CHAPTER 4. WATER RESOURCES

4.1 AFFECTED ENVIRONMENT

4.1.1 Definition of Resource

Water resources as defined in this Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) are sources of water available for use by humans, flora, or fauna, including surface water, groundwater, nearshore waters, and wetlands. Surface water resources, including but not limited to stormwater, lakes, streams, and rivers, are important for economic, ecological, recreational, and human health reasons. Groundwater may be used for potable water, agricultural irrigation, and industrial applications. Groundwater is classified as any source of water beneath the ground surface, and is the primary source of potable water used to support human consumption. Nearshore waters are defined as waters extending from the shoreline to the offshore zone, usually depth waters of about 33 feet (ft) (10 meter [m]). Nearshore waters can be directly affected by human activity, and are important for human recreation and subsistence. Wetlands are habitats that are subject to permanent or periodic inundation or prolonged soil saturation, and include marshes, swamps, and similar areas. Areas described and mapped as wetland communities may also contain small streams or shallow ponds, or pond or lake edges. Surface water, groundwater, nearshore waters, and wetlands on the island of Tinian in the Commonwealth of the Northern Mariana Islands (CNMI) are discussed below.

4.1.2 Tinian

4.1.2.1 Surface Water/Stormwater

Surface Water Availability

Rainfall for Tinian averages 82 inches (in) (208 centimeters [cm]) per year, runoff averages 6 in (15 cm) per year, groundwater recharge averages 30 in (76 cm) per year, and the balance (46 in [117 cm]) is evapotranspired. Thus, most of the precipitation on Tinian either evaporates or percolates into the limestone substrata (Gingerich 2002).

Figure 4.1-1 depicts the surface water features on Tinian. Lake Hagoi is 36.3 acres (ac) (14.7 hectare [ha]) open water/wetland area located in the northern end of the island. Other than Lake Hagoi, there are no perennial or intermittent streams or lakes on Tinian. Most precipitation either evaporates or percolates into the highly permeable limestone substrata. During periods of intense rainfall, runoff approximates 6-12% of total rainfall and flows toward the low-lying coastal areas (Gingerich 2002).

Surface Water Quality

Overall surface water quality data are limited on Tinian. In general terms, stormwater runoff is vulnerable to sewage disposal overflows, animal wastes, and sediment erosion carried into streams during periods of heavy rainfall.

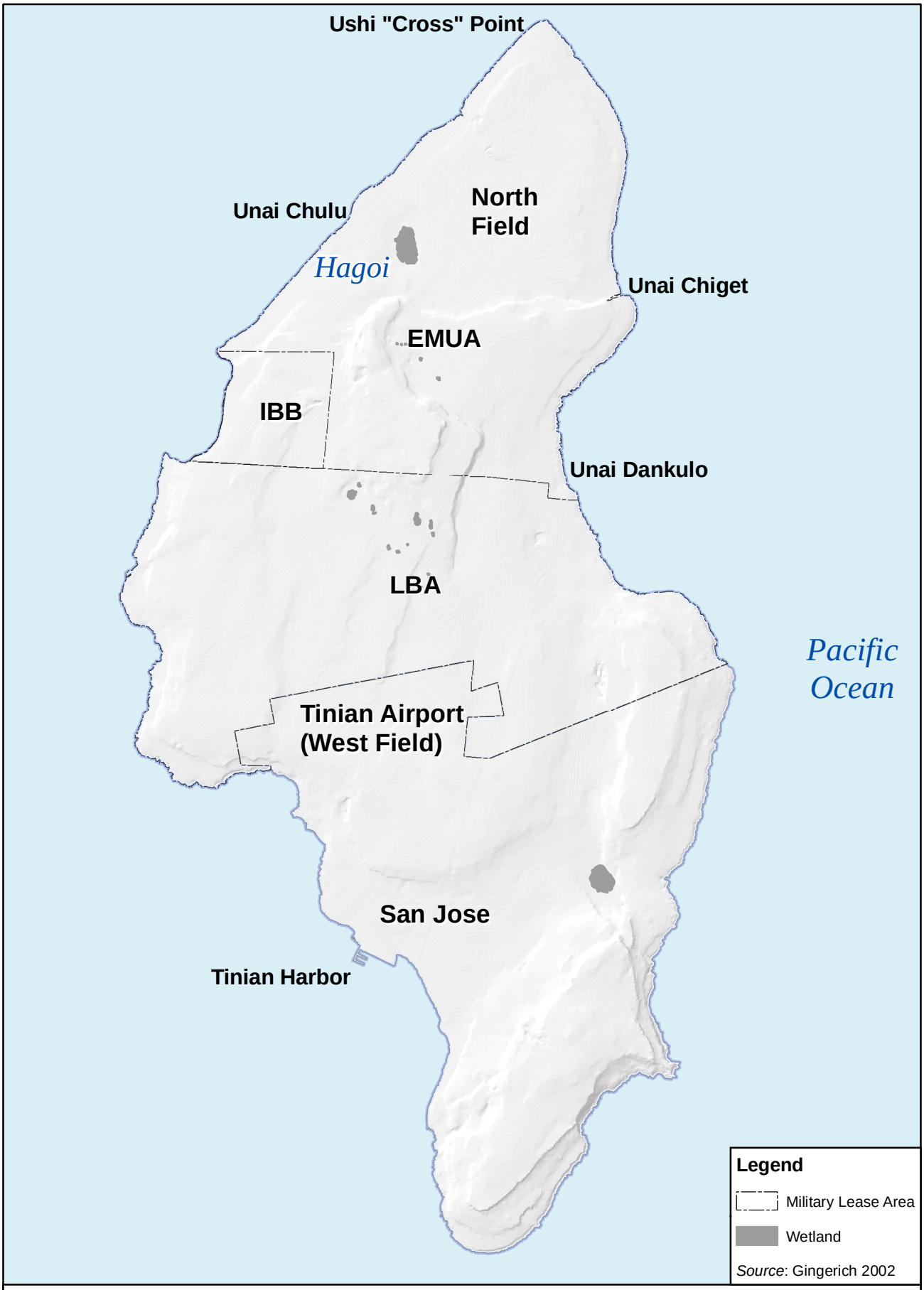

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Figure 4.1-1
Surface Waters of Tinian

Federal Regulations

The Clean Water Act (CWA) of 1972 is the primary federal law that protects the nation's waters, including lakes, rivers, and coastal areas. The primary objective of the CWA is to restore and maintain the integrity of the nation's waters. The United States (U.S.) Environmental Protection Agency (USEPA) Region 9 regulates discharges to surface waters through the issuance of National Pollutant Discharge Elimination System permits that are based on applicable federal standards and policies.

The CNMI Division of Environmental Quality (DEQ) is the administrative authority for CWA Section 401 Water Quality Certifications required for validation of CWA Section 404, Rivers and Harbors Act (RHA) Section 10, and CWA Section 402 National Pollutant Discharge Elimination System permits (U.S. Department of the Interior [USDOI] 2008).

Governing procedures for the use of training areas, ranges, and airspace operated and controlled by the Commander U.S. Naval Forces, Marianas is included in Commander Navy Region (COMNAV) Marianas Instruction 3500.4 (COMNAV Marianas 2000). This guidance identifies specific land use constraints to enable protection of environmental resources during military training.

Local Regulations

The CNMI DEQ provides the following classifications to surface waters of Tinian (CNMI DEQ 2004):

(a) Class 1 - It is the objective of this class that these waters remain in their natural state as nearly as possible with an absolute minimum of pollution from any human-caused source. To the extent possible, the wilderness character of such areas shall be protected. Wastewater discharges and zone of mixing into these waters are prohibited.

The uses to be protected in this class of water are for domestic water supplies, food processing, the support and propagation of aquatic life, groundwater recharge, compatible recreation and aesthetic enjoyment including water contact recreation with risk of water ingestion by either children or adults.

(b) Class 2 - It is the objective of this class that use of these waters for recreational purposes, propagation of fish and other aquatic life, and agricultural and industrial water supply not be limited in any way. The uses protected in this class of waters are all compatible with the protection and propagation of fish and other aquatic life, groundwater recharge, and recreation. Compatible recreation shall include limited body contact activities. Such waters shall not act as receiving waters for any discharge that has not received the best degree of treatment or control practical under technological and economic conditions and compatible with the standards established for this class. A zone of mixing is permissible in these waters.

Flood Zones

Floodplains are low-lying areas subject to flooding. Nineteen isolated areas are designated as Flood Zone A that are areas likely to be inundated in a 100-year flood event. These areas are located in unpopulated areas including Hagoi, portions of North Field, Tinian International Airport, and Makpo (COMNAV Marianas 2004) (Figure 4.1-2).

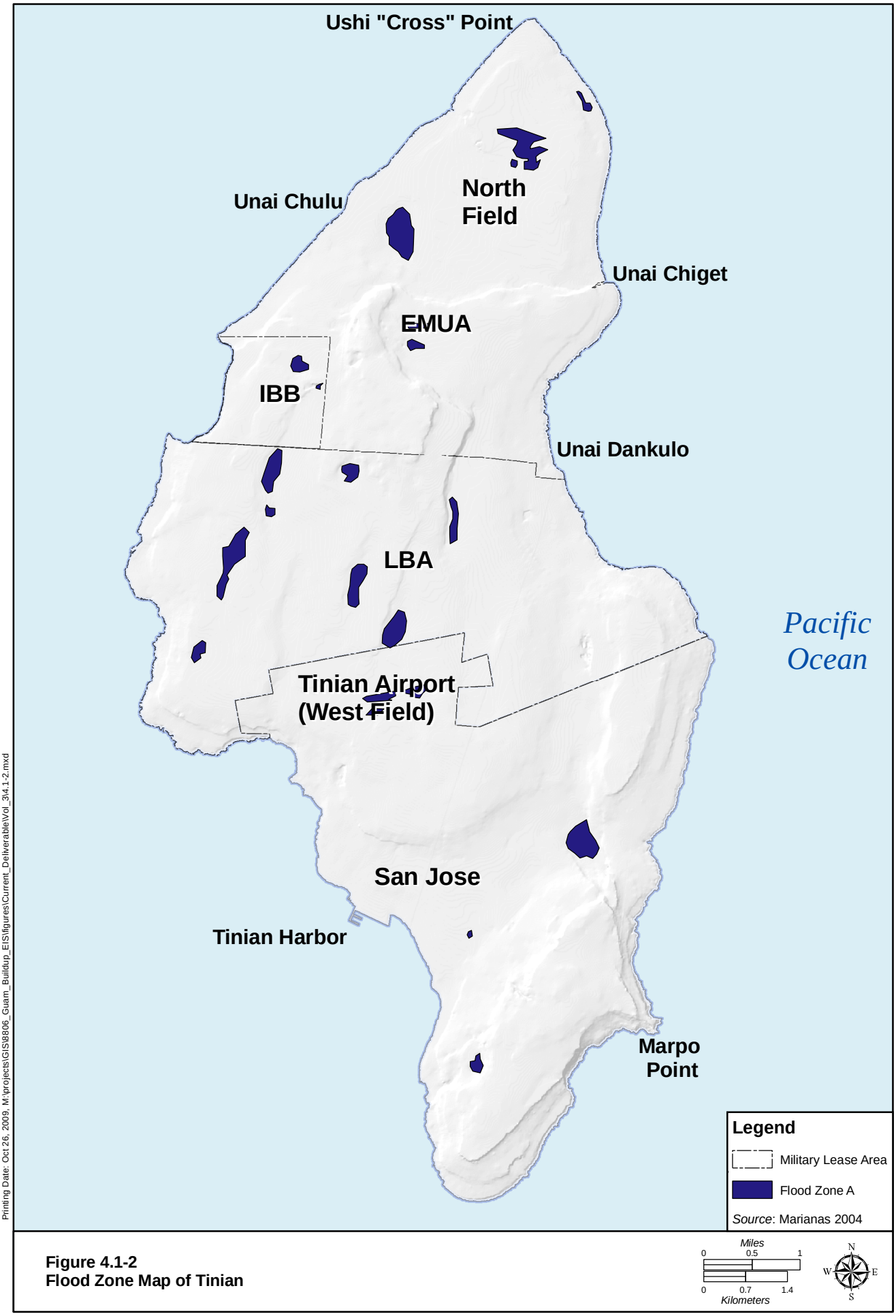

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Figure 4.1-2
Flood Zone Map of Tinian

4.1.2.2 Groundwater

Groundwater Availability

Tinian's groundwater supply is a lens of fresh water floating on saltwater. Percolation of precipitation through the rock formations forms a lens of fresh groundwater that floats on top of the saltwater. Due to the density difference between freshwater and saltwater the interface between the two is approximately 40 feet below sea level for every foot the water table is above sea level (Figure 4.1-3). This 1:40 relationship is commonly referred to as the Ghyben-Herzberg relationship (refer to Section 4.1 for a discussion of this relationship).

On Tinian, the basal fresh water lens, which is not underlain by volcanic material, extends from 2 to 4 ft (0.6 to 1.2 m) above mean sea level to approximately 80 to 160 ft (24 to 49 m) below sea level at its deepest point.

The primary aquifer on Tinian is in the coralliferous Mariana limestone. This rock formation is very permeable, covering over 80% of the land. In the central plateau of the island, this limestone extends down approximately 200 ft (61 m) below sea level, deeper than the bottom of the freshwater lens. The thickness of the Mariana Limestone increases toward the coast, but is thinnest or not present in small areas of the north-central and south-central parts of the island (Gingerich 2002).

The Natural Resources Conservation Service has mapped the known and probable extent of the freshwater lens from well development data (USDA Soil Conservation Service [SCS] 1994). The area of known freshwater lens includes most of the Central Plateau, inland portions of the Median Valley, and the Northern Lowland.

The main source of drinking water on Tinian is the freshwater lens aquifer in the high-permeability limestone overlying low-permeability volcanic rock (Gingerich 2002). USEPA Region 9 has not identified a sole source aquifer on Tinian. Historically, approximately 40 wells were drilled at an average depth of 229.7 ft (70 m); however, most of these have been abandoned. Currently, there are nine production wells on Tinian. The municipal and agricultural wells are located in or near the Makpo wetland area, and the potable water is stored in tanks at Makpo Heights and Carolinas Heights (Navy 2009).

Per the CNMI *Wastewater Treatment and Disposal Rules and Regulations*, a Class I Aquifer Recharge Area is defined as an "area contributing surface infiltration to a geologic formation, or part of a formation, that is water bearing and which currently transmits, or is believed capable of transmitting water to supply pumping wells or springs." It is inferred from mapping of the freshwater lens that most of the proposed project area lies within a Class I Aquifer Recharge Area. Coastal areas are likely underlain by brackish channeled groundwater (USDOI 2008).

Groundwater Quality

The potential for high chloride levels resulting from saltwater intrusion into the freshwater lens due to excessive pumping of the freshwater aquifer is of concern on Tinian. While it is not currently a problem, it may be in the future if groundwater pumping rates exceed the recharge capacity of the aquifer. Located beneath the Makpo Wetland, the aquifer is considered to be groundwater under direct influence of surface water that must meet the same drinking water treatment technologies standards as surface water (CNMI DEQ 2004).

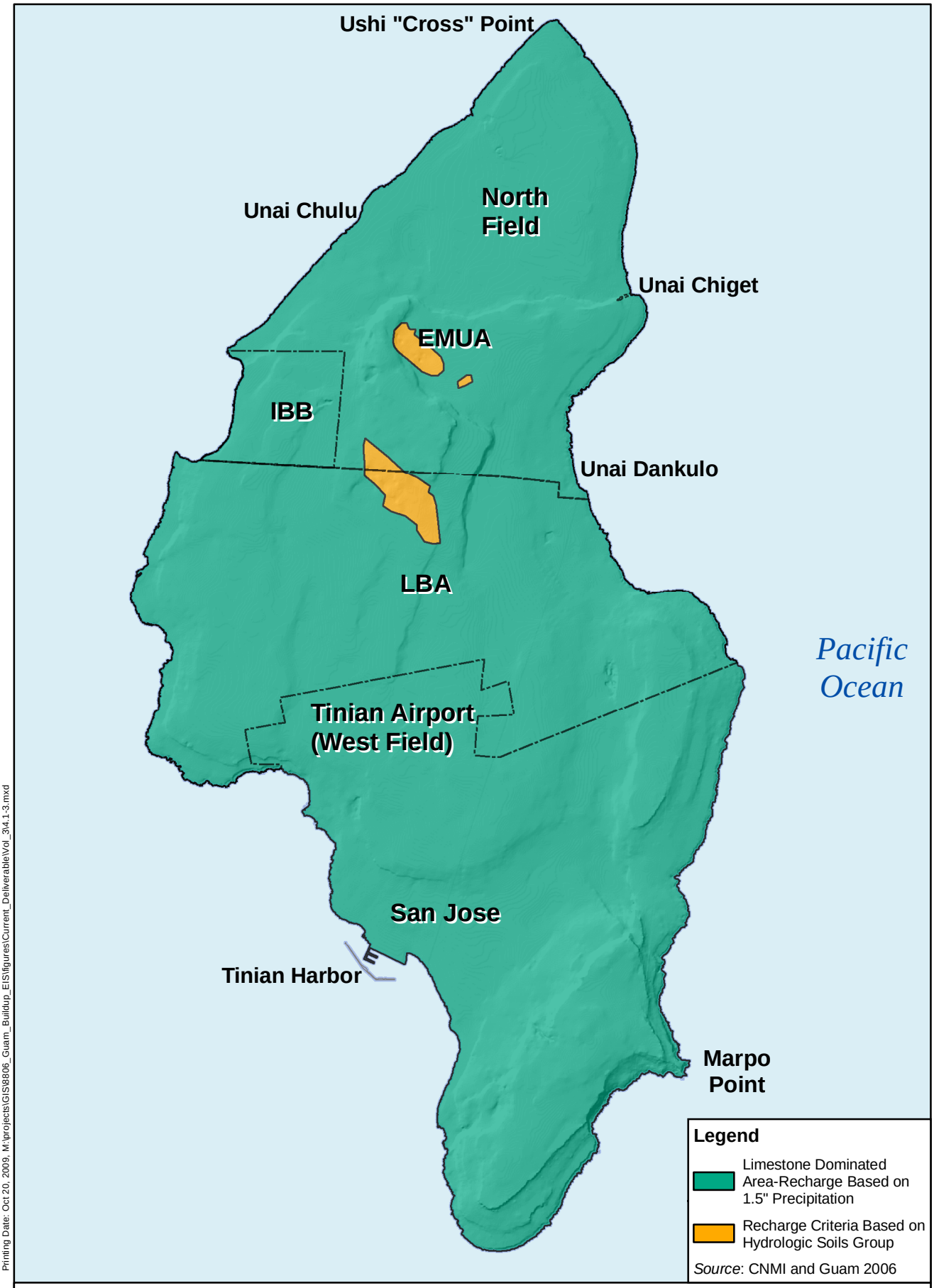

Figure 4.1-3
Water Quality Criteria Designations

Groundwater aquifers on Tinian are also vulnerable to contamination by substances introduced onto the soil surface because the thin soils and underlying permeable limestone does not significantly impede the passage of contaminants to the shallow aquifer.

Federal Regulations

Safe Drinking Water Act

The Safe Drinking Water Act regulates the nation's drinking water supplies by establishing standards for drinking water to protect against both naturally–occurring and man-made contaminants. This act also seeks to prevent contamination of drinking water resources by establishing requirements under programs such as the underground injection control program. This relates directly to groundwater resources on Tinian since this resource provides a majority of the drinking water.

Groundwater Rule

The Groundwater Rule (40 Code of Federal Regulations [CFR] Parts 9, 141 and 142) provides for increased protection against microbial contamination. This is a risk based rule that mandates treatment of groundwater used by public drinking water system be disinfected if indicator bacteria are detected in this water.

Technical Standards and Corrective Action Requirements for Owners and Operator of Underground Storage Tanks

This regulation (40 CFR Chapter 1, Part 280) protects groundwater by establishing regulations and procedures for underground storage tanks that contain regulated substances such as petroleum products. Owners and operators are required to take specific action when investigating releases for their tanks.

Local Regulations

CNMI Drinking Water Regulations

The Drinking Water Regulations establishes standards for drinking water to protect against both naturally–occurring and man-made contaminants. These regulations sets forth testing requirements and standards required to ensure groundwater does not pose a risk to human health. This relates directly to groundwater resources on Tinian since this resource provides a majority of the drinking water.

CNMI Well Drilling and Well Operation Regulations

The CNMI Well Drilling and Well Operation Regulations establish well-related regulations to ensure the long-term availability of reliable and potable groundwater to the public. This regulation also establishes groundwater management zones for the island of Saipan and wellhead protection requirements.

CNMI Water Quality Standards

The CNMI Water Quality Standards establish standards for all of CNMI's waters, including groundwater. These standards promulgate procedures to follow when disposing of wastewater over groundwater recharges zones. A primary recharge zone are areas that contribute recharge to groundwater that is perched and capable of supplying water to public water supply, with an active or future public water supply well field, discharges water to a stream or spring in sufficient quantity to support a public water supply, or is 400 ft (122 m) up gradient or 200 ft (61 m) down gradient from a public supply well. A secondary recharge zone overlies groundwater with a total dissolved solids concentration less than 500 parts per million that is currently or capable of transmitting quantities of water sufficient to support a public water supply well.

Technical Standards and Corrective Action Requirements for Owners and Operator of Underground Storage Tanks

This regulation (40 CFR Chapter 1, Part 280) protects groundwater by establishing regulations and procedures for underground storage tanks that contain regulated substances such as petroleum products. Owners and operators are required to take specific action when investigating releases for their tanks.

Underground Storage Tank Regulations

This regulation (Northern Mariana Islands Administrative Code Chapter 65-100) protects groundwater by establishing a system of control and enforcement over the permitting installation, compliance use, and monitoring for underground storage tanks that contain regulated substances such as petroleum products. Owners and operators are required to take specific action when investigating releases for their tanks.

Wastewater Treatment and Disposal Rules and Regulations

This regulation (Northern Mariana Islands Administrative Code Chapter 65-120) protects groundwater by establishing regulations and procedures for treatment and disposal of wastewater, in particular that wastewater that is discharged from individual wastewater systems.

4.1.2.3 Nearshore Waters

Definition

Nearshore waters of Tinian are defined as those areas under the jurisdiction of the CNMI Coastal Resources Management Program. This includes all areas extending seaward to the extent of the territorial waters (§ 1513 of the CNMI Coastal Resources Management Act).

Oceanography

Tinian is one of the 15 islands of the Mariana Archipelago. The Philippine Sea borders its western shores and the Pacific Ocean the east. The island is located on the frontal, southern arc that are capped or surrounded by limestone terraces. The majority of shoreline consists of low to high limestone cliffs with sea-level caverns, cuts, notches and or slumped boulders, commonly bordered by intertidal benches (Kolinski 2001).

The north, east, and south coasts of Tinian have very limited fringing or apron reef development that is most conspicuous at Unai Dankulo. Submarine topography appears mainly characterized by limestone pavement with interspersed coral colonies and occasional zones of submerged boulders. Coral reef development is more prevalent at various west coast locations, with fringing coral reef habitats present inside Lamanibot and Peipeinigul Bays, and a patch and small barrier reef system (altered as a breakwater for the harbor) located within the Tinian Harbor area (Kolinski 2001).

The water column of the Mariana Islands contains a well-mixed surface layer ranging from approximately 300 to 410 ft (90 to 125 m). Immediately below the mixed layer is a rapid decline in temperature to the cold deeper waters. Unlike more temperate climates, the thermocline is relatively stable, rarely turning over and mixing the more nutrient waters of the deeper ocean in to the surface layer. This constitutes what has been defined as a "significant" surface duct (a mixed layer of constant water temperature extending from the sea surface to 100 ft [30 m] or more) that influences the transmission of sound in the water (Navy 2009).

Nearshore Water Quality

The CNMI has two classifications (AA and A) for marine water use. The majority of the coastal marine waters are Class AA, meaning that these waters should remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions. The uses protected in these waters are the support and propagation of marine life, conservation of coral reefs and wilderness areas, oceanographic research, and aesthetic enjoyment and compatible recreation inclusive of whole body contact (e.g. swimming and snorkeling) and related activities. Class A waters are protected for their recreational use and aesthetic enjoyment; other uses are allowed as long as they are compatible with the protection and propagation of fish, shellfish, and wildlife, and recreation in and on these waters of a limited body contact nature (Bearden et. al. 2004).

All the nearshore waters surrounding Tinian are designated Class AA, except for the nearshore waters of San Jose Harbor that are designated Class A. Sewage outfalls, sewer collection overflows, sedimentation from unpaved roads and development, urban runoff, reverse osmosis discharges, and nutrients from golf courses and agriculture are the most significant stressors on the CNMI's marine water quality (Bearden et. al. 2004).

Only one nearshore area on Tinian, Unai Chulu, did not support its designated use classification due to exceedances in enterococci bacteria violations. This beach is classified as being only partially supportive of its designated uses (Bearden et. al. 2004).

Orthophosphate levels exceeded the water quality standards at all tested water bodies on Tinian suggesting that the water quality standard criteria (0.025miligrams per liter [mg/L]) is not appropriate for the CNMI, and the water quality standards should be updated in the next review cycle to account for this (Bearden et. al. 2004).

Federal Regulations

CWA or Federal Water Pollution Control Act

The purpose of the CWA is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." Under Section 404 of the CWA the U.S. Army Corps of Engineers (USACE) has regulatory jurisdictions over the discharge of dredged or fill material into waters of the U.S. including wetlands.

Coastal Zone Management Act and Amendments

The Coastal Zone Management Act establishes a federal-state partnership to provide for the comprehensive management of coastal resources. Coastal states and territories develop management programs based on enforceable policies and mechanisms to balance resource protection and coastal development needs.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act ensures that water resources development programs must consider wildlife conservation. Under this act, federal agencies proposing actions, including issuance of permits, that would affect any body of water, must consult with U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the affected state or territory's fish and wildlife management agency.

Merchant Marine Act

This law empowers the Maritime Administration to investigate causes of congestion at ports; to investigate the practicability and advantage of harbor, river, and port improvements in connection with

foreign and coastwise trade; and to investigate any other matter that may tend to promote use by vessels of ports.

Rivers and Harbors Act

The original purpose of the RHA was to establish the federal interest in interstate navigation. Section 10 of the RHA requires approval from the USACE prior to undertaking any work with the potential to affect the course, capacity, use, or quality of navigable waters.

Water Resources Development Acts

Dredging projects are authorized by Congress through the Water Resources Development Act that are reauthorized biennially. Water Resources Development Act 86 introduced cost sharing for construction projects whereby the local sponsor pays between 20 and 60% of the construction cost based on the depth of the navigation channel. The Water Resources Development Act cost sharing provisions apply to federal dredging projects implemented by the USACE Civil Works Program, and are not applicable to dredging undertaken by other agencies.

Local Regulations

CNMI coastal waters are divided into Class A and Class AA waters by CNMI DEQ. Water quality criteria specific to Class AA and Class A waters are presented in Table 4.1-1 (USDOI 2008). Class A waters are designated for recreational purposes and aesthetic enjoyment and are to be protected. Any use shall be allowed as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife. Class A waters shall be kept clean of solid waste, oil and grease, and shall not act as receiving waters for any effluent that has not received the best degree of treatment of control practicable under existing technology and economic conditions and compatible with standards established for this class. A mixing zone is approvable in Class A waters (CNMI DEQ 2004).

Table 4.1-1. Specific Water Quality Criteria for Class AA and Class A

Parameter	*Unit*	*Class AA*	*Class A*
Total Nitrogen	mg/L	0.4	0.75
Nitrate-Nitrogen	mg/L	0.20	0.50
Ammonia (un-ionized)	mg/L	0.02	0.02
Total Phosphorous	mg/L	0.025	0.05
Orthophosphate	mg/L	0.025	0.05
Fecal Coliform	CFU per 100 ml	200[a]	200[a]
Enterococci	Per 100 ml	35[b]	35[c]
Dissolved Oxygen	% saturation	$\geq$ 75%	$\geq$ 75%
TSS	mg/L	5[d]	40[d]
Turbidity[a]	NTU	0.5	1.0
Temperature[e]	°C	1.0	1.0
pH	-	7.6 – 8.6	7.6 – 8.6

Legend: °C= degrees Celsius; ml= million liters; CFU= Colony Forming Units; NTU =nephelometric turbidity units

Notes: [a] Fecal coliform concentration shall not exceed a geometric mean of 200 CFU per 100 ml based on samples taken over a 30-day period nor shall any single sample exceed 400 CFU per 100 ml at any time.

[b] Enterococci concentration shall not exceed a geometric mean of 35 per 100 ml based on samples taken over a 30-day period nor shall any single sample exceed 104 per 100 ml at any time.

[c] Enterococci concentration shall not exceed a geometric mean of 35 per 100 ml based on samples taken over a 30-day period nor shall any single sample exceed 276 per 100 ml at any time.

[d] Concentrations of suspended matter shall not be increased from ambient conditions at any time, and should not exceed the criteria when due to natural conditions.

[e] Shall not exceed ambient more than stated value.

Source: CNMI DEQ 2004.

Class AA waters should remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions. To the extent practicable, the wilderness character of such areas must be protected as well as for the support and propagation of shellfish and other marine life, conservation of coral reefs and wilderness areas, oceanographic research, and aesthetic enjoyment and compatible recreation with risk of water ingestion by people. Mixing zones for dredging and the discharge of dredged or fill material may be permitted in Class AA waters; mixing zones for any other discharge are not permitted.

4.1.2.4 Wetlands

Definition

Wetlands are habitats that are subject to permanent or periodic inundation or prolonged soil saturation including marshes, swamps, and similar areas. The recurrent excess of water in wetlands imposes controlling influences on all biota (plants, animals, and microbes). Areas described and mapped as wetland communities may also contain small streams or shallow ponds or pond or lake edges.

Marshes are generally located in low places along the coast, along streams, in depressions and sinkholes with argillaceous limestone, or in poorly drained areas with volcanic soils. Marshes may be inundated with freshwater or brackish water if near the ocean. Swamps are generally located along rivers, especially near the coast or near sea level along river valleys if inland, and are usually designated as ravine communities rather than as wetland communities.

Wetland Areas and Quality

The limestone plateaus of Tinian are generally far too porous to support stream or wetland development. Thus, the few wetlands on Tinian constitute discrete areas where impermeable materials such as clay impounds rainwater and are entirely dependent on direct precipitation as a water source. No mangrove or coastal wetlands are found on Tinian as the entire shoreline is either limestone cliffs and blocks or sand beach. The two largest wetland areas, Hagoi and Makpo, are located in the Northern Lowland and Median Valley, respectively. Both of these wetland areas are located well north and south of the project area, respectively (NAVFAC Marianas 2009a). Wetlands on Tinian are subject to siltation that can reduce their size and functionality. In addition, wetlands are threatened by groundwater wells located adjacent to wetlands and the use of the wetlands for aquaculture in some areas (Scott 1993).

Hagoi (which means "lake" in Chamorro) is a 38.5 ac (15.5 ha) marsh wetland with areas of open water located within the Exclusive Military Use Area approximately 2.5 mi (4 km) north of the project area. It is classified as palustrine, emergent herbaceous wetland, water persistent by intermittently exposed and brackish or mixohaline. Hagoi is situated either on an impervious layer or over a perched water table. As the basin fills in with sediment, the open water of the lake would eventually transform to a marsh with a more or less complete covering of emergent vegetation. The Makpo wetland area is an approximately 28 ac (11.33 ha) wetland located east of the village of San Jose, approximately 3.0 mi (4.9 km) south southeast of the project area. Groundwater pumping wells located adjacent to the Makpo wetland area present a threat to the wetland area during overdraft pumping in dry periods (NAVFAC Marianas 2009a).

The 2007 survey evaluated several NWI-indicated wetland areas in and around the project area using satellite data and performing field inspections (Figure 4.1-4). Table 4.1-2 summarizes the NWI-indicated wetland areas in and near the project area. These 12 NWI-indicated wetland areas are collectively referred to as the "Bathea Area". These presumably ephemeral wetlands have been indicated as occurring in this area, although the USFWS regards that there is only one wetland at a site visited regularly during moorhen surveys in 1994 and 1995 (Area 8294) (NAVFAC Marianas 2009a).

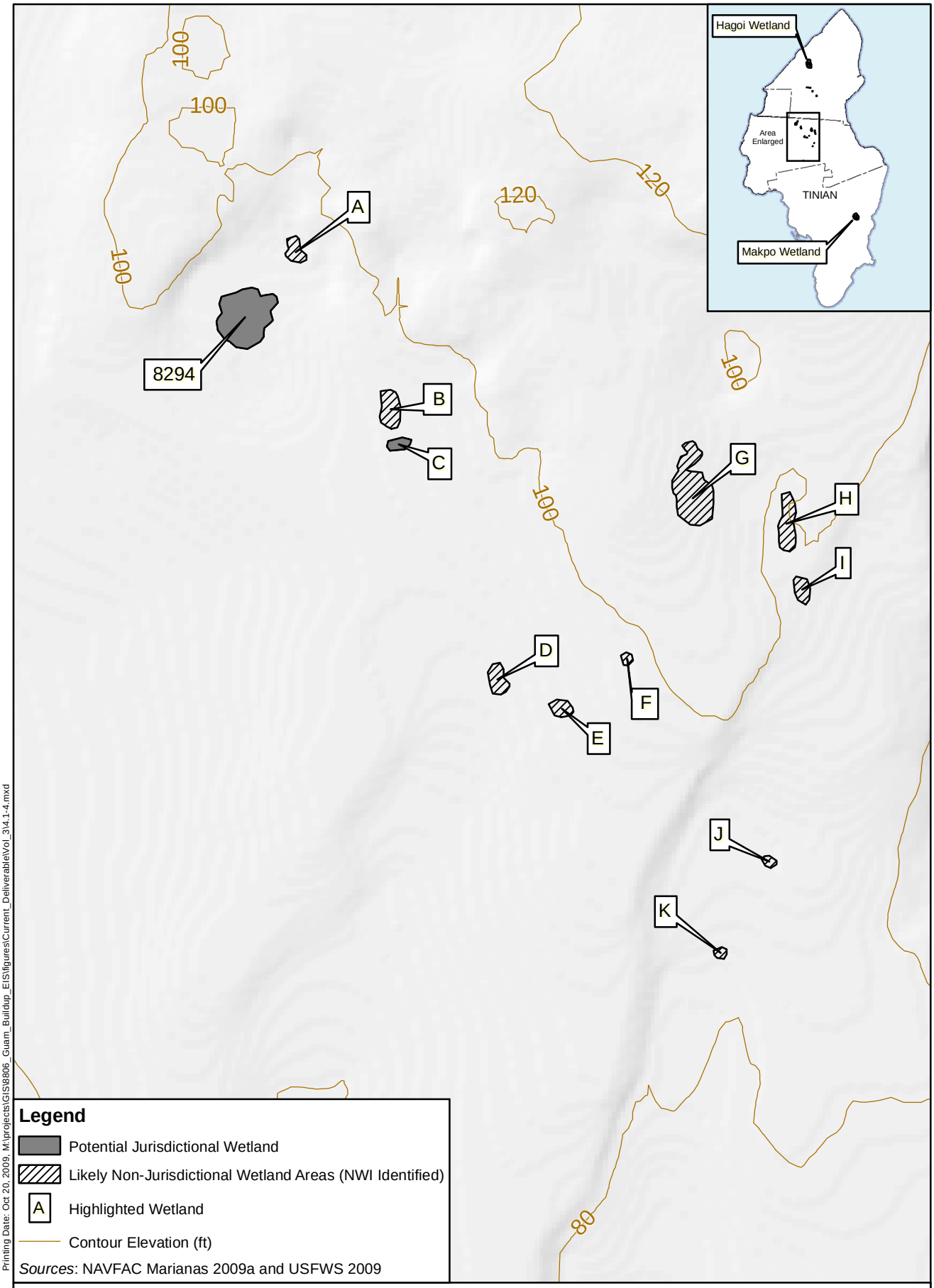

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Figure 4.1-4
Results of NWI-Indicated Wetland Area Investigation

Table 4.1-2. NWI-Indicated Wetlands in the Tinian Project Area

Wetland Area	*Size (ac/ha)*
8294	3.5/1.41[a]
A	0.5/0.20
B	0.9/0.36
C	0.3/0.12[a]
D	0.6/0.24
E	0.4/0.16
F	0.1/0.04
G	3.0/1.21
H	1.1/0.44
I	0.5/0.20
J	0.2/0.08
K	0.2/0.08

Legend: [a] = potential jurisdictional wetland.
Sources: NAVFAC Marianas 2009a, USFWS 2009.

The majority of these NWI-indicated wetland areas are located in an area formerly used for farming (and with some evidence of either ongoing or recently abandoned occupation). There is no or minimal evidence of distinguishable hydrology; that is, while the areas may be distinguishable from surrounding area by vegetation, they appear not to represent depressions that would accumulate runoff, even temporarily (NAVFAC Marianas 2009a).

At Area 8294 water accumulates, although not for very long periods; outflow is via seepage into the ground. Wetland indicators (soil and vegetation) are weak, but perhaps sufficient to claim wetland status as the flooding appears to control the vegetation (NAVFAC Marianas 2009a). While Area 8294 is not definitely a wetland area, Area 8294 is classified as a "potential jurisdictional wetland" and is treated as such in the subsequent analysis.

Areas B - G were further investigated in September 2009 shortly after a major rain event (NAVFAC Marianas 2009b). Areas D, E and F were old farm fields and had no hydrology, plants, or hydric soils. Areas B, G, H had identical conditions as D, E, and F were also most likely farmed in the past. Areas I, J, and K were not investigated in September 2009; however, based on their location and the findings of the evaluation for adjacent areas, these NWI-indicated wetland areas are likely not wetlands. The underlying factor appears to be that none the aforementioned NWI-indicated areas are sufficiently permanent, primarily due to the underlying porous limestone geology of Tinian.

Area C is a large sink-hole type area. The land in the area slopes gently towards it from all directions and the last few meters is steep, descending into the pan. At the time of the investigation, it had a few inches of water in the pan. No hydric soils were observed; however, if one were to dig in the center of the area, where the water is deepest, it is possible to find hydric soils at depth. There were no facultative obligate plants, possibly because the area is totally surrounded by bamboo, even into the pan in higher areas. While Area C is not definitely a wetland area, Area C is classified as a "potential jurisdictional wetland" and is treated as such in the subsequent analysis.

Thus, of the 12 NWI-indicated wetland areas in and adjacent to the project area (refer to Figure 4.1-1) all except for the 3.5 ac (1.41 ha) Area 8294 and the 0.3 ac (0.12 ha) Area C are not considered not to be wetland features. Both potential jurisdictional wetland areas are classified as palustrine, non-persistent emergent herbaceous vegetation, intermittently flooded.

Federal Regulations

Federal Water Pollution Control Act (CWA 33 U.S. Code [USC] §1251 et seq.)

Regulates dredging and filling of wetlands and establishes procedures for identifying and regulating nonpoint sources of polluted discharge into waterways. Actions require federal consistency with State Nonpoint Source Pollution Control Plans.

Statement of Procedures on Floodplain Management and Wetlands Protection; 40 CFR Part 6, Appendix A

These procedures set forth USEPA policy and guidance for carrying out Executive Order 11990 and 11988.

Endangered Species Act (ESA), 16 USC §1531 et seq.; 50 CFR Parts 17, Subpart I, and 50 CFR Part 402

The ESA of 1973 and subsequent amendments provide for the conservation of threatened and endangered species of animals and plants, and the habitats that they are found. The act requires federal agencies, in consultation with the Secretary of the Interior, to verify that any agency supported action is not likely to jeopardize the continued existence of any endangered or threatened species or its critical habitat, or result in the destruction or adverse modification of a critical habitat of such species. Exemptions may be granted by the Endangered Species Committee.

Fish and Wildlife Coordination Act (16 USC § 662)

The Fish and Wildlife Coordination Act requires consideration of the effects of a proposed action on wetlands and areas affecting streams (including floodplains), as well as other protected habitats. Federal agencies must consult with the U.S. Fish and Wildlife Service and the appropriate state agency with jurisdiction over wildlife resources prior to issuing permits or undertaking actions involving the modification of any body of water (including impoundment, diversion, deepening, or otherwise controlled or modified for any purpose). The requirements of this act are applicable for alternatives involving remediation activities in wetlands or floodplains.

National Wildlife Refuge System Administration Act of 1966 (16 USC §§ 668dd-668ee)

The Act provides for the administration and management of the national wildlife refuge system, including wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas and waterfowl production areas.

4.2 ENVIRONMENTAL CONSEQUENCES

This chapter contains the discussion of the potential environmental consequences associated with implementation of the alternatives within the ROI for water resources. For a description of the affected environment, refer to Section 4.1.

4.2.1 Approach to Analysis

4.2.1.1 Methodology

The environmental consequences of each alternative and the no-action alternative are presented in this section. Available data and literature were used to assess existing conditions and to establish a baseline for the assessment, as described in the affected environment section (Section 4.1). The methodology for identifying, evaluating, and mitigating impacts to water resources has been established based on federal and local laws and regulations as described in Section 4.1.

The environmental consequences evaluation for water resources includes a qualitative and quantitative analysis of surface water, groundwater, nearshore waters, and wetlands to the extent possible given available project data. Environmental impact assessments were made and compared to baseline conditions, items of public concern, and significance criteria to determine the magnitude of potential impacts to water resources.

The proposed action analysis is separated into two main activities: construction and operation (consisting of non-training and training operations). Each of these activities has potential impacts to water resources. The analysis of potential impacts considers both direct and indirect impacts. Direct impacts are those that may occur during the construction phase of the project and cease when the project is complete or those that may occur as a result of project operations following the completion of construction. Indirect impacts are those that may occur as a result of the completed project or those that may occur during operations but not as a direct result of the construction or operational action.

Sustainability Requirements and Goals

Water resource sustainability is addressed in two categories: minimization of water demand and maximization of the quantity and quality of groundwater recharge. Implementation of the proposed action would be consistent with Navy policy in compliance with laws and executive orders whereby Department of Defense entities are required to reduce demand for indoor water by as much as 20% and outdoor water use by 50% in the coming years. Concurrent with these mandates is the Navy/Marine Corps policy to pursue and facilitate Leadership in Energy and Environmental Design (LEED) Silver certification for their facilities. LEED is a voluntary point system tool that measures the degree of sustainability features incorporated into a development.

The Marine Corps would review various options to achieve water demand reductions on Tinian. However, the limited amount of construction, lack of permanent habitable structures, and the intermittent use of the facilities may reduce the options available for sustainable features on Tinian.

Surface Water/Stormwater

Surface water issues include:

- Water quality
- Flooding
- Flow path alterations

Surface water quality impacts are evaluated by examining the potential increase of contamination including chemicals, heavy metals, nutrients, and/or sediments in the surface water as a result of the proposed action. The analysis is performed by comparing existing water quality data with possible increases in water quality contaminants in the surface water. Potential impacts to surface water quantity and velocity are analyzed by examining changes in drainage volumes and patterns associated with the proposed action. For construction activities, some of the key effects include stormwater discharges that may contain elevated sediment concentrations, and spills and leaks of chemicals such as lubricants, fuels, or other construction materials that may increase pollutant loading in to the surface water. In addition, direct construction or alteration of stream channels or reservoirs may cause increased contamination by sedimentation or chemical constituents.

For construction activities, some of the key effects include stormwater discharges that may contain elevated sediment concentrations and spills and leaks of chemicals such as lubricants, fuels, or other construction materials that may increase pollutant loading in the surface water. In addition, direct

construction or alteration of stream channels or reservoirs may cause increased contamination by sedimentation or chemical constituents. If flow paths or patterns are altered, additional studies, such as instream flow analysis, would be conducted to ensure the human uses and/or biological services are preserved.

For non-training operation activities, effects include stormwater discharges that may increase the volume of sediment loading to the surface water as well as increase contaminants from vehicle maintenance, household discharge, privately-owned vehicles, and animal waste. Contamination of surface water from leaks or spills of hazardous, or otherwise regulated materials, is also a potential impact. Increased water usage may reduce the water availability in the reservoirs and/or reduce instream flows. Increased impervious areas may increase the runoff and increase the potential for flooding. Development in the floodplain may result in potential damage from flooding. Diversion of water courses for municipal water consumption may impact the ecological services that the resource provides. Training operation activities include potential contaminants from range and course training activities. For example, vehicle traffic could result in an increase in runoff due to the removal of ground cover. The storage of hazardous materials and fuels pose a continued risk of contamination for surface water from leaks or spills.

Groundwater

Groundwater impact concerns include water quality and water quantity. Groundwater quality was assessed by examining the potential risk of a hazardous or regulated waste release, as well as approximating the amount of additional stormwater and associated non-point source pollution that enter the groundwater.

Groundwater quality was assessed by examining the potential risk of a hazardous or regulated waste release, as well as approximating the amount of additional stormwater and associated non-point source pollution that would enter the groundwater. Water availability is addressed in Volume 6, Chapter 3, Section 3.1.2.

Potential groundwater impacts associated with construction activities include spills, leaks, and sedimentation having direct impacts to stormwater runoff that can contribute to groundwater contamination, well as direct contamination of groundwater resources through percolation.

Potential impacts resulting from non-training operation activities include increases in impervious surfaces, waste generating activities, storage of potential contaminants, and landfill leaching. The direct impacts include an increase in polluted stormwater runoff and contamination from leaks or spills of hazardous or regulated materials. In addition, increased water usage may increase the depletion of groundwater resources (Volume 6, Chapter 3, Section 3.1.2). Indirect impacts include decreases in groundwater recharge from increased impervious areas and saltwater intrusion from increased aquifer pumping.

The effects related to training operations include contamination from expended training materials, discharges from latrines, and leaks or spills from hazardous materials. These training activities can pose both short-term and long-term effects.

Nearshore Water

The nearshore water impact analysis focuses on water quality. Recreational nearshore issues are addressed in Volume 3, Chapter 9, Recreational Resources. The potential increases of contamination including chemicals, heavy metals, nutrients, and/or sediments in nearshore waters as a result of the

proposed action are assessed by comparing existing water quality data with the projected changes in water quality.

Potential impacts associated with construction activities include construction spills and leaks that may discharge to nearshore waters and an increase in stormwater discharge that may increase non-point source pollution.

Operations effects include potential non-point source from chemicals, nutrients, and/or sediments that may runoff from bivouac sites. Training operation activity effects include direct contamination from training materials that are used and not recovered.

Wetlands

The wetland impact of concern include:

- Pollutants
- Loss of area
- Loss of functionality

The potential for pollutants to impact a wetland is evaluated by examining the risk of hazardous materials leaking or spilling and their proximity to the wetlands. The loss of area is assessed by the total amount of delineated wetland area that would be directly removed either in loss of area or function as a result of the proposed action. The wetland functionality refers to the ability of the wetland to trap sediment and nutrients, receive and retain water, maintain wildlife habitat (both flora and fauna), and provide recreational uses. The impacts to wildlife habitat associated with wetlands are addressed in Volume 3, Chapter 10, Terrestrial Biological Resources.

For construction activities, the effects associated with activities in close proximity to any designated wetland or activities in the wetlands themselves are considered. Runoff from nearby construction sites may contain increased chemicals, heavy metals, nutrients, and/or sediment that could adversely affect those wetlands. Wetland impacts could result from changes in land uses and/or spills or leaks from construction operations and equipment. Loss of functionality can also occur if construction operations occur directly within the designated wetlands. Loss of wetland area would occur if the proposed action involves the direct removal of wetlands.

The effects associated with operations include an increase in potential spills and leaks from hazardous materials that may be stored in close proximity to designated wetlands. An indirect impact to existing wetlands may occur by altering (i.e., diverting or restricting) the surface water flowing into the wetlands. Indirect impacts to wetlands could also occur as a result of altered sedimentation of watercourses or drainage conveyances connected to wetland areas.

4.2.1.2 Determination of Significance

The following factors are considered in evaluating impacts to groundwater and surface waters:

- Long-term increased inundation, sedimentation, and/or damage to water resources in the ROI caused by project activities, including impervious surfacing that increases and/or diverts rainfall runoff and/or affects its collection and conveyance and implementation of mitigation measures.
- Depletion, recharge, or contamination of a usable groundwater aquifer for municipal, private, or agricultural purposes.

- Increases in soil settlement or ground swelling that damages structures, utilities, or other facilities caused by inundation and/or changes in groundwater levels.
- Noncompliance with all applicable water quality standards, laws, and regulations.
- Increasing risk associated with environmental hazards or human health.
- Decreasing existing and/or future beneficial use.
- Reducing the amount of water or wetlands available for human use or ecological services.
- Reducing availability or accessibility of water resources.
- Long-term increased inundation, sedimentation, and/or damage to water resources.

If an activity is deemed as having an impact, the activity then can be evaluated to determine if the impact is significant or insignificant. For significant impacts, a determination is made as to whether the impacts can be mitigated to less than significant impacts.

4.2.1.3 Issues Identified During Public Scoping Process

The following analysis focuses on the effects to water resources: surface water, groundwater, nearshore water, and wetlands that could be impacted by the proposed action. As part of the analysis, concerns relating to water resources that were identified by the public, including regulatory stakeholders, during the scoping meetings are addressed. These include:

- Describe water quality with respect to public health requirements, drinking water regulations, and applicable water quality standards.
- Estimate quality and quantity of storm water runoff to be generated by increased impervious surface, methods of contaminant removal, methods of runoff redirection to recharge the aquifer, and groundwater under the direct influence of surface water.
- Accidental or intentional contamination of groundwater.
- Capacity of water resources to meet the agricultural needs.
- Stormwater management controls to prevent pollution during construction and subsequent operations.
- Construction and vegetation clearing that potentially cause runoff, pollute the beaches, and destroy marine life.
- Effects of training and dredging on sedimentation stress for the coral reefs and other marine life.
- Identify ways to monitor and mitigate indirect impacts from sediments on coral reefs.

4.2.2 Alternative 1 (Preferred Alternative)

The analysis of potential impacts to water quality under Alternative 1 focuses on proposed firing training. This involves construction and operation of the proposed firing ranges as configured for the alternative.

4.2.2.1 Tinian

Construction

Surface Water/Stormwater

Under Alternative 1, proposed firing range and supporting areas (parking areas, roads, and bivouac areas) construction activities would result in the potential for a temporary increase in stormwater runoff, erosion, and sedimentation. To minimize these potential impacts, construction-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) would be implemented to reduce the potential for erosion, runoff, sedimentation, and water quality impacts.

A part of construction activities, a water quality monitoring program would be implemented to identify ambient conditions and then identify deviations from ambient conditions due to construction activities. Any deviations with a potential to negatively impact water quality would be addressed per the procedures and corrective actions identified in the water quality management plan. Proposed construction activities would not occur within the 100-year floodplain zone. Therefore, construction activities associated with Alternative 1 would result in less than significant impacts to surface water.

Groundwater

Under Alternative 1, range construction activities would include surface water protection measures (identified above) that would also serve to protect groundwater quality. These BMPs and follow-on measures would reduce the pollutant loading potential in stormwater and the underlying groundwater sub-basins. Therefore, construction activities associated with Alternative 1 would result in less than significant impacts to groundwater.

Nearshore Waters

Range construction activities associated with Alternative 1 would occur more than one mile (1.6 km) from the coastline. As a result, construction activities would not result in direct impacts to the nearshore water. Any potential impacts would further be lessened through implementation of surface water BMPs and adherence to all applicable orders, laws, and regulations relating to water quality. Therefore, construction activities associated with Alternative 1 would result in less than significant impacts to nearshore waters.

Wetlands

Potential jurisdictional wetland Area 8294 is located approximately 1,000 ft (305 m) west of the proposed Platoon Battle Course (Figure 4.2-1). The recognized Hagoi and Makpo Wetland Areas are located 2.5 mi (4 km) north and 3.0 mi (4.9 km) south, respectively of the project area associated with Alternative 1; these wetlands would not be impacted. In addition, as Area 8294 is located up-gradient from the proposed range footprints, no indirect impacts to this wetland area would occur during construction.

As shown on Figure 4.2-1, there is one potential jurisdictional wetland area (Area C) located within the range footprint associated with Alternative 1. Area C, a 0.3 ha (0.12 ha) potential jurisdictional wetland area, would be filled (directly impacted) with implementation of Alternative 1.

The actual impacts to wetlands from Alternative 1 have not been field verified; if verified at 0.3 ac (0.12 ha), impacts would be relatively small. This area has not been formally delineated, so the effects are only to a *potential* wetland area. Given this small amount of potential effect, the Marine Corps could potentially adjust the layout of the proposed Platoon Battle Course under Alternative 1 to avoid this potential wetland area. However, for the purposes of this analysis, it is assumed direct impacts would occur. During construction, indirect impacts to other nearby wetland areas would be minimized by incorporating site-specific appropriate BMPs (Volume 2, Chapter 4, Table 4.2-1) that would reduce the potential for construction impacts to these wetland areas. With implementation of the mitigation measures identified in Section 4.2.2.3, construction activities associated with Alternative 1 would result in less than significant impacts to wetlands.

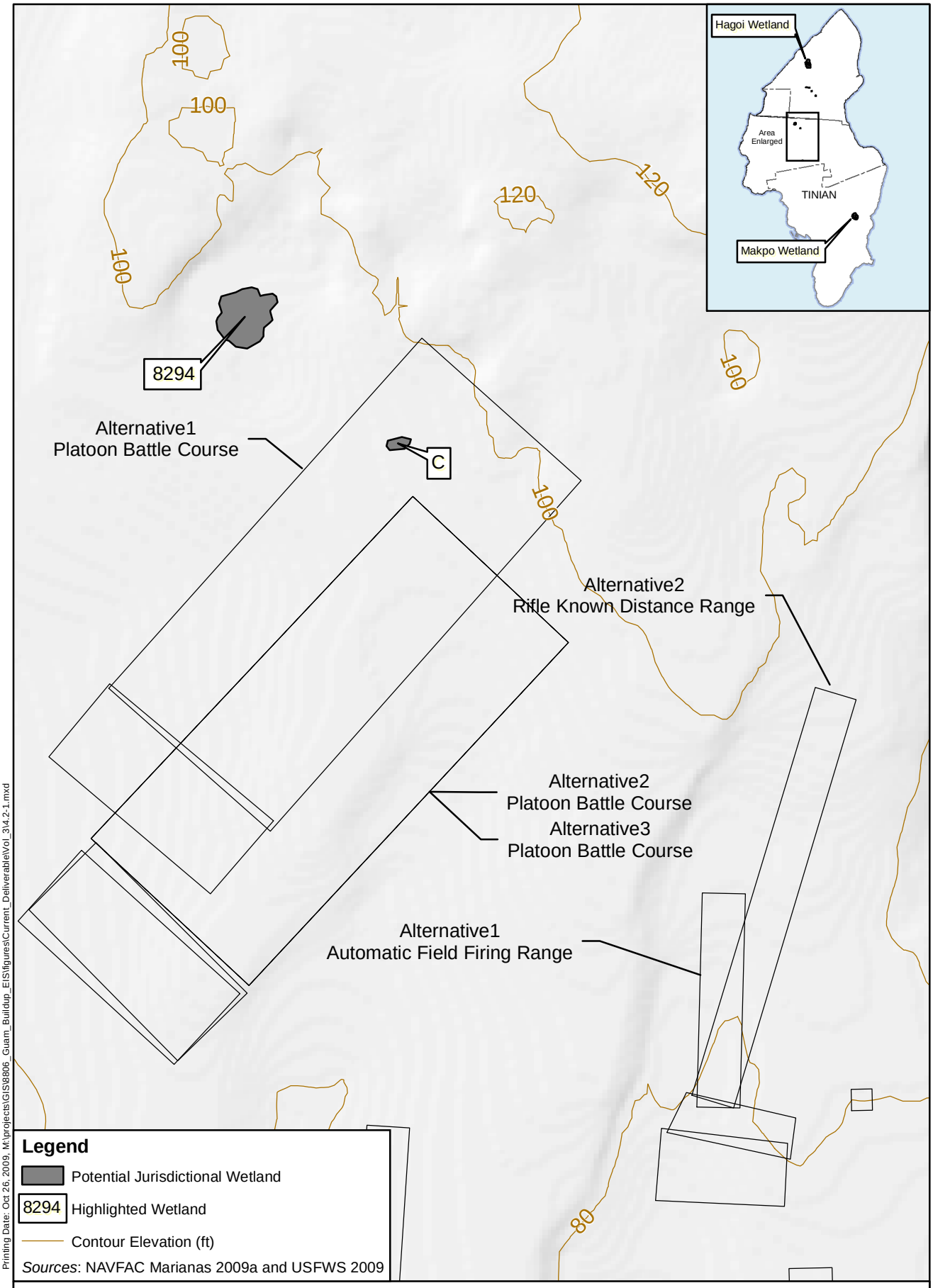

Figure 4.2-1
Potential Jurisdictional Wetlands and Range Footprints, All Alternatives

Operation

Surface Water/Stormwater

The operational phase would result in a minor increase in the area of impervious surface as a result of new range training buildings and courses that would result in an associated relatively minor increase in stormwater discharge intensities and volume. This increase would be minor and would be accommodated by stormwater infrastructure, and stormwater flow paths would continue to mimic area topography. To address this potential increase in stormwater runoff, Alternative 1 would incorporate the concept of Low Impact Development (LID) in the final planning, design, and permitting of the design of the ranges and courses.

The goals of LID are too closely match the post-development topography and stormwater runoff hydrology to the pre-development status. The intent of LID is to control non-point source runoff through the implementation of plant-soil-water and man-made, where appropriate, mechanisms that protect and sustain the ecological integrity of the receiving water bodies and wetlands. LID technologies are well suited to reduce stormwater runoff loadings for a variety of potential contaminants including sediment, nutrients, and heavy metals. LID practices at the planning level are in conformance with USEPA non-structural Pollution Prevention strategies. The range-specific LID measures for Tinian would reduce stormwater runoff using a combination of retention devices and vegetation. For example, grassy vegetation would be maintained on the berms to help manage stormwater and control erosion, thereby reducing potential water quality impacts. With the implementation of LID measures to reduce impacts, no diversion or restriction of surface water flow would occur.

Proposed range training activities would have the potential to release potential contaminants into receiving waters. To minimize these potential impacts, Alternative 1 would be implemented in accordance with all applicable orders, laws, and regulations, including preparation of and compliance with a Stormwater Pollution Prevention Plan, Stormwater Management Plan, and Spill Prevention, Control, and Countermeasure Plan that would minimize potential water quality impacts from runoff, leaks, spills, and range training activities. For example, munitions expended at the ranges would be entrapped in soil impact berms that would be maintained to remove expended rounds from the soil. The soils would be returned to the range, and the rounds would be removed and transported for recycling. A monitoring program would be implemented to identify any early indications of lead movement so that action could be taken to address any potential water quality impacts. Thus, implementation of these range-specific water quality protective measures would minimize potential impacts of runoff, spills, leaks, and training activities to water resources.

Implementation of Alternative 1 would be in compliance with all federal, local, and military orders, laws, and regulations, including COMNAV Marianas Instruction 3500.4, as well as the implementation of BMPs, LID, and monitoring. Regulatory compliance and implementation of protective measures and plans would minimize potential impacts to surface water resources. Therefore, operations associated with Alternative 1 would result in less than significant impacts to surface water.

Groundwater

None of the proposed range locations lie over the Takapochao Limestone, which is the main drinking water supply for Tinian. Furthermore, proposed training operations would be in compliance with the water protection measures identified in the surface water section above during training operations that would therefore also protect local groundwater quality. Implementation of Alternative 1 would not

increase groundwater pumping rates. Therefore, operations associated with Alternative 1 would result in less than significant impacts to groundwater.

Nearshore Waters

While alterations to the watershed have the potential to result in indirect impacts that could alter the nearshore water quality, these potential effects would be minimized by complying with all applicable orders, laws and regulations presented in Volume 7, Chapter 3, Section 3.1. In addition, the aforementioned training surface water resource protection measures would minimize potential indirect impacts to nearshore waters. Therefore, operations associated with Alternative 1 would result in less than significant impacts to nearshore water.

Wetlands

Post-construction, no direct impacts to the wetland areas are anticipated. Following construction, no wetland areas would be located within the proposed ranges and courses. Range operations would not alter surface water flow to wetland areas as wetland areas are located at higher elevations that the proposed ranges (i.e., any changes to surface hydrology would occur down-gradient from wetland areas) (Figure 4.1-4). In addition, as the range operations would occur down-gradient from the potential wetland areas, there would be no potential for any residual lead or other potential contaminants to reach Wetland Area 8294 via stormwater runoff. There is a slight chance of an expended round to land in Wetland Areas C or 8294 as the areas are located within the Surface Danger Zone (SDZ) associated with the ranges; however, the chances of having enough spent rounds to fall within the wetland area to impact the function of the wetland is negligible. Therefore, operations associated with Alternative 1 would result in less than significant impacts to wetlands.

4.2.2.2 Summary of Alternative 1 Impacts

Table 4.2-1 summarizes the potential construction and operational impacts associated with implementation of Alternative 1.

Table 4.2-1. Summary of Alternative 1 Impacts

Area	*Project Activities*	*Project Specific Impacts*
Tinian	Construction	SW: Temporary increase in stormwater runoff, erosion, and sedimentation GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential WL: Direct impact (fill) of 0.3 ac (0.12) of potential jurisdictional wetland
	Operation	SW: Increase in stormwater volume and intensity; increase in training-related residual contaminants GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential WL: Minor increase in pollutant loading potential from expended rounds

Legend: SW = Surface water/stormwater; GW = Groundwater; NW = Nearshore waters; WL = Wetlands.

Under Alternative 1, there would be no reduction in the amount of wetlands on Tinian, and there would be no reduction in the availability or accessibility of water resources. Increases in stormwater would be managed by LID measures, stormwater flow paths would continue to mimic area topography, range operations and maintenance activities would not alter surface water flow to wetland areas, and no construction would occur in a flood zone; therefore, there would be no increase in flooding risk. Through the development and implementation of site-specific BMPs and LID measures, as well as range and course-specific plans and procedures, there would no increased risk from environmental hazards or to human health. Furthermore, all actions associated with Alternative 1 would be implemented in

accordance with all applicable federal, local, and military orders, laws, and regulations (Volume 8, Chapter 3, Table 3.1-1), including COMNAV Marianas Instruction 3500.4. Therefore, Alternative 1 would result in less than significant impacts to water resources.

4.2.2.3 Alternative 1 Potential Mitigation Measures

To compensate for the potential filling of approximately 0.3 ac [0.15 ha] of wetlands and the associated loss of wetland function from the proposed construction of the Platoon Battle Course, the Navy would first attempt to avoid impacts; if avoidance is not possible, then the Navy would implement measures to minimize potential impacts. Potential impacts could be mitigated through preserving existing areas, or compensating for the fill of the wetland area by creating or improving existing wetland areas on Tinian to, at a minimum, replace the area filled. The Navy would also obtain a USACE permit for this action and would comply with the permit requirements.

A detailed description of resource protection measures potentially required by regulatory mandates is in Volume 7, Section 3.1. A more detailed explanation of potential regulatory permitting requirements is also available in Volume 8, Chapter 3, Table 3.1-1.

4.2.3 Alternative 2

The analysis of potential impacts to water quality under Alternative 2 focuses on proposed firing training. Alternative 2 is general similar to Alternative 1; the orientation of the ranges and courses would be slightly different under Alternative 2.

4.2.3.1 Tinian

Construction

Surface Water/Stormwater

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to surface water resources resulting from implementation of Alternative 2 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 2 would result in less than significant impacts to surface water.

Groundwater

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to groundwater resources resulting from implementation of Alternative 2 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 2 would result in less than significant impacts to groundwater.

Nearshore Waters

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to nearshore water resources resulting from implementation of Alternative 2 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 2 would result in less than significant impacts to nearshore waters.

Wetlands

Based on a recent investigation (refer to Section 4.1.2.4), there are no wetlands located within the range footprints associated with Alternative 2. No direct impacts to wetlands would occur during construction activities. The nearest wetland area to proposed construction under Alternative 2 is Area C, located approximately 400 ft (122 m) north of the Platoon Battle Course. The next nearest wetland area is Area 8294, located approximately 1,750 ft (305 m) west of the proposed Platoon Battle Course (Figure 4.2-1). Both of these recognized potential jurisdictional wetland areas are located up-gradient from the proposed range footprints; no indirect impacts to these wetland areas would occur during construction. The recognized Hagoi and Makpo Wetland Areas are located 2.5 mi (4 km) north and 3.0 mi (4.9 km) south, respectively of the project area associated with Alternative 2; these wetlands would not be impacted. Therefore, construction activities associated with Alternative 2 would result in no impacts to wetlands.

Operation

Surface Water/Stormwater

The proposed range training operations on Tinian are the same for all action alternatives; therefore, the potential operational impacts to surface water resources resulting from implementation of Alternative 2 would be the same as the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, operations associated with Alternative 2 would result in less than significant impacts to surface water.

Groundwater

The proposed range training operations on Tinian are the same for all action alternatives; therefore, the potential operational impacts to groundwater resources resulting from implementation of Alternative 1 would be the same as the potential impacts discussed under Alternative 2. Refer to Section 4.2.2.1. Therefore, operations associated with Alternative 2 would result in less than significant impacts to groundwater.

Nearshore Waters

The proposed range training operations on Tinian are the same for all action alternatives; however, as shown in Volume 3, Chapter 2, Figure 2.5-2, a portion of the notational SDZ associated with the Platoon Battle Course would overlap nearshore waters. As discussed in Volume 3, Chapter 2, Section 2.3.1.1, there is a very small chance an expended projectile to fall outside of the range footprint, within the SDZ. There would be an even smaller chance for an expended projectile to fall within the nearshore water portion of the SDZ. Due to the small number of potential projectiles that could fall into the nearshore SDZ and the relatively small size of the projectile, the potential impacts to nearshore water quality from these projectiles would be negligible. In addition, the same range and course management measures as identified in Section 4.2.2.1 would be implemented to minimize potential operational impacts to nearshore waters. Therefore, operations associated with Alternative 2 would result in less than significant impacts to nearshore waters.

Wetlands

Post-construction, range operations would not alter surface water flow to wetland areas as wetland areas are located at higher elevation that the proposed ranges (i.e., any changes to surface hydrology would occur down-gradient from wetland areas) (Figure 4.1-4). In addition, as the range operations would occur down-gradient from the potential wetland areas, there would be no potential for any residual lead or other potential contaminants to reach Wetland Areas C or 8294 via stormwater runoff. There is a slight chance

of an expended round to land in Wetland Areas C and 8294 as the areas are located within the SDZ associated with the ranges; however, the chances of having enough spent rounds to fall within the wetland area to impact the function of the wetland is negligible. Therefore, operations associated with Alternative 2 would result in less than significant impacts to wetlands.

4.2.3.2 Summary of Alternative 2 Impacts

Table 4.2-2 summarizes the potential construction and operational impacts associated with implementation of Alternative 2.

Table 4.2-2. Summary of Alternative 2 Impacts

Area	*Project Activities*	*Project Specific Impacts*
Tinian	Construction	SW: Temporary increase in stormwater runoff, erosion, and sedimentation GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential WL: No impacts
	Operation	SW: Increase in stormwater volume and intensity; increase in training-related residual contaminants GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential; increase in training-related residual contaminants WL: Minor increase in pollutant loading potential from expended rounds

Legend: SW = Surface water/stormwater, GW = Groundwater, NW = Nearshore waters, WL = Wetlands.

Under Alternative 2, there would be no reduction in the area of wetlands on Tinian and there would be no reduction in the availability or accessibility of water resources. Increases in stormwater would be managed by LID measures, stormwater flow paths would continue to mimic area topography, range operations and maintenance activities would not alter surface water flow to wetland areas, and no construction would occur in a flood zone; therefore, there would be no increase in flooding risk. Through the development and implementation of site-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) and LID measures, and range and course-specific plans and procedures, there would no increased risk from environmental hazards or to human health. Any potential projectiles landing in the nearshore water portion of the SDZ would have a negligible impact on nearshore water quality. Furthermore, all actions associated with Alternative 2 would be implemented in accordance with all applicable federal, local, and military orders, laws, and regulations (Volume 8, Chapter 3, Table 3.1-1), including COMNAV Marianas Instruction 3500.4. Therefore, Alternative 2 would result in less than significant impacts to water resources.

4.2.3.3 Alternative 2 Potential Mitigation Measures

No potential mitigation measures have been identified for Alternative 2.

4.2.4 Alternative 3

The analysis of potential impacts to water quality under Alternative 3 focuses on proposed firing training. Alternative 3 is general similar to Alternative 1; the orientation of the ranges and courses would be slightly different under Alternative 3.

4.2.4.1 Tinian

Construction

Surface Water/Stormwater

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to surface water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 3 would result in less than significant impacts to surface water.

Groundwater

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to groundwater resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 3 would result in less than significant impacts to groundwater.

Nearshore Waters

The proposed range and course construction activities are similar for all action alternatives; therefore, potential construction impacts to nearshore water resources resulting from implementation of Alternative 3 would be similar to the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, construction activities associated with Alternative 3 would result in less than significant impacts to nearshore waters.

Wetlands

Based on a recent investigation (refer to Section 4.1.2.4), there are no wetlands located within the range footprints associated with Alternative 3. No direct impacts to wetlands would occur during construction activities. The nearest wetland area to proposed construction under Alternative 3 is Area C, located approximately 400 ft (122 m) north of the Platoon Battle Course. The next nearest wetland area is Area 8294, located approximately 1,750 ft (305 m) west of the proposed Platoon Battle Course (Figure 4.2-1). Both of these recognized potential jurisdictional wetland areas are located up-gradient from the proposed range footprints; no indirect impacts to these wetland areas would occur during construction. The recognized Hagoi and Makpo Wetland Areas are located 2.5 mi (4 km) north and 3.0 mi (4.9 km) south, respectively of the project area associated with Alternative 3; these wetlands would not be impacted. Therefore, construction activities associated with Alternative 3 would result in no impacts to wetlands.

Operation

Surface Water/Stormwater

The proposed range training operations on Tinian are the same for all action alternatives; therefore, the potential operational impacts to surface water resources resulting from implementation of Alternative 3 would be the same as the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, operations associated with Alternative 3 would result in less than significant impacts to surface water.

Groundwater

The proposed range training operations on Tinian are the same for all action alternatives; therefore, the potential operational impacts to groundwater resources resulting from implementation of Alternative 3 would be the same as the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, operations associated with Alternative 3 would result in less than significant impacts to groundwater.

Nearshore Waters

The proposed range training operations on Tinian are the same for action alternatives; therefore, the potential operational impacts to nearshore water resources resulting from implementation of Alternative 3 would be the same as the potential impacts discussed under Alternative 1. Refer to Section 4.2.2.1. Therefore, operations associated with Alternative 3 would result in less than significant impacts to nearshore waters.

Wetlands

Post-construction, range operations would not alter surface water flow to wetland areas as wetland areas are located at higher elevation that the proposed ranges (i.e., any changes to surface hydrology would occur down-gradient from wetland areas) (Figure 4.1-4). In addition, as the range operations would occur down-gradient from the potential wetland areas, there would be no potential for any residual lead or other potential contaminants to reach Wetland Areas C or 8294 via stormwater runoff. There is a slight chance of an expended round to land in Wetland Areas C or 8294 as the areas are located within the SDZ associated with the ranges; however, the chances of having enough spent rounds to fall within the wetland area to impact the function of the wetland is negligible. Therefore, operations associated with Alternative 3 would result in less than significant impacts to wetlands.

4.2.4.2 Summary of Alternative 3 Impacts

Table 4.2-3 summarizes the potential construction and operational impacts associated with implementation of Alternative 3.

Table 4.2-3. Summary of Alternative 3 Impacts

Area	*Project Activities*	*Project Specific Impacts*
Tinian	Construction	SW: Temporary increase in stormwater runoff, erosion, and sedimentation GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential WL: No impacts
	Operation	SW: Increase in stormwater volume and intensity; increase in training-related residual contaminants GW: Increased potential for local groundwater contamination NW: Minor increase in runoff volume and pollutant loading potential WL: Minor increase in pollutant loading potential from expended rounds

Legend: SW = Surface water/stormwater; GW = Groundwater; NW = Nearshore waters; WL = Wetlands.

Under Alternative 3, there would be no reduction in the area of wetlands on Tinian and there would be no reduction in the availability or accessibility of water resources. Increases in stormwater would be managed by LID measures, stormwater flow paths would continue to mimic area topography, range operations and maintenance activities would not alter surface water flow to wetland areas, and no construction would occur in a flood zone; therefore, there would be no increase in flooding risk. Through the development and implementation of site-specific BMPs (Volume 2, Chapter 4, Table 4.2-1) and LID

measures, and range and course-specific plans and procedures, there would no increased risk from environmental hazards or to human health. Furthermore, all actions associated with Alternative 3 would be implemented in accordance with all applicable federal, local, and military orders, laws, and regulations (Volume 8, Chapter 3, Table 3.1-1), including COMNAV Marianas Instruction 3500.4. Therefore, Alternative 3 would result in less than significant impacts to water resources.

4.2.4.3 Alternative 3 Potential Mitigation Measures

No potential mitigation measures have been identified for Alternative 3.

4.2.5 No-Action Alternative

4.2.5.1 Surface Water/Stormwater

Under the no-action alternative, Marine Corps units would remain in Japan and would not conduct additional training on Tinian. No construction or operations would occur; therefore, existing surface water conditions as presented in Section 4.1 would remain.

The identified surface water availability and quality concerns for Tinian (e.g., construction-related discharges, sewage overflows, animal waste, and sediment erosion) would continue to exist. These threats to surface water would continue to be monitored by federal and Tinian agencies, and appropriate regulatory action would continue to occur in order to maximize surface water quality and availability. In time, surface water quality is expected to slowly improve as point and non-point sources of pollution are identified and pollution loading to surface waters is reduced. Not increasing the amount of training on Tinian would not change the ongoing water quality concerns or protection actions for surface waters; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to surface water.

4.2.5.2 Groundwater

Under the no-action alternative, Marine Corps units would remain in Japan and would not conduct additional training on Tinian. No construction or operations would occur; therefore, existing groundwater conditions as presented in Section 4.1 would remain.

The identified groundwater availability and quality concerns for Tinian (e.g., saltwater intrusion, leaky septic systems) would continue to exist. These threats to groundwater availability and quality would continue to be monitored by federal and Tinian agencies to minimize potential impacts, and appropriate regulatory action would continue to occur in order to protect groundwater resources. Monitoring for saltwater intrusion and coordination amongst water users, as well as potential designations for groundwater resources is expected to ensure there is a dependable, safe supply of groundwater for Tinian users. Not increasing the amount of training on Tinian would not change the on-going groundwater availability and quality concerns or the protection actions for Tinian nearshore waters; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to groundwater.

4.2.5.3 Nearshore Waters

Under the no-action alternative, Marine Corps units would remain in Japan and would not conduct additional training on Tinian. No construction or operations would occur; therefore, existing nearshore conditions as presented in Section 4.1 would remain.

The identified nearshore water quality concerns for the marine waters of Tinian (sewage outfalls, sewer collection overflows, sedimentation from unpaved roads and development, urban runoff, reverse osmosis

discharges, and enterococci bacteria,) would continue to persist. These threats to nearshore water quality would continue to be monitored by federal and Tinian agencies to minimize potential impacts, and appropriate regulatory action would continue to occur to protect nearshore waters. In time, nearshore water quality is expected to slowly improve as point and non-point sources of pollution are identified and pollution loading to nearshore waters is reduced. Not increasing the amount of training on Tinian would not change the on-going nearshore water quality concerns or the protection actions for Tinian nearshore waters; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to nearshore waters.

4.2.5.4 Wetlands

Under the no-action alternative, Marine Corps units would remain in Japan and would not conduct additional training on Tinian. No construction or operations would occur; therefore, existing wetland conditions as presented in Section 4.1 would remain.

The identified primary threats to wetlands on Tinian (feral ungulates, human disturbance, non-native plants species, sedimentation, and erosion) would continue to occur. These threats to wetland area and function are of concern and are therefore monitored by federal and Tinian agencies to protect wetland areas. Not increasing the amount of training on Tinian would not change the on-going threats or protection actions for wetlands on Tinian; these conditions and actions would continue to persist. Therefore, implementation of the no-action alternative would result in no impacts to wetlands.

4.2.6 Summary of Impacts

Table 4.2-4 summarizes the potential impacts. A text summary is provided below.

Table 4.2-4. Summary of Impacts

Alternative 1	*Alternative 2*	*Alternative 3*	*No-Action Alternative*
Construction Impacts			
SW: LSI • Temporary increase in stormwater runoff, erosion, and sedimentation GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: SI-M • Direct impact (fill) of 0.3 ac (0.12 ac) of potential jurisdictional wetland	SW: LSI • Temporary increase in stormwater runoff, erosion, and sedimentation GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI	SW: LSI • Temporary increase in stormwater runoff, erosion, and sedimentation GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: NI	Water Resources: NI
Operation Impacts			
SW: LSI • Increase in stormwater volume and intensity; increase in training-	SW: LSI • Increase in stormwater volume and intensity; increase in training-	SW: LSI • Increase in stormwater volume and intensity; increase in training-	Water Resources: NI

Table 4.2-4. Summary of Impacts

Alternative 1	*Alternative 2*	*Alternative 3*	*No-Action Alternative*
related residual contaminants GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: LSI • Minor increase in pollutant loading potential from expended rounds	related residual contaminants GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential; increase in training-related residual contaminants WL: LSI • Minor increase in pollutant loading potential from expended rounds	related residual contaminants GW: LSI • Increased potential for local groundwater contamination NW: LSI • Minor increase in runoff volume and pollutant loading potential WL: LSI • Minor increase in pollutant loading potential from expended rounds	

Legend: SI-M = Significant impact mitigable to less than significant; LSI = Less than significant impact; NI = No impact; SW = Surface water/stormwater; GW = Groundwater.

Implementation of the alternatives would have the potential to impact the quality and quantity of stormwater runoff, during both the construction and operational phases of the project. Construction and operation would have the potential to cause erosion and sedimentation that could degrade surface water quality. In addition, the action alternatives would increase the potential for leaks and spills from contaminants. These potential impacts would be reduced through the combination of BMPs (Volume 2, Chapter 4, Table 4.2-1), LID measures, and monitoring programs. Furthermore, the action alternatives would be implemented in compliance with all federal, local, and military orders, laws, and regulations (Volume 8, Chapter 3, Table 3.1-1) including COMNAV Marianas Instruction 3500.4 and would include the implementation of BMPs, LID, and monitoring. Proposed construction activities would not occur within the 100-year floodplain zone.

Alternative 1 has the potential to impact approximately 0.3 ac (0.12 ha) of potential jurisdictional wetlands; this direct impact would be mitigated by potentially creating or enhancing wetland areas elsewhere on Tinian and complying with USACE permit requirements. Therefore, with mitigation, Alternative 1 would result in less than significant impacts to wetlands. No wetland impacts would occur under Action Alternatives 2 or 3. Alternative 2 has the potential to result in a negligible impact to nearshore water quality due to expended projectiles falling in the nearshore water portion of the SDZ. Under Alternatives 1 and 3, the SDZs would not overlap nearshore waters.

4.2.7 Summary of Potential Mitigation Measures

Potential impacts of Alternative 1 could be mitigated through preserving existing areas, or compensating for the fill of the wetland area by creating or improving existing wetland areas on Tinian to, at a minimum, replace the area filled. The Navy would also obtain a USACE permit for this action and would comply with the permit requirements. No potential mitigation measures have been identified for Alternatives 2 or 3.

4.3 LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE (LEDPA)

This section focuses on compliance with the Section 404(b)(1) guidelines of the Clean Water Act. Specifically, Section 404(b)(1) of the Clean Water Act stipulates that no discharge of dredged or fill material into waters of the United States, which include wetlands, shall be permitted if there is a practicable alternative which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences. Furthermore, an alternative is considered practicable if it is available and capable of being implemented after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Section 404 permitting is applicable to the proposed training actions on Tinian. Permitting decisions are based on guidelines ("404(b)(1) Guidelines") developed jointly with the USEPA that are now part of the Code of Federal Regulations (40 CFR 230). A Section 404 Permit would be applied for and obtained prior to construction. This analysis is to show that the screening and selection process used in the development of this EIS/OEIS has identified the *least environmentally damaging practicable alternative* (LEDPA) consistent with the Section 404(b)(1) guidelines.

The discussion below provides a brief comparative summary of the three alternatives carried forward for analysis in this EIS/OEIS and highlights the reasons why Alternative 2 is considered the LEDPA. However, the Marine Corps has determined that Alternative 1 is the preferred alternative for the proposed action. Alternative 1 is preferred because it consolidates the ranges in a central location, is located on the terrain that requires the least amount of earthmoving for construction, makes best use of the existing road network to get to and to service the ranges, provides the most flexibility for future expansion, has the least impact on airspace due to centralized/overlapping SDZs, and only closes Broadway access when Platoon Battle Course is being used.

Options for a Range Training Area (RTA) that could accommodate the four proposed ranges (Rifle Known Distance (KD) Range, Automated Combat Pistol Range, Platoon Battle Course, and Field Firing Range) were evaluated on Tinian. Based on planning limitations and constraints at Tinian and the purpose and need for the proposed action at Tinian, this process identified that the RTA would:

- Be located within the MLA
- Compliment, but not conflict with or infringe on, other training activities within the MLA (to the extent practicable)
- Compliment, but not conflict with, other non training activities within MLA including the International Broadcasting Bureau (IBB) property
- Provide for controlled access to and through the range areas for safety prior to and during firing
- Be suitable for company level training of approximately 200, but possibly up to 400, personnel that would periodically bivouac (i.e., a temporary camp under little or no shelter) at the RTA

Sections 2.1-2.5 of this Volume provide an overview of the background, planning criteria, proposed action elements, and alternatives. The purpose of the overall proposed actions is to relocate and site military forces within the Western Pacific Region to meet the following criteria based on U.S. policy, international agreements, and treaties. The rationale for siting the ranges on Tinian is that this is within the MIRC, provides close proximity to Marine Corps based on Guam, and provides reliable access to training resources.

4.3.1 Alternatives Comparison Summary

4.3.1.1 Alternative 1 (Preferred)

Wetlands Differences

Alternative 1 would not impact any formally delineated wetlands. However, Alternative 1 would have effects on a potential jurisdictional wetland area. Further discussion on impacts to wetlands may be found in Chapter 4, Water Resources of this Volume. Area C, a 0.3 ac (0.12 ha) potential jurisdictional wetland (palustrine) area, would be filled (directly impacted) with implementation of Alternative 1. The Marine Corps would strive to avoid directly impacting, to the greatest extent possible, this potential wetland area in the design and implementation phases of the Platoon Battle Course. However, for the purposes of this analysis at this time, it is assumed direct impacts would occur.

During construction, indirect impacts to other nearby wetland areas would be minimized by incorporating site-specific appropriate BMPs (Volume 2, Chapter 4, Table 4.2-1) that would reduce the potential for construction impacts to these wetland areas. Therefore, with implementation of the mitigation measures identified in Section 4.2, construction activities associated with Alternative 1 would result in less than significant impacts to wetlands. Post-construction, no direct impacts to the wetland areas are anticipated as following construction, no wetland areas would be located within the proposed ranges and courses.

Terrestrial Biological Resources Differences

Project construction would impact 1.0% of the current Tinian monarch population. The Tinian monarch is a CNMI listed endangered species. Based on territory densities estimated by USFWS (2009), the number of Tinian monarch territories that would be lost through construction would be 204. Approximately 70 ac (28 ha) of the 936 ac (379 ha) Airport Mitigation Conservation Area would be removed. Direct impacts to the Tinian monarch would be significant. Vegetation that would be removed includes 173 ac (70 ha) of mixed introduced forest and smaller amounts of tangantangan (*Leucaena leucocephala*) and shrub/grassland. About 193 ac (78 ha) of forested habitat would be indirectly impacted.

Cultural Resources Differences

Alternative 1 would have significant adverse direct impacts to 10 NRHP-eligible archaeological resources, indirect impacts to 55 NRHP-eligible archaeological sites in the SDZ and the National Historic Landmark (NHL), and indirect impacts to two NRHP-eligible traditional cultural properties.

Operational Differences

There are no operational differences between the three alternatives.

4.3.1.2 Alternative 2 (LEDPA)

Wetlands Differences

Alternative 2 would not impact any formally delineated wetlands or potential jurisdictional wetland areas.

Terrestrial Biological Resources Differences

Project construction would impact 0.7% of the current Tinian monarch population. Based on territory densities estimated by USFWS (2009), the number of Tinian monarch territories that would be lost through construction would be 149. Approximately 108 ac (44 ha) of the 936 ac (379 ha) Airport Mitigation Conservation Area would be removed. Direct impacts to the Tinian monarch would be significant. Vegetation that would be removed includes 121 ac (49 ha) of mixed introduced forest and

smaller amounts of tangantangan (*Leucaena leucocephala*) and shrub/grassland. About 178 ac (72 ha) of forested habitat would be indirectly impacted.

Cultural Resources Differences

Alternative 2 would have significant adverse direct impacts to 10 NRHP-eligible archaeological resources, indirect impacts to 52 NRHP-eligible archaeological sites in the SDZ and the NHL, and indirect impacts to one NRHP-eligible traditional cultural properties.

Operational Differences

There are no operational differences between the three alternatives.

4.3.1.3 Alternative 3

Wetlands Differences

Alternative 3 would not impact any formally delineated wetlands or potential jurisdictional wetland areas.

Terrestrial Biological Resources Differences

Project construction would impact 0.9% of the current Tinian monarch population. Based on territory densities estimated by USFWS (2009), the number of Tinian monarch territories that would be lost through construction would be 190. Approximately 82 ac (33 ha) of the 936 ac (379 ha) Airport Mitigation Conservation Area would be removed. Direct impacts to the Tinian monarch would be significant. Vegetation that would be removed includes 155 ac (63 ha) of mixed introduced forest and smaller amounts of tangantangan (*Leucaena leucocephala*) and shrub/grassland. About 213 ac (86 ha) of forested habitat would be indirectly impacted.

Cultural Resources Differences

Alternative 3 would have significant adverse direct impacts to 7 NRHP-eligible archaeological resources, indirect impacts to 55 NRHP-eligible archaeological sites in the SDZ and the NHL, and indirect impacts to two NRHP-eligible traditional cultural properties.

Operational Differences

There are no operational differences between the three alternatives.

4.3.2 Conclusion

Based on the above discussion, Alternative 2 is considered the LEDPA but as previously noted, Alternative 1 is the Marine Corps' preferred alternative. The environmental differences between all three alternatives are small, with the greatest difference being due to potential wetland impacts and impacts to the CNMI listed endangered Tinian monarch. Alternatives 2 and 3 would result in no impacts to the aquatic ecosystem including wetlands. Alternative 1, the preferred alternative, has the potential to impact 0.3 ac (0.12 ha) of potential jurisdictional wetland. However, the actual impacts to wetlands from Alternative 1 have not been field verified and if verified at 0.3 ac (0.12 ha), would be relatively small. This area has not been formally delineated, so the effects are only to a *potential* wetland area. Given this small amount of potential effect, the Marine Corps could potentially adjust the layout of the proposed Platoon Battle Course under Alternative 1 to avoid this potential wetland area. Should Alternative 1, as the Marine Corps preferred alternative, be implemented with minimal wetland impacts, best management practices and compensatory mitigation would be provided as described in Volume 7. Once final impacts through complete design are identified, a final mitigation plan would be prepared if necessary for the limited wetland impact.

Alternative 2 has fewer impacts to cultural resources, but the differences are small. Alternative 2 has fewer impacts to terrestrial biological resources; however, these differences also are small. Alternative 1 would have less impact to the Airport Mitigation Conservation Area than either Alternatives 2 or 3. Consequently, adjustment of the Platoon Battle Course could potentially change the LEDPA conclusion from Alternative 2 to Alternative 1.