction activities associated with Tinian Alternative 1 would not significantly increase the potential for impacts from hazardous waste. Therefore, Tinian Alternative 1 construction would result in less than significant direct and indirect impacts with respect to hazardous waste.

4.16.3.1.1.4 Contaminated Sites

As shown in Figure 4.16-1, several contaminated sites have been identified within or near the proposed Tinian Alternative 1 construction areas. Consideration and careful attention during project design phases would be given prior to construction to either avoid these sites as much as practicable. Proposed RTA facilities and infrastructure would exclude the Tinian Mortar Range (also called Chiget Mortar Range) (see Figure 4.16-1). If proposed construction projects cannot be designed to avoid these contaminated

sites, then various best management practices and construction operational protocols would be followed to protect human health and the environment.

In addition, best management practices that would be used include, but are not limited to, development of site-specific health and safety plans; the use of engineering controls (e.g., dust suppression) and administrative controls; and the use of personal protective equipment (see Appendix D, *Best Management Practices*, for a discussion of proposed best management practices).

Explosives safety documentation would be prepared and would outline specific measures that would be implemented to ensure the safety of workers and the public. This would reduce the potential hazards related to the exposure to unexploded ordnance. It would also be in accordance with Department of Defense Instruction 3200.16, Operational Range Clearance (Department of Defense 2005), Department of Defense Instruction 4140.62, Material Potentially Presenting and Explosive Hazard (Department of Defense 2014), Department of Defense Directive 6055.9, Department of Defense Ammunition and Explosive Safety Submission (DoN 2010a), and Naval Ordnance and Safety and Security Activity Instruction 8020.15D (DoN 2011). Best management practices that would be implemented include having qualified operational range clearance or unexploded ordnance personnel perform surveys to identify and remove potential unexploded ordnance before the start of ground-disturbing activities to minimize potential impacts. However, additional safety precautions could include operational range clearance or unexploded ordnance personnel supervision during earth moving and providing a safety awareness/hazardous assessment brief to construction contractors and equipment operators to train them to identify whether materials are unexploded ordnance that potentially present an explosive hazard. Any unexploded ordnance identified during construction would be disposed of in accordance with applicable regulations.

The design of Tinian Alternative 1 would either avoid the disturbance and dispersion of soil and groundwater at contaminated sites, or use of best management practices to minimize impacts. Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, construction activities associated with Tinian Alternative 1 would not significantly increase the potential for impacts to contaminated sites. Therefore, Tinian Alternative 1 construction would result in less than significant direct and indirect impacts with respect to contaminated sites.

4.16.3.1.2 Operation Impacts

4.16.3.1.2.1 Hazardous Materials

Munitions and Explosives of Concern

Figure 4.16-1 shows the locations of live-fire range complexes and the Convoy Course associated with Tinian Alternative 1. Activities associated with live-fire range operations would result in increased hazardous materials in the form of munitions and explosives of concern and heavy metals. This is because unexploded ordnance, military munitions, and munitions constituents (i.e., chemical components of munitions) have the potential to contain high explosives, explosives constituents, and potentially leachable compounds (i.e., heavy metals that dissolve in water). Training ranges within Range Complexes A, B, C, and D as well as the Convoy Course objective areas would receive spent munitions (e.g., bullets, grenades, rockets, mortars). The High Hazard Impact Area (within Range

Complex A) would receive high explosive munitions such as grenades, mortars, and rockets, as well as inert aviation ordnance.

In general, when munitions are fired, the explosives constituents are consumed in the explosion. Trace amounts of explosives may be detectable on remaining metal components, such as small arms projectiles and hand grenade and mortar fragments. Inert aviation ordnance used on Tinian would be filled with materials such as concrete that do not contain any hazardous constituents. Spotting charges in the inert aviation ordnance and explosives in flares would also be almost entirely consumed in firing the munition except for the dudded munitions and fusing failures.

With the implementation of resource management measures described in Section 4.16.2, the negligible amounts of explosives constituents remaining on projectiles and fragments would not be a source of potential contamination to surface water or groundwater. Munitions constituents, in particular heavy metals (i.e., lead, nickel, chromium, cadmium, and copper), do not break down easily and tend to build up in surface soils. They may rust or otherwise react with natural substances, but do not break down like organic compounds. Therefore, the volume of expended material within the training areas would gradually increase over time (DoN 2010b). As discussed in Section 4.3, *Water Resources*, Low Impact Development features would be utilized to control stormwater runoff from the ranges. Range management activities may include the use of impoundments, traps, or other structures to catch lead particles in sediments transported away from objective or target areas and engagement zones by runoff and the application of buffering agents such as limestone, gypsum, and dolomite to maintain a more neutral pH in areas where lead may come in contact with rainwater (e.g., berms in static ranges). These, range management activities would minimize the accumulations of munitions constituents.

The majority of munitions constituents released to the environment originate from munitions that either partially detonate or do not detonate at all (DoN 2010b). Munitions constituents in partially or unexploded ordnance are contained within the munition itself and release of munitions constituents due to corrosion of the casing may take a long time to occur, although salt spray and humidity may accelerate deterioration of the casing (DoN 2010b). Unexploded ordnance would occur in Range Complex A (High Hazard Impact Area).

The RTA would be managed in accordance with current Marine Corps range management policies and procedures, which are designed to ensure the safe, efficient, effective, and environmentally sustainable use of the ranges. To minimize potential impacts of munitions constituents accumulating and/or migrating in soil and surface water/groundwater, routine range clearance operations would be scheduled and conducted, as needed. Munitions that fail to function as intended during the training activity would be tracked by the Range Control Facility and rendered safe by Explosive Ordnance Disposal Technicians. Applicable U.S. military munitions and explosives of concern operations guidance protocols would also be implemented to mitigate adverse impacts from munitions and explosives of concern, including deposits that have the potential to leach into the subsurface. Best management practices would be implemented to minimize or eliminate direct runoff of munitions and explosives of concern and surficial soil into adjacent areas. Live-fire training would produce ammunition shell casings that would be collected and sent to an authorized recycling center.

All surface danger zone boundaries for munitions impacts extend over much of the Military Lease Area and portions of the adjacent open ocean, so it is unlikely that munitions would land outside the Military

Lease Area. However, it is possible that munitions could fall into ocean waters (i.e., due to ricochet or breakup of munitions after detonation). In the unlikely event that a fragment should land in the ocean, concentrations of munitions constituents would be very low due to the dilution from seawater.

Fuels, Petroleum, Oils, and Lubricants

Training and maintenance activities would require the use of vehicles that would result in an increase in the amount of fuel, petroleum, oils, and lubricants used. During training exercises, the Forward Arming and Refueling Point would be staged on existing pavement at North Field, within berms containing impervious liners or secondary containment. The Forward Arming and Refueling Point for North Field would be a temporary, mobile field facility that would be set up and broken down in the Drop Zone as part of the training exercise, so it would not have a designated permanent location (see Figure 4.16-1).

Beach and amphibious training maneuvers and the use of Amphibious Assault Vehicles would have the potential for accidental fuel spills in marine and nearshore waters. However, best management practices and standard operating procedures would be used to manage and minimize potential accidental releases of fuel, petroleum, oils, and lubricants (see Appendix D, *Best Management Practices*).

Used military vehicles with potential contaminants would not be used as targets at any of the training ranges. All targets would be three dimensional representations constructed of sheet metal.

Figure 4.16-2 shows the locations of hazardous materials and hazardous waste use/storage areas that would be constructed for all alternatives. Hazards materials storage facilities on Tinian would be constructed using best management practices for construction in any unavoidable areas that are known to have seismic and tsunami hazards to minimize potential impacts from geologic hazards. A fueling station would be constructed at the Tinian base camp and two military bulk fuel storage areas (with a 30-day fuel capacity of 500,000 gallons [1,900,000 liters]) would be established at the port (see Figure 4.16-3). The operation of the Bulk Fuel Storage facility and off-load terminal would require an Oil Pollution Act of 1990 permit. Fuel would be delivered by military or civilian vessels to the military bulk fuel facility at the port then trucked to the expeditionary airfield-base for storage in a smaller aboveground storage tank. Air resupply may also be used to deliver bulk fuel to the expeditionary bulk fuel storage facility at the airfield base camp. The transport and transfer of fuel has the potential to result in accidental releases from spills. The military fuel storage facilities would be constructed with secondary containment and other controls to prevent and minimize leaks and spills (e.g., pumps with fuel-level sensors and controls with automatic shut-off capability) (Department of Defense 2013). Fuels would be handled according to permit requirements, best management practices and standard operating procedures designed to prevent and minimize leaks and spills. Personnel working in the fuel facilities would be trained in spill response procedures in accordance with the installations Facility Response Plan and Spill Prevention, Control, and Countermeasures Plan to minimize impacts to the environment in the event of an accidental release.

Tinian Alternative 1 operations would result in an increase to the disposal rate for spent petroleum products. All fuels, petroleum, oils, and lubricants would be stored, handled, transported, and disposed according to existing best management practices, standard operating procedures, and applicable federal and CNMI regulations and permit requirements, as well as U.S. military requirements.

Other Hazardous Materials

Training and maintenance would also involve the use of batteries, pesticides, herbicides, paints, solvents, fluorescent light fixtures, and flameless ration heaters for meals ready to eat. Most hazardous materials (such as paints, solvents, pesticides and herbicides) would be used up and thus not require disposal. Pesticides and herbicides would be used as part of range and facility management to control nuisance species and would be applied and managed in accordance with applicable regulations and manufacturer instructions. For those hazardous materials that do require disposal, a hazardous materials storage facility would be constructed at the base camp, where hazardous materials would be properly managed and stored in accordance with federal and CNMI regulations and U.S. military requirements. The storage facility would be constructed using best management practices for construction in unavoidable areas with seismic and tsunamic hazards to minimize potential impacts from geologic hazards. Batteries would be treated as recyclables. Fluorescent light fixtures would be containerized and shipped off-island. Human health, welfare, and the environment would be protected through the use of proven and effective best management practices and standard operating procedures to:

- Prevent, contain, and/or clean up spills and leaks
- Provide personnel training and operational protocol and procedures, including segregation of unused flameless ration heaters from solid waste for proper reuse or hazardous waste disposal (Breeh 2004)
- Ensure Defense Marketing and Reutilization Office's ability to properly arrange for and coordinate the disposal of anticipated hazardous materials
- Ensure all U.S. military personnel and contractors are trained in accordance with the CNMI pesticide management regulations (Rabauliman 2013) regarding the importation, handling, use, and application of pesticides

Due to the projected increase in the use of hazardous materials, Tinian Alternative 1 operations would have the potential to result in direct and indirect impacts to human health and the natural environment (i.e., soils, surface water, groundwater, air, plants, and animals). Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, direct and indirect impacts from hazardous materials would be reduced to less than significant.

4.16.3.1.2.2 Toxic Substances

Toxic substances, including depleted uranium or radioactive munitions, would not be used as part of operations. Facilities use and maintenance would not require the use or disposal of lead based paint, asbestos containing materials, or polychlorinated biphenyls as these substances have been banned from use.

Radon hazards on Tinian have not been identified; however, radon is known to exceed U.S. Environmental Protection Agency action levels in areas on Guam which has similar geologic formations (e.g., Mariana Limestone). Radon testing on Guam resulted in a definite correlation between the type of surficial geology and radon concentrations. In almost all cases, elevated radon concentrations were found in buildings located above Barrigada Limestone and Mariana Limestone but not in those located above alluvial clay deposits, beach deposits, and volcanic rocks (Burkhart et al. 1993). A large portion of

the geology of Tinian consists of Mariana Limestone, and therefore, there is a potential for radon intrusion into structures constructed on the island where this geology is present.

To minimize this potential impact, radon control measures such as using resistant construction techniques and abatement systems would be incorporated into building/facility designs. In addition, the U.S. military would periodically test facilities constructed in known radon zones in accordance with Office of the Chief of Naval Operations Instruction 5090.1D, Chapter 25-3.2, once determined, to verify that no unacceptable radon gas buildup occurs, and would install radon abatement systems as appropriate.

Tinian Alternative 1 would have potential adverse impacts from toxic substances as a result of radon gas. Based upon the above analysis and through implementation of resource management measures described in Section 4.16.2, *Resource Management Measures*, operational activities under Tinian Alternative 1 result in less than significant direct or indirect impacts to radon. In addition, there would not be direct or indirect impacts associated with other toxic substances.

4.16.3.1.2.3 Hazardous Waste

Spent Munitions

Military munitions that are used for their "intended purposes" are not considered waste per the Military Munitions Rule (40 CFR 266.202). In general, military munitions become subject to Resource Conservation and Recovery Act hazardous waste transportation, storage, and disposal requirements (i.e., judged not to have been used for their "intended purposes") when:

- Transported off-range for storage
- Reclaimed and/or treated for disposal
- Buried or land filled on- or off-range
- Munitions land off-range and are not immediately rendered safe or retrieved

With careful management of range clearance and maintenance, and the recovery and recycling of range related scrap metal range operations would not result in increases in hazardous waste volumes on Tinian.

Other Hazardous Waste

There could be increased generation of hazardous waste as a result of operational activities associated with Tinian Alternative 1. Specific increases in hazardous waste generated could include: off-specification pesticides and herbicides; spent or off-specification solvents; corrosive or toxic liquids; and spent or off-specification aerosols. These materials would primarily be generated as a result of firing range maintenance, vehicle maintenance, and aircraft maintenance.

Tinian Alternative 1 operations would result in an increase to the Tinian hazardous waste disposal rate. To accommodate the increase in hazardous waste generation, a satellite hazardous waste accumulation site would be constructed at the Tinian base camp. Hazards waste storage facilities on Tinian would be constructed using best management practices in unavoidable areas with seismic and tsunamic hazards to minimize potential impacts from geologic hazards. The satellite accumulation area would be managed in accordance with applicable regulations and the facility Hazardous Waste Management Program to minimize the likelihood of accidental releases and resulting impacts. Waste collected at the satellite

accumulation area would be transported to Guam for recycling/disposal through the Defense Reutilization and Marketing Office in accordance with federal, Guam, and CNMI regulations and U.S. military requirements. There would be sufficient capability at Guam facilities to accommodate recycling and disposal of hazardous waste generated under Tinian Alternative 1.

Tinian Alternative 1 would generate increased volumes of hazardous wastes on Tinian. However, hazardous waste would be managed (stored, transported, disposed) according to best management practices and standard operating procedures that would minimize the potential for accidental spills and releases that could expose people and the environment to hazardous waste.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, Tinian Alternative 1 operations would not significantly increase the potential for impacts from hazardous waste. Therefore, Tinian Alternative 1 operations would result in less than significant direct and indirect impacts with respect to hazardous waste.

4.16.3.1.2.4 Contaminated Sites

Contaminated sites have been identified within or near the proposed RTA and Supply Route (Table 4.16-1). If contaminated soil, groundwater, or munitions and explosives of concern are encountered or disturbed during training activities, there could be potential direct and indirect impacts to human health to the natural environment (i.e., soils, surface water, groundwater, air, plants, and animals). These impacts would be minimized through avoidance and the use of appropriate best management practices and standard operating procedures. These may include redesigning or re-routing the proposed training area to avoid a contaminated site and/or having qualified unexploded ordnance personnel perform surveys to identify and remove potential munitions and explosives of concern before training activities begin. Where appropriate, limited testing of soils and groundwater may also occur to identify potential health risks where hazardous wastes are suspected to be present. Additional precautions, such as unexploded ordnance personnel supervision during training activities, and/or providing munitions and explosives of concern awareness training to personnel before training activities begin could also be taken.

Disturbance of contaminated sites would be avoided to the maximum extent practicable. Where contaminated sites cannot be avoided, the use of best management practices and standard operation procedures regarding munitions and explosives of concern and hazardous waste management would minimize potential impacts.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, Tinian Alternative 1 operations would not increase the potential for impacts to contaminated sites. Therefore, Tinian Alternative 1 operations would result in less than significant direct and indirect impacts with respect to contaminated sites.

Table 4.16-1. Potentially Contaminated Sites Within or Near Training Areas Under Alternative 1

Training Area	*Contaminated Site*	*Potential Hazard*	*Applicable Resource Management Measures*
Range Complex A	E-2	Petroleum residues, small ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-11	Petroleum residues	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational safety and Health Administration Compliance
	E-12	Ordnance	Munitions and Explosives of Concern Protocol, Procedures, and Guidance
	E-18	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
Range Complex B	L-2	Petroleum residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-5	Petroleum residues, Asbestos; Unidentified chemical hazards	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
Range Complex C	L-7	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-12	Petroleum, Metals, Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
Tracked Vehicle Drivers Course	E-1	Petroleum residues, small ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-17	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-2	Petroleum residues, Asbestos	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-4	Petroleum Residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-5	Petroleum residues, Asbestos; Unidentified chemical hazards	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-8	Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance;

Table 4.16-1. Potentially Contaminated Sites Within or Near Training Areas Under Alternative 1

Training Area	*Contaminated Site*	*Potential Hazard*	*Applicable Resource Management Measures*
			Occupational Safety and Health Administration Compliance
	R-1	Petroleum Residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	R-15	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	Masalog Ridge Area Site	Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
Convoy Course	E-1	Petroleum residues, small ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-13	Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-17	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	E-18	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	E-29	Unidentified chemical hazards	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-2	Petroleum residues, Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	L-5	Petroleum residues, Asbestos	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-7	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance

Table 4.16-1. Potentially Contaminated Sites Within or Near Training Areas Under Alternative 1

Training Area	*Contaminated Site*	*Potential Hazard*	*Applicable Resource Management Measures*
Proposed Supply Route	R-1	Petroleum, Ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	R-4	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	R-6	Petroleum residues, Unidentified chemical hazards	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	R-15	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-4	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-6	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	L-7	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
All training areas	Site Wide	Munitions and Explosives of Concern; Sodium arsenate, Petroleum	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance

Sources: GMP Associates, Inc. 1997; CNMI Bureau of Environmental and Coastal Quality 2014.

4.16.3.2 Tinian Alternative 2

4.16.3.2.1 Construction Impacts

Tinian Alternative 2 would use similar construction materials and methods as described in Section 4.16.3.1 for Tinian Alternative 1. Alternative 2 would also follow the same best management practices, standard operating procedures, and regulatory compliance which would minimize the potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites as described in Section 4.16.3.1 for Tinian Alternative 1. The primary difference related to hazardous materials and waste is that a larger construction footprint would be created under Tinian Alternative 2 due to the addition of a Battle Area Complex and associated Urban Assault Course at the International Broadcasting Bureau (Range Complex C) and the addition of five more Convoy Course engagement areas. Within Range Complex C, the International Broadcasting Bureau would no longer be operational. Its buildings would be stripped and the antennae removed. These actions would result in a temporary increase in hazardous materials and waste being used/generated on Tinian. The potential for construction activities to encroach or intersect with contaminated sites would be the same as described

under Alternative 1 for all RTAs except Range Complex C and the Convoy Course. The increased area of this range would potentially encounter seven additional contaminated sites, as summarized in Table 4.16-2. The difference in the amount of construction or number of contaminated sites within the Alternative 2 footprint would not change the effectiveness of the best management practices and standard operating procedures in preventing and minimizing adverse environmental impacts.

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, activities associated with Tinian Alternative 2 would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Tinian Alternative 2 construction would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

4.16.3.2.2 Operation Impacts

Tinian Alternative 2 training and maintenance activities would be similar to those described in Section 4.16.3.1 for Tinian Alternative 1 with regards to hazardous materials, toxic substances, hazardous wastes, and contaminated sites. Tinian Alternative 2 would also follow the same best management practices, standard operating procedures, and regulatory compliance which would minimize the potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites as described in Section 4.16.3.1 for Tinian Alternative 1. The only difference is that maneuver activities would take place over a larger area for Tinian Alternative 2 as compared with Tinian Alternative 1, because Alternative 2 would include the southern Battle Area Complex, and six additional engagement zones associated with the Convoy Course. Due to the larger Battle Area Complex and Convoy Course, Tinian Alternative 2 would likely use more petroleum based hazardous materials and generate more non-petroleum-based hazardous waste (e.g., pesticides) than Tinian Alternative 1.

Disturbance of contaminated sites would be avoided to the maximum extent practicable. Where contaminated sites cannot be avoided, the use of resource management measures identified in Section 4.16.2 would minimize potential impacts to contaminated sites.

The differences in the size of the training area, hazardous materials and waste volumes, and number of contaminated sites would not change the effectiveness of the best management practices and standard operating procedures in preventing and minimizing adverse environmental impacts.

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, Tinian Alternative 2 operations would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Tinian Alternative 2 operations would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

Table 4.16-2. Potentially Contaminated Sites Within or Near Training Areas Under Alternative 2

Training Area	*Contaminated Site*	*Potential Hazard*	*Applicable Resource Management Measures*
Range Complex C	E-6	Asphalt plant release area, hazardous substances	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	E-15	Medical waste	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	E-17	Agricultural chemical residues	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance
	E-22	Metals, toxic substances, petroleum residues, ordnance, hazardous materials and wastes	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-25	Metals, ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
	E-26	Petroleum residues, ordnance	Erosion control measures; Hazardous Waste Management Program; Munitions and Explosives of Concern Protocol, Procedures, and Guidance; Occupational Safety and Health Administration Compliance
Convoy Course	E-20	Petroleum	Erosion control measures; Hazardous Waste Management Program; Occupational Safety and Health Administration Compliance

Sources: GMP Associates, Inc. 1997; CNMI Bureau of Environmental and Coastal Quality 2014.

4.16.3.3 Tinian Alternative 3

4.16.3.3.1 Construction Impacts

Tinian Alternative 3 would use similar construction materials and methods as described in Section 4.16.3.1 for Tinian Alternative 1. Alternative 3 would also follow the same best management practices, standard operating procedures, and regulatory compliance to minimize potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites as described in Section 4.16.3.1 for Tinian Alternative 1. Differences would include slightly less construction within Range Complex D as there would be no northern Battle Area Complex and associated Urban Assault Course under Tinian Alternative 3; increased construction for six additional engagement zones associated with the Convoy Course; and increased construction associated with the southern Battle Area Complex and associated Urban Assault Course (Range Complex C). Within Range Complex C, the International Broadcasting Bureau would no longer be operational. Its buildings would be stripped and the antennae removed. The potential for construction activities to encroach or intersect with contaminated sites would be the same as described under Tinian Alternative 2 and summarized in Tables 4.16-1 and 4.16-2. These actions would result in a temporary increase in hazardous materials and waste being used/generated on Tinian. The difference in the amount of construction for Tinian Alternative 3 would not change the effectiveness of the resource management measures identified in Section 4.16.2 in preventing or minimizing adverse environmental impacts.

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, construction activities associated with Tinian Alternative 3 would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Tinian Alternative 3 construction would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

4.16.3.3.2 Operation Impacts

Tinian Alternative 3 training and maintenance activities would be similar to those described in Section 4.16.3.1 for Tinian Alternative 1 with regard to hazardous materials, toxic substances, hazardous wastes and contaminated sites. Tinian Alternative 3 would also follow the same best management practices and standard operating procedures to minimize potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites as described in Section 4.16.3.1 for Tinian Alternative 1. The only difference is that training activities would take place over a slightly larger area for Tinian Alternative 3 as compared with Tinian Alternative 1, because Alternative 3 would not have the northern Battle Area Complex and associated Urban Assault Course (Range Complex D) but it would have the larger southern Battle Area Complex and associated Urban Assault Course at the International Broadcasting Bureau (Range Complex C). Tinian Alternative 3 would also have six additional engagement zones associated with the Convoy Course. Due to the larger training area, Alternative 3 would likely use slightly more petroleum based hazardous materials and generate slightly more non-petroleum based hazardous waste (e.g., pesticides) than Tinian Alternative 1. The differences in the size of the maneuver area and hazardous materials and waste volumes would not change the effectiveness of the best management practices and standard operating procedures in preventing or minimizing adverse environmental impacts.

The potential for training operations to encroach or intersect with contaminated sites would be the same as described under Tinian Alternative 2 and summarized in Tables 4.16-1 and 4.16-2. Disturbance of contaminated sites would be avoided to the maximum extent practicable. Where contaminated sites cannot be avoided, the use of resource management measures identified in Section 4.16.2 would minimize potential impacts to contaminated sites.

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, Tinian Alternative 3 operations would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Tinian Alternative 3 operations would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

4.16.3.4 Tinian No-Action Alternative

Hazardous materials used in the periodic non-live-fire training exercises that have and would continue to occur on Tinian and any hazardous waste generated during these brief exercises would be managed properly through use of best management practices and in compliance with all applicable regulations. The four planned live-fire training ranges included in the Guam and CNMI Military Relocation Final EIS (DoN 2010c) would result in less than significant impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites (see Table 17.2-12; DoN 2010c). On Tinian, Mariana Islands Range Complex operations would not incur any impacts to hazardous materials and waste (DoN 2010b). Existing hazardous materials, toxic substances, hazardous wastes and contaminated sites in the proposed action areas on Tinian would remain in their current conditions. Therefore, the no-action alternative would result in less than significant impacts on Tinian with respect to hazardous materials and waste.

4.16.3.5 Summary of Impacts for Tinian Alternatives

Table 4.16-3 provides a comparison of the potential impacts to hazardous materials and waste resources for the three Tinian alternatives and the no-action alternative.

Table 4.16-3. Summary of Impacts for Tinian Alternatives

Resource Area	*Tinian (Alternative 1)*		*Tinian (Alternative 2)*		*Tinian (Alternative 3)*		*No-Action Alternative*	
Hazardous Materials and Waste	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**
Hazardous Materials	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Toxic Substances	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Hazardous Waste	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Contaminated Sites	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*

Legend: *LSI* = less than significant impact.

4.16.4 Pagan

4.16.4.1 Pagan Alternative 1

4.16.4.1.1 Construction Impacts

4.16.4.1.1.1 Hazardous Materials

The development and construction of Pagan Alternative 1 facilities would take place entirely within the North Range Complex. Construction activities would cause a short-term increase in the use of hazardous materials that would end when the construction is finished. Most of the hazardous materials expected to be used are common to construction (e.g., diesel fuel, gasoline, and propane; hydraulic fluids, oils, and lubricants; welding gases; paints and solvents; adhesives; and batteries). The increased volume and use of hazardous materials during the construction period would present a potential for increased accidental spills and releases of hazardous materials, resulting in potential impacts to human health and the environment. The hazardous materials would be handled, stored, and disposed according to applicable best management practices; standard operating procedures; and federal and CNMI regulations.

The best management practices and standard operating procedures described in Section 4.16.2 would be followed to minimize or prevent accidental releases of hazardous materials during construction on Pagan. Storage of construction related hazards materials on Pagan would occur using best management practices and in accordance with applicable standards to minimize risks and potential impacts from seismic and volcanic hazards. The use, transport, storage, and handling of hazardous materials would be in accordance with applicable federal and CNMI regulations and U.S. military requirements. Laguna Sanhalom, a surface water, is surrounded by but not included in the northern High Hazard Impact Area. Laguna Sanhalom and Laguna Sanhiyon and surrounding areas have been designated "No Maneuver Areas" where no construction activities are proposed and no direct or indirect construction impacts are anticipated.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, the construction activities associated with Pagan Alternative 1 would not significantly increase the potential for impacts from hazardous materials. Therefore, Pagan Alternative 1 construction would result in less than significant direct and indirect impacts with respect to hazardous materials.

4.16.4.1.1.2 Toxic Substances

No demolition would take place under Pagan Alternative 1 construction activities, so it is unlikely that toxic substances in materials from existing buildings would be encountered. In the event that asbestos-containing materials, lead-containing paint, or polychlorinated biphenyls are discovered, these materials would be managed by properly trained and licensed personnel to ensure that applicable hazardous waste testing, handling, and disposal procedures and requirements are followed. No toxic-substance building materials would be used in the construction of facilities under Pagan Alternative 1.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, the construction activities associated with Pagan Alternative 1 would not significantly

increase the potential for impacts from toxic substances. Therefore, Pagan Alternative 1 construction would result in less than significant direct and indirect impacts with respect to toxic substances.

4.16.4.1.1.3 Hazardous Waste

Construction activities would result in a short-term increase in the generation of hazardous waste that would end when construction is finished. Hazardous waste generated from construction activities includes pesticides, herbicides, solvents, adhesives, lubricants, corrosive liquids, batteries, and aerosols. Due to the projected increase in generation of hazardous waste, this alternative would have the potential to result in adverse impacts to human health and the environment (i.e., soils, surface water, groundwater, air, and biota). However, the hazardous waste would be handled and disposed per applicable best management practices and standard operating procedures (see Appendix D, *Best Management Practices*) to reduce the likelihood and volume of accidental releases, allow for accelerated spill response times, and allow for the timely implementation of cleanup measures. Hazardous waste generated during construction on Pagan would be temporarily stored on the island to minimize risks from seismic and volcanic hazards. Long-term storage of hazardous wastes would not occur on Pagan. The generation, transport, storage, and handling of hazardous waste would be in accordance with applicable federal and CNMI regulations and U.S. military requirements. All hazardous waste would be shipped off the island to the appropriate disposal facility site. Transport of hazardous wastes from Pagan, including shipping by commercial carrier, would utilize existing transportation routes to the maximum extent practicable, for the conveyance of hazardous waste to a licensed disposal facility site. Currently, there are no existing commercial carrier transportation routes to Pagan. Transportation of all hazardous waste would be conducted in compliance with U.S. Department of Transportation regulations and CFR Title 49.

The temporary increase in the generation, transport, storage, and handling of hazardous waste during construction activities associated with Pagan Alternative 1 would not significantly increase the potential for impacts from hazardous waste. Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, Pagan Alternative 1 construction would result in less than significant direct and indirect impacts with respect to hazardous waste.

4.16.4.1.1.4 Contaminated Sites

Contaminated sites on Pagan have not been well documented but are likely to be present as a result activities conducted during World War II (Figure 4.16-4). Construction activities at proposed tactical amphibious landing beaches are likely to encroach or intersect with contaminated sites and these areas are co-located with Japanese defense positions. In addition, erosion may have transported contaminated soil from upward defense positions to these low lying, coastal areas. The Japanese airfield is also likely to be contaminated with petroleum products and munitions and explosives of concern as a result of its use during World War II. Several firing positions and helicopter landing sites may also encroach on or intersect with Japanese defense positions and that may be contaminated with munitions and explosives of concern. If Pagan Alternative 1 cannot be constructed without avoiding contaminated sites, then the same resource management measures as described in Section 4.16.2 would be followed. Through the use of the identified resource management measures, impacts resulting from the disturbance of contaminated sites would be minimized.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, the construction activities associated with Pagan Alternative 1 would not significantly increase the potential for impacts from contaminated sites. Therefore, Pagan Alternative 1 construction would result in less than significant direct and indirect impacts with respect to contaminated sites.

4.16.4.1.2 Operation Impacts

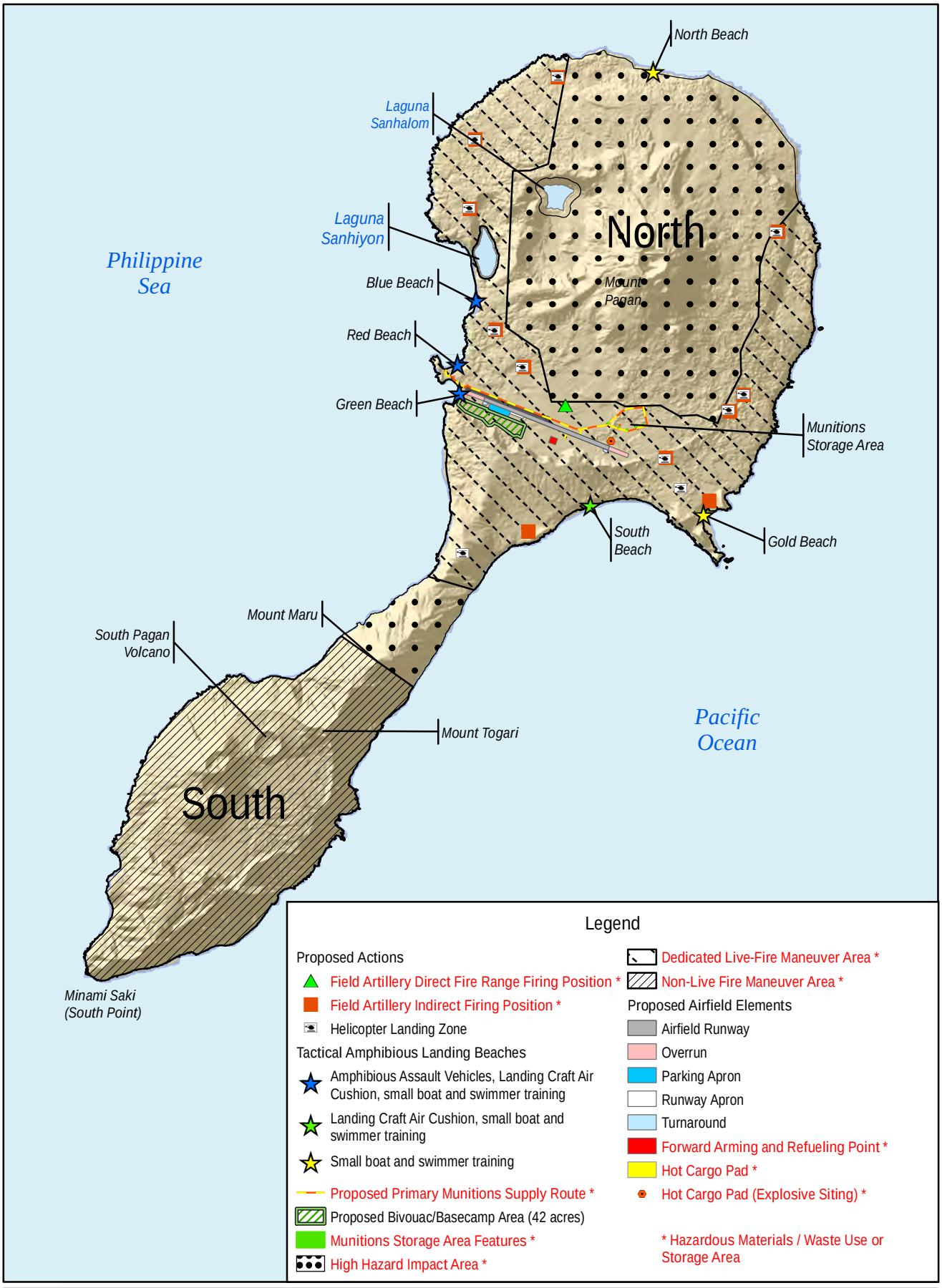
4.16.4.1.2.1 Hazardous Materials

Munitions and Explosives of Concern

Figure 4.16-4 shows the locations of live-firing positions and High Hazard Impact Areas associated with Pagan Alternative 1. Activities associated with live-fire range operations would result in increased hazardous materials in the form of munitions and explosives of concern and heavy metals. This is because unexploded ordnance, military munitions, and munitions constituents (i.e., chemical components of munitions) have the potential to contain high explosives, explosives constituents, and potentially leachable compounds (i.e., heavy metals that dissolve in water). Pagan Alternative 1 would have two High Hazard Impact Areas (Figure 4.16-4). As described in Section 2.5.2, the High Hazard Impact Areas on Pagan would receive artillery, mortars, inert aviation ordnance, 5-inch naval machine gun rounds, and rifle fire. Live-fire weapons such as artillery and mortars and small-caliber munitions would be used in the Live-Fire Maneuver Area in the North Range Complex, where they would be fired at temporary objectives in the High Hazard Impact Areas (non-maneuver area). No weapons would be used in the Non-Live-Fire Maneuver Area in the South Range Complex.

In general, when munitions are fired, the explosives constituents are consumed in the explosion. Trace amounts of explosives may be detectable on remaining metal components, such as small arms projectiles and hand grenade and mortar fragments.

With the implementation of resource management measures identified in Section 4.16.2, the negligible amounts of explosives constituents remaining on projectiles and fragments would not be a source of potential contamination to surface water or groundwater. Munitions constituents, in particular heavy metals (i.e., lead, nickel, chromium, cadmium, and copper), do not break down easily and tend to build up in surface soils. They may rust or otherwise react with natural substances, but do not break down like organic compounds. Therefore, the volume of expended material within the training areas would gradually increase over time (DoN 2010b). As discussed in Section 4.3, *Water Resources*, Low Impact Development features would be utilized to control stormwater runoff from the ranges. Additional range management activities may also include the use of impoundments, traps, or other structures to catch lead particles in sediment transported away from the range area by runoff and the application of buffering agents such as limestone, gypsum, and dolomite to maintain a more neutral pH in areas where lead may come in contact with water. These, range management activities would minimize the accumulations of munitions constituents.



0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Figure 4.16-4
Pagan Alternative 1
Hazardous Materials / Waste Use or Storage Area

NORTH

The majority of munitions constituents released to the environment originate from munitions that either partially detonate or do not detonate at all (DoN 2010b). Munitions constituents in partially or unexploded ordnance are contained within the munition itself and release of munitions constituents due to corrosion of the casing may take a long time to occur, although salt spray and humidity may accelerate deterioration of the casing (DoN 2010b). Unexploded ordnance is likely to occur in the High Hazard Impact Area.

The RTAs on Pagan would be managed in accordance with current Marine Corps range management policies and procedures, which are designed to ensure the safe, efficient, effective, and environmentally sustainable use of the ranges. To minimize potential impacts of munitions constituents accumulating and/or migrating in soil and surface water/groundwater, routine range clearance operations would be scheduled and conducted, as needed. Munitions that fail to function as intended during the training activity would be tracked by the Range Control Facility and rendered safe by Explosive Ordnance Disposal Technicians. Applicable U.S. military munitions and explosives of concern operations guidance protocols would also be implemented to mitigate adverse impacts from munitions and explosives of concern, including deposits that have the potential to leach into the subsurface. The resource management measures described in Section 4.16.2, including the use of the Range Environmental Vulnerability Assessment program, would be implemented to minimize potential impacts from munitions and explosives of concern.

Pagan Alternative 1 surface danger zones would extend over open ocean waters but all impact areas for munitions would be on land. In the unlikely event that fragments should land in the ocean, concentrations of munitions constituents would be very low through dilution.

Fuels, Petroleum, Oils, and Lubricants

Training on Pagan would include vehicle transport and maneuvers, resulting in the temporary storage and use of fuel, petroleum, oils, and lubricants on Pagan. No long-term storage of these materials would occur on Pagan. A Forward Refueling Point would be specified to provide aircraft refueling. The Forward Arming and Refueling Point for Pagan at the airfield would have a concrete containment berm to prevent accidental releases of fuel. Bulk fuel would be delivered by aircraft carrying approximately 5,000 gallons (19,000 liters) of fuel per delivery. Beach and amphibious training maneuvers and the use of Amphibious Assault Vehicles would have the potential for accidental fuel spills in marine and nearshore waters. However, the same best management practices and standard operating procedures to manage and minimize potential accidental releases of fuel, petroleum, oils, and lubricants described in Appendix D, *Best Management Practices*, would be followed on Pagan.

Other Hazardous Materials

Training and maintenance would also involve the use of batteries, pesticides, herbicides, paints, solvents and flameless ration heaters for meals ready to eat. Most hazardous materials (such as paints, solvents, pesticides, and herbicides) would be used up and thus not require disposal. For those hazardous materials that do require disposal, a temporary, hazardous materials storage site would be designated at the base camp to properly manage and store the materials in accordance with federal and CNMI regulations and U.S. military requirements. All hazardous materials would be removed from Pagan at the completion of the training activity and properly disposed of in accordance with applicable federal and CNMI regulations and U.S. military requirements. No long-term storage of hazardous materials

would occur. The same best management practices and standard operating procedures as described in described in Section 4.16.2 would be followed on Pagan to prevent and minimize accident spills and releases, and protect human health, welfare, and the environment.

Due to the projected increase in the use of hazardous materials, Pagan Alternative 1 operations would have the potential to result in direct and indirect impacts to human health and to the natural environment (i.e., soils, surface water, groundwater, air, plants and animals).

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, operations associated with Pagan Alternative 1 would not significantly increase the potential for impacts from hazardous materials. Therefore, Pagan Alternative 1 operations would result in less than significant direct and indirect impacts with respect to hazardous materials.

4.16.4.1.2.2 Toxic Substances

No depleted uranium or radioactive munitions would be used for live-fire training on Pagan. Use and maintenance of the training areas would not require the use or disposal of lead based paint, asbestos containing materials, or polychlorinated biphenyls as these substances have been banned from use. No human-occupied facilities would be constructed on Pagan. Therefore, there would be no impacts with regards to radon.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, Pagan Alternative 1 operations would not significantly increase the potential for impacts from toxic substances. Therefore, operations associated with Pagan Alternative 1 would result in less than significant direct and indirect impacts with respect to toxic substances.

4.16.4.1.2.3 Hazardous Waste

Pagan Alternative 1 operational activities would result in the generation of hazardous wastes. Munitions would be brought to Pagan by units arriving for training, stored temporarily, and used during the exercise. Any unused munitions would be packed and returned with the units. As long as the proposed live-fire ranges on Pagan remain on “active” or “inactive” status, the expenditure of munitions and explosives of concern would not likely represent an increase in hazardous waste volumes.

Other hazardous waste associated with training and maintenance activities on Pagan would primarily be used for firing range maintenance, vehicle maintenance, and aircraft maintenance and would include pesticides, herbicides, solvents, corrosive or toxic liquids, and aerosols. All hazardous waste would be containerized and removed from Pagan by trained personnel with the training units when they depart the island and would be recycled or disposed of at an appropriately permitted off-island facility. Transportation of hazardous waste would be properly manifested from either the point of generation or from the satellite accumulation area. The increases in hazardous waste would be managed (stored, transported, disposed) according to best management practices and standard operating procedures that would minimize the potential for accidental spills and releases that could expose people and the environment to hazardous waste.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, Pagan Alternative 1 operations would not significantly increase the potential for impacts from hazardous waste. Therefore, Pagan Alternative 1 operations would result in less than significant direct and indirect impacts with respect to hazardous waste.

4.16.4.1.2.4 Contaminated Sites

Several potentially contaminated sites have been identified within or near the proposed RTAs on Pagan. If contaminated soil, groundwater, or munitions and explosives of concern are encountered or disturbed during training activities, there could be potential direct and indirect impacts to human health to the natural environment (i.e., soils, surface water, groundwater, air, plants, and animals). These impacts would be minimized through the use of appropriate resource management measures. These may include relocating the training area to avoid a contaminated site and/or having qualified unexploded ordnance personnel perform surveys to identify and remove potential munitions and explosives of concern before training activities begin. Where appropriate, limited testing of soils and groundwater may also occur to identify potential health risks where hazardous wastes or environmental contamination are suspected to be present. Additional precautions, such as unexploded ordnance personnel supervision during training activities, and/or providing munitions and explosives of concern awareness training to personnel before training activities begin could also be taken. The identification and removal of munitions and explosives of concern, hazardous wastes, and/or environmental contamination prior to initiating training activities, in addition to training military personnel to the hazards associated with unexploded military munitions, would minimize potential impacts during operations.

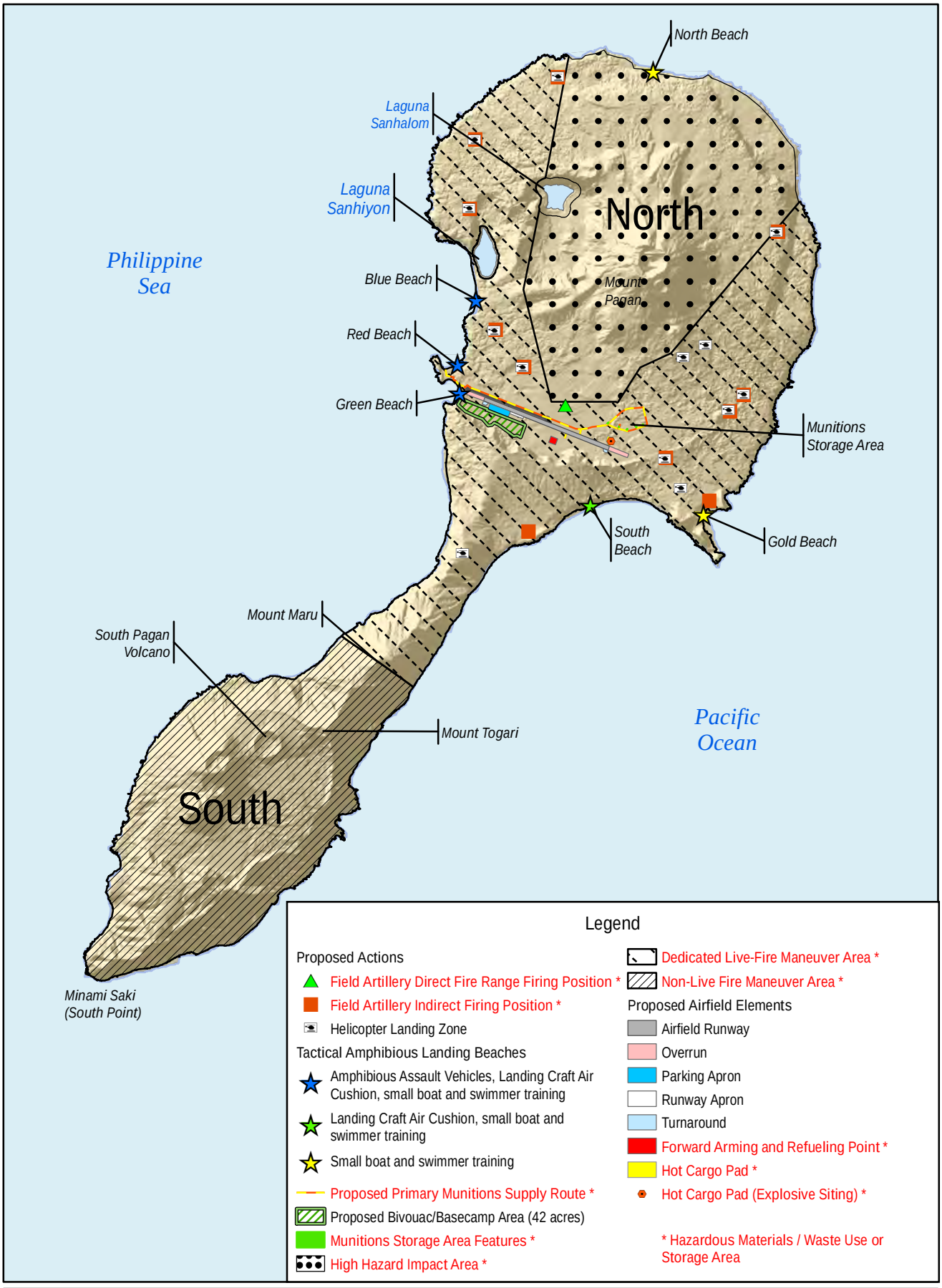
Disturbance of contaminated sites would be avoided to the maximum extent practicable. Where contaminated sites cannot be avoided, the use of resource management measures described in Section 4.16.2 would minimize potential impacts.

Based on the above analysis and the implementation of the resource management measures described in Section 4.16.2, operations associated with Pagan Alternative 1 would not increase the potential for impacts to contaminated sites. Therefore, Pagan Alternative 1 operations would result in less than significant direct and indirect impacts with respect to contaminated sites.

4.16.4.2 Pagan Alternative 2

4.16.4.2.1 Construction Impacts

Pagan Alternative 2 would use similar construction materials and methods as those described in Section 4.16.4.1 for Pagan Alternative 1. Alternative 2 would also follow the same resource management measures which would minimize the potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites. The only difference is that Pagan Alternative 2 would have no isthmus High Hazard Impact Area, and the northern High Hazard Impact Area would be smaller than that for Pagan Alternative 1 (Figure 4.16-5). With either alternative, only a small portion of the High Hazard Impact Area would be improved for target placement. Under Alternative 2 no target placement improvements would occur on the isthmus of Pagan. The difference in the size of the northern High Hazard Impact Area would not create much difference between the two alternatives from a hazardous materials/waste perspective at that location. Construction impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites for Pagan Alternative 2 would be similar to those identified under Pagan Alternative 1 in Section 4.16.4.1.



0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Figure 4.16-5
Pagan Alternative 2
Hazardous Materials / Waste Use or Storage Area

NORTH

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, construction activities associated with Pagan Alternative 2 would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Pagan Alternative 2 construction would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

4.16.4.2.2 Operation Impacts

Pagan Alternative 2 training and maintenance activities would be similar to those described in Section 4.16.4.1 for Pagan Alternative 1 with regard to hazardous materials, toxic substances, hazardous waste, and contaminated sites. Pagan Alternative 2 would also follow the same resource management measures which would minimize the potential impacts associated with hazardous materials, toxic substances, hazardous waste, and contaminated sites as described in Section 4.16.4.1 for Pagan Alternative 1. The same amounts and types of munitions would be fired under either alternative, and the same types of training activities would take place. The only differences are that under Pagan Alternative 2, all munitions would impact in the smaller, northern High Hazard Impact Area; however, the target areas would be the same as those under Pagan Alternative 2. In addition, there would be no high impact hazard area on the isthmus; and there would be more area for ground maneuver training (see Figure 4.16-5). Due to the larger maneuver area, Pagan Alternative 2 would likely use more petroleum based hazardous materials and generate more non-petroleum based hazardous waste than Alternative 1. The differences in the size of the maneuver area and hazardous materials and waste volumes would not change the effectiveness of the resource management measures in preventing or minimizing adverse environmental impacts.

Based upon the above analysis and the implementation of the resource management measures described in Section 4.16.2, Pagan Alternative 2 operations would not significantly increase the potential for impacts from hazardous materials, toxic substances, hazardous waste, and contaminated sites. Therefore, Pagan Alternative 2 operations would result in less than significant direct and indirect impacts with respect to hazardous materials, toxic substances, hazardous waste, and contaminated sites.

4.16.4.3 Pagan No-Action Alternative

The no-action alternative for Pagan would involve the continued infrequent visitations of low impact trips by small groups of eco-tourists, scientific surveys, and military non-live-fire training related to search and rescue. All visits would be approved by the CNMI government. The impacts would be short-term and very minor and would not involve the on-island use of any substantial quantities of hazardous materials or generation of hazardous waste. Therefore, the no-action alternative would result in less than significant impacts on Pagan with respect to hazardous materials and waste.

4.16.4.4 Summary of Impacts for Pagan Alternatives

Table 4.16-4 provides a comparison of the potential impacts to hazardous materials and waste resources for the two Pagan alternatives and the no-action alternative.

Table 4.16-4. Summary of Impacts for Pagan Alternatives

Resource Area	*Pagan (Alternative 1)*		*Pagan (Alternative 2)*		*No-Action Alternative*	
Hazardous Materials and Waste	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**
Hazardous Materials	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Toxic Substances	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Hazardous Waste	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Contaminated Sites	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*

Legend: *LSI* = less than significant impact.