4.14 UTILITIES

Section 4.14 describes the potential utility impacts of the proposed action requirements on the existing utility infrastructure on Tinian and Pagan. Impacts such as installation of proposed utilities and construction of facilities that could affect other resources are covered in their respective sections, including: Sections 4.3, *Water Resources*; 4.4, *Air Quality*; 4.5, *Noise*; 4.9, *Terrestrial Biology*; and 4.10, *Marine Biology*. Changes to land uses are presented in Section 4.7, *Land and Submerged Land Use*, and potential soil contamination issues are addressed in Section 4.16, *Hazardous Materials and Waste*.

4.14.1 Approach to Analysis

The impact analysis addresses potential effects to the capacity and/or distribution of the following utilities systems: electrical, potable water, wastewater, stormwater, solid waste, and information technology/communications. The analysis estimates increased requirements due to proposed facilities, infrastructure, personnel, and forecast natural civilian population growth independent of the proposed action. These analyses cover both construction and operation of the proposed action. The *Utilities Study* (Appendix P) used an approximate current population for Tinian of 3,500 including an allowance for tourists (DoN 2014a). The *Socioeconomic Impacts Assessment Study* (Appendix Q) estimated the impact of the proposed action to Tinian's population (not including training units) presented below in Table 4.14-1 (DoN 2014b). Tinian's utility requirements are assessed based on these forecast changes to the island population plus requirements to support the training units.

Table 4.14-1. Total Estimated Change to Tinian Population

Category	*Low*	*Medium*	*High*
Estimated Baseline Population	2,890	3,211	3,532
Population Change – Construction[1, 2]	477	537	596
Population Change – Military Operations[2]	143	192	242
Population with the Proposed Action	3,510	3,940	4,370
Total Population Change	**620**	**729**	**838**
Population Change – Percentage	21.4%	22.7%	23.7%

Notes: [1]Annual average during the 8 to 10 years of construction.
[2]Includes dependents.
Source: Socioeconomic Impacts Assessment Study, Table 5.1-3 (DoN 2014b).

The analysis also compares projections of future utility requirements to the capacity of the utilities. Existing utility requirements attributed to the current Tinian population are considered baseline conditions and are discussed in Section 3.14, *Utilities*.

For the purposes of this analysis, a conservative assumption was made that most of the construction workers would come from off-island locations (i.e., presently not resident on Tinian or Pagan). In addition, for the purposes of this analysis, off-island construction workforce dependents are considered under direct impacts. Therefore, there would be no indirect impacts of the proposed action as it relates to the utility resource.

The projections of future utility requirements account for the following impacts:

- Off-island (i.e., presently not resident on Tinian or Pagan) construction workforce and their dependents
- All proposed U.S. military active duty personnel
- On-base civilian workforce
- Industrial requirements from proposed facilities

The impact analysis considered the capacity of the various utilities and the ability of the utility to properly handle and provide required services to both the military and civilian customers. The analysis also assesses whether the utility is currently operating within design capacity and regulatory requirements, and whether the utility would continue to operate within design capacity and regulatory requirements under the conditions of the proposed action.

As discussed in Chapter 3, data was available for October 2011 through August 2014 pertaining to potable water production and use (Commonwealth Utilities Corporation 2014). Pump rates from Marpi Well #2 are available through 2014. The potable water database supplied by Commonwealth Utilities Corporation, consisting of potable water production rates and metered supply from October 2011 through August 2014, was used to evaluate available potable water to meet the project demands.

The significance of utility-related impacts was determined qualitatively. A significant impact would occur if:

- The projected increase in demand for a utility would exceed the available or proposed planned capacity of that utility, resulting in substandard service to existing or expected future customers of that utility.
- The estimated demands of the proposed action would cause the utility to operate in violation of regulatory requirements.

If a utility obtains (or is expected to obtain) an agreement with regulatory agencies to either exempt certain requirements or extend the due date for regulatory compliance, then that utility would be deemed to be operating within regulatory requirements. This situation would be categorized as a less than significant impact.

4.14.2 Resource Management Measures

- Resource management measures, including best management practices and standard operating procedures, applicable to utilities are provided below and described in Appendix D, *Best Management Practices.* Leadership in Energy and Environmental Design (construction and operations)
- Stormwater Management Plan and Stormwater Pollution Prevention Plan (construction)
- Coordination with the utility providers on planned outages and service disruptions (construction)
- Inventory of spare parts, maintenance equipment, and tools (operation)

Potable Water

- Disposal of hydrotesting and cleaning and flushing water in accordance with the CNMI Bureau of Environmental and Coastal Quality regulations
- Operation, inspection, and maintenance of potable water storage tanks, water production wells, pumps and treatment equipment in accordance with a regularly updated and approved Operations and Maintenance manual to ensure proper function
- Periodic inspection of water transmission, distribution and service lines and repair of any damaged lines to ensure adequate operation and identification of any damage or leaks within the system

Wastewater

- Operation and maintenance of wastewater facilities in accordance with a regularly updated and approved Operations and Maintenance manual
- Inspection of septic tank systems no less than every 3 years and periodic cleaning in accordance with the CNMI regulations
- Prevent trees or shrubs from growing over any septic tank and leaching field components
- Sewer lines and pump station(s) would be inspected and maintained to minimize the risk of sanitary sewer overflows

Stormwater Management

- Compliance with Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects
- Well Head Protection Zones (construction and operations)
- Low Impact Development (construction and operations)

Solid Waste

- Recycling of municipal solid waste, such as glass, paper, and metals
- Reuse of all green waste and 60% of construction and demolition debris, based upon Department of Defense Strategic Sustainability Performance Plan, fiscal year 2012 (dated September 20, 2012)

4.14.3 Tinian

4.14.3.1 Tinian Alternative 1

4.14.3.1.1 Construction Impacts

As described in Section 2.4.1.2.7, *Utility Improvements*, new construction and improvements to the existing utilities infrastructure would occur to provide electrical power, potable water, wastewater management, stormwater management, solid waste, and communications to the base camp, Munitions Storage Area, Port of Tinian support facilities, and the Tinian RTA. There are no permanent electrical power utility, potable water utility, wastewater infrastructure, or information technology/ communications infrastructure associated with the Tinian International Airport Improvements.

Construction of the Tinian RTA would be accomplished over an 8 to 10 year period. During that time, training events could also occur, so there could be an overlap of construction and operation activities. Routinely, construction work would temporarily be impacted during live-fire training events, construction workers would remain on island, and construction would resume after training events have ended. Because construction activities would be impacted during live-fire training events, this overlap would not result in additive impacts to utilities resources. Regardless of when these activities would occur, all construction-related impacts, including impacts associated with workers residing at worker housing, have been assessed within the construction impacts, while all operation-related impacts have been assessed within operation impacts.

During an overlap of construction and operation, not all of the facilities would be completed and in operation. As an example, there would be a reduction in electrical power demand from operation that would compensate for having some construction electrical power demand during that time. The existing power generating capacity has excess capacity to provide for any potential increased electrical power demand during overlap between construction and operation that might occur. Short-term power outages could occur at some of the operational facilities for construction hook ups, which would need to be coordinated between construction and operation. Stormwater management features would be built in phases with the training facilities and be functional during any training exercises occurring during construction.

4.14.3.1.1.1 Electrical Power

As discussed in Section 3.14.4.1, *Electrical Power*, the existing Tinian power plant has an installed generating capacity rated at 17.0 megawatts. One 4.5 megawatt generation unit is kept in reserve for maintenance purposes; therefore, the utility maintains 12.5 megawatts of capacity available to meet expected loads. With an average daily load of 4.5 megawatts, 8 megawatts of reserve power remains available. The power demand required during construction would mainly be met with portable generators in the field, and connections to the existing electrical system would be limited. As a result, the 8 megawatt reserve far exceeds any contemplated demand, and is within the current capability of the existing power plant. Therefore, there would be no impacts to services associated with capacity.

As discussed in the *Utilities* subsection of Section 2.4.1, *Elements Common to All Action Alternatives*, new electrical lines and improvements to existing power distribution lines would be constructed. Impacts to the provision of electrical power during construction of the proposed facilities may include temporary power outages to facilitate hooking up new and rerouted power lines. These would be of short duration, scheduled to allow for advance notification to users, and timed to be least disruptive (e.g., late in the evening), thereby minimizing the effect of any potential outages. Therefore, Tinian Alternative 1 construction activities would result in less than significant impacts to the existing electrical utility.

4.14.3.1.1.2 Potable Water

Construction water use would include dust suppression, concrete mixing, rinsing new water pipes, hydrotesting new water storage tanks, and other typical construction requirements. As discussed in the potable water portion of Section 2.4.1, *Elements Common to All Action Alternatives*, the projected water supply requirements for the proposed action would be mostly met by a new water system and supply wells in the Military Lease Area for military use. The new water system would be completely independent of the existing Commonwealth Utilities Corporation system. The proposed water system would be constructed early in the site development process. The existing Commonwealth Utilities Corporation water system will be able to meet increased demand as a result of construction activities in the early phases of construction due to the limited need for road watering, cement requirements, and other construction water uses. After the proposed military potable water system is installed, construction activities within the Military Lease Area would use minimal water from the existing Commonwealth Utilities Corporation water system. This use would be limited to water use by facilities outside of the Military Lease Area, such as the existing concrete batch plant, if utilized by the construction contractor.

Use of the existing Commonwealth Utilities Corporation potable water system would occur for supplying the proposed military facilities at the Port of Tinian. Thus, construction impacts to the existing Commonwealth Utilities Corporation potable water system would be limited to tie-ins at the Port of Tinian, which could cause short duration local water service outages. The impacts of these outages would be coordinated with the Commonwealth Utilities Commission operators to be during the least disruptive times, and are anticipated to be of short duration.

The majority of the construction workers would reside in a work camp outside the Military Lease Area provided by the construction contractor. With proper negotiation, the existing worker facilities associated with the Tinian Dynasty Hotel and Casino could potentially be utilized as the work camp. Construction managers and their dependents are expected to find housing in existing properties outside of the Military Lease Area on Tinian. The additional work force would increase the demand on the existing Commonwealth Utilities Corporation potable water system by approximately 33,525 gallons (126,906 liters) per day. To evaluate the capacity and ability of the existing Tinian potable water system to meet project needs, production and use data from October 2011 through August 2014 was utilized. The average daily production over this time period was 1,056,553 gallons (3,999,488 liters) per day; average use was 320,384 gallons (1,212,785 liters) per day. The potential water production from Maui Well #2 has been estimated as at least 1 million gallons per day (3.8 million liters) of potable water in the dry season and 1.5 million gallons (5.7 million liters) per day in the wet season (Army Corps of Engineers 2003). Based upon this production range, the maximum production in 2013 of 1,260,000 gallons (4,769,619 liters) per day was selected to represent a new average production rate that could be sustainably pumped. Utilizing this new average pump rate, an additional 203,477 gallons (770,131 liters) per day would be available for the potable water system. After applying the unaccounted for water factor of 75%, 50,862 gallons (192,534 liters) per day (after losses in the distribution system) would be available to the Tinian population.

The existing potable water system would be expected to meet increased water need~~s~~ during construction. Therefore, construction under Tinian Alternative 1 would result in less than significant impacts to the existing potable water utility.

4.14.3.1.1.3 Wastewater

The existing U.S. military septic tank and leaching field system on Tinian is not currently being used due to poor condition of the leaching field. Currently, Joint Region Marianas has plans to rehabilitate this system in order to support current military training exercises not associated with the proposed action on Tinian. Use of this existing system during construction for the proposed action may require the rehabilitation of the septic tank or leaching field depending on its condition at the time of the construction. The use of the existing system for the proposed action would also require inspection and permit compliance verification prior to use. Wastewater generated around construction sites by construction workers and managers would be collected at temporary toilet facilities that would be emptied periodically using a vacuum truck, and then transported to the existing U.S. military septic tank and leaching field system for treatment and disposal. The estimated average daily wastewater flow rate is 1,370 gallons (5,190 liters). The existing system is permitted for an average daily flow of 6,640 gallons (25,000 liters), thus there is a 5,270 gallons (19,950 liters) per day excess capacity. The estimated wastewater flow generated during construction is anticipated to be within the excess capacity of the U.S. military septic tank and leaching field system. Should this existing U.S. military septic tank and leaching field system become unavailable, a potential alternate approach may be to pursue the existing wastewater system at the Tinian Dynasty Hotel and Casino to treat and dispose of wastewater. This option would require proper negotiation with the Tinian Dynasty Hotel and Casino and regulatory approval.

It is anticipated that construction managers and their dependents would reside in existing housing outside the Military Lease Area. The individual septic tank and leaching field systems associated with these housing units are typically sized for small families. Consequently, there should be no additional capacity required. A majority of the construction workforce will reside in a work camp located outside the Military Lease Area provided by the construction contractor. With proper negotiation and rehabilitation, existing worker facilities associated with the Tinian Dynasty Hotel and Casino could potentially be utilized as the work camp. According to recent discharge monitoring reports in 2014, the Dynasty Hotel and Casino's wastewater treatment plant has an average daily flow up to 150,000 gallons (568,000 liters). The permitted discharge limit of the plant is a monthly average flow of 240,000 gallons (908,000 liters), thus there is 90,000 gallons (341,000 liters) per day of excess capacity. The estimated increase in wastewater flow generated by the construction workforce is an average daily flow of 27,400 gallons (104,000 liters) and is well within the 90,000 gallons (341,000 liters) per day of excess capacity at the plant. As such, the existing plant is anticipated to have adequate capacity to treat and dispose of the additional wastewater flow generated by the construction workforce. It is not anticipated that upgrades to the wastewater treatment plant would be required if the work camp is utilized.

Because the existing wastewater infrastructure could handle the projected wastewater increase associated with the construction and construction worker housing, it is not anticipated that the wastewater generated during construction would cause existing wastewater systems to operate in violation of their regulatory requirements. Therefore, Tinian Alternative 1 construction activities would result in less than significant impacts to the existing wastewater infrastructure.

4.14.3.1.1.4 Stormwater Management

Drainage and Low Impact Development is described in Section 4.3, *Water Resources*. Stormwater management infrastructure would be constructed in accordance with local and federal regulations and guiding documents that take into account both quantity and quality. During construction stormwater management facilities would be strategically placed throughout the base camp, the Port of Tinian improvement area, the Tinian International Airport, along road improvements, and within the Tinian RTA. These improvements would be located adjacent to and downstream of the proposed site improvements, to capture, detain, and treat any increases in stormwater runoff volume, rate, and pollutants, as applicable. Temporary stormwater control facilities would be, where possible, located in areas that will ultimately be developed such that surface disturbances would be minimized. In locations where the temporary facilities would not have additional construction on the disturbed area, the site would be re-graded, seeded and mulched to minimize stormwater erosion impacts.

Proposed stormwater retention ponds and other infiltration devices would be located outside of existing water wellhead protection zones, in accordance with the CNMI Well Drilling and Well Operations Regulations. Other environmental and operational constraints, such as Federal Aviation Administration mitigation areas for ecological/species protection, would also be applied when siting proposed stormwater management improvements to prevent and/or minimize the potential for any adverse impacts.

The primary stormwater improvements would consist of temporary surface conveyance and control via vegetated swales, pipe culverts, and retention ponds. The majority of roadways would be rural road sections (no curb and gutter) and thus stormwater would be controlled using roadside swales. Urban road sections with curb, gutter, and drainage inlets would only be used when necessary and in limited quantity, as applicable, for water quality treatment, and improve conveyance of large volumes of stormwater, and to minimize associated construction, operation, and maintenance costs.

Construction of permanent stormwater management facilities would occur at the base camp, training areas, Munitions Storage Area, the Port of Tinian, the Tinian International Airport, and at other areas with proposed site improvements. An effort would be made during construction to reduce areas disturbed to only those areas required to construct each facility or improvement. The stormwater management facilities would be modified, as needed, to accommodate construction phasing.

Based on the stormwater management treatment systems described above and the implementation of best management practices in Appendix D, *Best Management Practices*, Tinian Alternative 1 would result in less than significant impacts to stormwater management.

4.14.3.1.1.5 Solid Waste

Solid waste generated during the construction phase would primarily consist of green waste resulting from the clearing and grubbing of the base camp, Munitions Storage Area, roadways, and training facility footprints. The solid waste streams anticipated to be generated during the construction phase are summarized in Table 4.14-2.

Construction and demolition waste would be sampled if reviews of existing reports indicate that lead-based paint or asbestos could be present. If required, waste would be treated and disposed of appropriately (see Section 4.16, *Hazardous Materials and Waste*). Green waste can be beneficially reused as compost, cover material, animal food, and other alternative uses. To the extent possible, beneficial reuse and recycling of construction and demolition waste would occur. Other construction and demolition waste would be transported off-island for recycling at facilities with capacity to receive the material and proper permitting, in accordance with construction and demolition waste disposal regulations.

Table 4.14-2. Tinian Alternative 1 Projected Construction Waste

	Waste Description	*Waste in Tons (metric tons)*
Green Waste		
Tinian Base Camp	Vegetation Clearance	60,984 tons (55,324 metric tons)
Training Range Alternative 1	Range Clearance	378,824 tons (343,667 metric tons)
Construction and Demolition Waste		
Base Camp	Construction and demolition waste from construction of base camp facilities (3.89 pounds per square foot of facility space)	766 tons (695 metric tons)
Base Camp Road Demolition	Asphalt waste from planned demolition of 8,563 feet of existing roads located within the base camp	6,668 tons (6,049 metric tons)
Munitions Storage Area	Construction and demolition waste from planned construction of Munitions Storage Area facilities (3.89 pounds per square foot of facility space)	168.2 tons (152.6 metric tons)
Tinian International Airport Improvements	Construction and demolition waste from planned construction of Tinian Airport Improvements (3.89 pounds per square foot of facility space)	468.4 tons (425.8 metric tons)
Port of Tinian	Construction and demolition waste from planned construction of Port of Tinian facilities (3.89 pounds per square foot of facility space)	29.7 tons (26.9 metric tons)

**Source:* Appendix A, Version 4, CJMT Solid Waste Study, August 2014.

Other municipal solid waste generated by the construction contractors would be disposed of at a regulatory compliant facility. The existing solid waste facilities on Tinian are not in compliance with regulatory requirements, and therefore solid waste generated would have to be transferred off-island to a compliant landfill.

Based on the previous analysis, Tinian Alternative 1 construction activities would result in less than significant impacts to the solid waste management.

4.14.3.1.1.6 Information Technology/Communications

The proposed telecommunications system would consist of a combination of overhead pole-mounted cabling and underground conduits, manholes/handholes, and pull-boxes that would provide the site infrastructure to support government communications systems (e.g., government telephone, government data, security, and closed circuit television), as well as commercial utility services, including commercial telephone, internet, and cable television. New distribution infrastructure originating at the base camp area distribution node would distribute telecommunications services to end-user buildings and facilities in the base camp, ranges, and other facilities. Proposed core information technology/communications cable connections would connect the area distribution node to end user buildings and facilities at the base camp through overhead pole-supported cabling. Proposed core information technology/communications cable connections would connect the area distribution node in the base camp to range entrances through overhead pole supported cabling and underground concrete encased duct banks and cabling.

Commercial telephone, internet, and cable television services would be provided to the base camp through infrastructure provided by the commercial utility providers. The cables are anticipated to be installed mostly overhead except for routing that crosses the runway clear zone, which would be installed underground. Inside the base camp, the cables for commercial telephone, internet, and cable television service would be distributed around the base camp through overhead pole-supported cabling.

Commercial telephone, internet, and cable television services would be provided to the construction work camp through infrastructure provided by the commercial utility providers. Inside the work camp, the cables for commercial telephone, internet, and cable television service is anticipated to be distributed through overhead pole-supported cabling. Commercial telephone, internet, and cable television services to the work camp would be minimal and have limited impact to the existing commercial provider infrastructure. Impact to existing commercial telephone, television, and internet services during construction would be limited to potential short outages that would be necessary to facilitate new connections to the existing systems. As with other utilities, such outages would be of short duration and would be scheduled to cause the least disruption. Therefore, Tinian Alternative 1 construction activities would result in less than significant impacts to the existing information technology/communications utilities.

4.14.3.1.2 Operation Impacts

4.14.3.1.2.1 Electrical Power

The electrical load increase due to the population change for operation workers and training personnel is included in the facility demand calculations, which is calculated on a watts per square foot basis and included in the total maximum demand shown in Table 4.14-3. The electrical load increase could be less than the calculated load due to implementation of Leadership in Energy and Environmental Design Certification and the Energy Policy Act of 2005, and best management practices listed in Appendix D, *Best Management Practices*. However, even without such savings, the total power demand for the Tinian Alternative 1 shown in Table 4.14-3 is 6.03 megawatts, which is less than the current excess capacity of the existing power plant. The existing island-wide power generation facility is capable of meeting the increased power demand during operation.

A study of the existing electrical utility infrastructure was performed and documents that both Tinian's generating system and distribution system are reliable and in good condition. Details of this study are provided in Volume II of Appendix P, *Utilities Study*. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to the existing electric utility generation capability and electrical distribution system.

Table 4.14-3. Tinian Future Proposed Plan Electrical Power Demand Forecast

Item	*Description*	*Megawatts*
1	Existing Peak Demand (see note below)	4.5
2	Base Camp	1.17
3	Training Facilities	0.21
4	Munition Storage Area	0.12
5	Biosecurity facility and Port of Tinian Bulk Fuel Storage Tanks	0.03
Total Increase		**1.53**
Percent Increase from Existing Peak Demand		**34%**
Total Tinian Demand		**6.03**
Tinian Power Plant Capacity		**12.5**
Available Remaining Power Capacity		**6.47**

Note: The existing peak demand includes the future anticipated load for the existing International Broadcasting Bureau facility. The International Broadcasting Bureau facility would remain on Tinian in Tinian Alternative 1. The International Broadcasting Bureau load is included for all three proposed alternatives, because it would continue to operate for a period of time before it is relocated.

Source: DoN 2014a.

4.14.3.1.2.2 Potable Water

There is currently no existing potable water system to, or within, the Military Lease Area. Under Tinian Alternative 1, the base camp, Munitions Storage Area, and proposed facility improvements at the Port of Tinian would require potable water and fire protection systems. The estimated average and maximum demands for the proposed facilities are provided in Table 4.14-4.

Table 4.14-4. Estimated Potable Water Demand for Proposed Tinian Range Training Area System

Description	*Average Demand*	*Maximum Demand*
Base Camp (Including Munitions Storage Area)	240,013 gallons per day (908,548 liters per day)	459,758 gallons per day (1,740,374 liters per day)
Port facilities (Military Biosecurity & Vehicle Wash Down Facilities)	22,181 gallons per day (83,965 liters per day)	22,581 gallons per day (85,479 liters per day)
Total Tinian Demand for Proposed Action	262,194 gallons per day (992,513 liters per day)	482,339 gallons per day (1,825,853 liters per day)

Source: DoN 2014a.

Under Tinian Alternative 1, operation of the potable water system serving the proposed military facilities, except the proposed Port of Tinian facilities, would be independent of the Commonwealth Utilities Corporation's water system. Approximately three to six new supply wells, plus one backup, located to the north and east of the Tinian International Airport within the Military Lease Area would be installed to support the proposed action. The operation and maintenance of this new system, including supply, transmission, and distribution, would be independent of the Commonwealth's Utilities Corporation's water system. Fire suppression services for the expeditionary airport facilities would be provided by standard expeditionary procedures such as using stand-by fire water trucks as no permanent utility infrastructure will be installed.

Due to the distance between the proposed facilities at the Port of Tinian (in the village of San Jose) and the proposed military potable water system (in the Military Lease Area), the Commonwealth Utilities Corporation's potable water system would need to be used to supply water to the proposed facilities at the Port of Tinian. The proposed facilities at the Port of Tinian would require an average demand of 12,675 gallons (47,980 liters) per day.

The potable water demand from operation personnel and their dependents would average 30,250 gallons (114,509 liters) per day. The operation personnel and their dependents would reside in the public areas and increase the demand on the Commonwealth Utilities Corporations' potable water system. The total average demand of 12,675 gallons (47,980 liters) per day for personnel and industrial use at the proposed facilities at the Port of Tinian and operation personnel and their dependents living outside the Military Lease Area result in a total demand of 42,925 gallons (162,489 liters) per day. As described in the Construction section, the Tinian potable water system has a potential to produce and deliver an additional 50,862 gallons (192,534 liters) per day. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to the Tinian potable water system.

4.14.3.1.2.3 Wastewater

The areas requiring wastewater infrastructure on Tinian under the proposed action include the base camp, Munitions Storage Area, and proposed facilities at the Port of Tinian. The largest wastewater needs for the proposed action come from the base camp. The estimated wastewater flows for the proposed base camp are shown in Table 4.14-5, and include domestic and industrial wastewater sources. Due to the magnitude of the estimated flows associated with the proposed action, the existing U.S. military septic tank and leaching field system would not have adequate capacity. A new wastewater collection and treatment system is required to support the proposed action and would be located at the base camp. Due to the transient nature of the population, the wastewater system would need to be able to handle a wide range of flow conditions.

Table 4.14-5. Estimated Wastewater Flows generated by Military Personnel

Wastewater Flow	***Flow Conditions***		
	No Training	***For Basic Max Training Population***	***For Surge Training Population***
Average Day	47,052 gallons per day (178,111 liters per day)	122,052 gallons per day (462,016 liters per day)	197,052 gallons per day (745,922 liters per day)
Peak Day	51,327 gallons per day (194,293 liters per day)	238,827 gallons per day (904,058 liters per day)	426,327 gallons per day (1,613,823 liters per day)
Peak Hour*	58,452 gallons per day (221,264 liters per day)	402,312 gallons per day (1,522,916 liters per day)	655,602 gallons per day (2,481,723 liters per day)

Source: DoN 2014a. * Peak Hour is the peak hour flow rate given as a daily rate.
Note: The "no training" scenario accounts for the operation and maintenance of the base camp by the operations personnel when no training military personnel are present. The "training population" scenario would include wastewater generated by up to 1,500 military training personnel. The "surge training population" scenario addresses the potential for up to 3,000 military training personnel for several weeks, several times per year inclusive within the proposed action for 20 weeks per year of training.

Per discussions with the CNMI Bureau of Environmental and Coastal Quality, Tinian is a Class I Aquifer Recharge Area, which, by the CNMI regulations, requires that projects with an average daily flow greater than 5,000 gallons (18,927 liters) per day utilize technology other than a septic tank and leaching field system. The CNMI regulations would also require that the system be capable of producing secondary treated effluent. As shown in Table 4.14-5, the average daily flow could vary from 47,052 gallons (178,111 liters) per day to 197,052 gallons (745,922 liters) per day. Therefore, the wastewater treatment system would require a minimum of secondary level of treatment, as defined by CNMI regulations. The CNMI secondary treated effluent regulatory requirements are summarized in Table 4.14-6.

Table 4.14-6. CNMI Secondary Treated Effluent Requirements (Base Camp)

Effluent Characteristic	***Maximum Discharge Limits***	
	Average Monthly	***Maximum Daily***
Biochemical Oxygen Demand, 5-day	20 mg/L	40 mg/L
Total Suspended Solids	20 mg/L	40 mg/L
Total Nitrogen	1.0 mg/L	2.0 mg/L
Fecal Coliform	23 cfu/100 mL	23 cfu/100 mL
pH	Between 6.5 and 8.6	

Legend: cfu = colony forming unit; mg/L = milligram per liter; mL = milliliter.
Source: Northern Mariana Islands Administrative Code 2004.

A critical issue with the regulatory effluent limits is the total nitrogen parameter. The limits for secondary treated effluents include a total nitrogen concentration of 1.0 milligram per liter. This regulatory limit is lower than what is attainable using currently best available control technology for total nitrogen, wherein total nitrogen is the sum of the organic nitrogen, ammonia, nitrite, and nitrate concentrations. The CNMI Bureau of Environmental and Coastal Quality, Division of Environmental Quality is aware of this issue and evaluates this requirement on a case-by-case basis. According to the CNMI Bureau of Environmental and Coastal Quality, Division of Environmental Quality, other systems required to meet this nitrogen limit measure nitrate as nitrogen.

The estimated wastewater characteristics for the base camp are summarized in Table 4.14-7, see Volume IV of Appendix P, *Utilities Study*.

Table 4.14-7. Estimated Influent Loading (Base Camp)

Training Scenario	***Biological Oxygen Demand (5-day)***		***Total Suspended Solids***	
	(pounds/day)	***(milligrams/liter)***	***(pounds/day)***	***(milligrams/liter)***
No Training	16	679	19	799*
Typical Training	271	418	319	491
Training Surge	526	413	619	486

Note: * Higher concentration is due to a lower flow rate with fewer personnel; more personnel result in additional flows
Source: DoN 2014a.

As discussed in the *Utilities* subsection of Section 2.4.1, *Elements Common to All Alternatives,* a new wastewater collection, treatment, and disposal system would be provided at the base camp. This system would include sewage receiving and solids management. The wastewater treatment system at the base camp would be designed, permitted, constructed, certified for use, operated, and maintained in accordance with the CNMI regulations and be capable of meeting the CNMI's secondary treated effluent requirements. Industrial wastewater sources at the base camp such as the dining facility, fuel loading, vehicle wash platforms, vehicle grease racks, and vehicle maintenance shops would have their wastewater flow directed through grease traps or oil/water separators prior to flowing downstream to the wastewater treatment system. Secondary treated effluent would be disposed of through a subsurface disposal area consisting of sub-leaching fields.

The Munitions Storage Area would be located outside of the base camp area and would have lower wastewater needs that would be served by individual sewage disposal systems, including a septic tank and leach field. The estimated average daily wastewater flow for the Munitions Storage Area is 3,880 gallons (14,687 liters) per day. The individual wastewater disposal systems for the Munitions Storage Area would be designed, permitted, constructed, certified for use, operated, and maintained in accordance with the CNMI regulations. Where site limitations of area and/or soil type are such that methods of individual wastewater disposal system cannot be utilized, wastewater would be stored in water-tight holding tanks and periodically pumped by a licensed contractor and taken to the base camp wastewater treatment plant for treatment and disposal.

The proposed facilities at the Port of Tinian would require treatment of industrial wastewater generated from the wash-down of vehicles, which is estimated to be up to 12,000 gallons (45,000 liters) per day when the facility is in use. This wastewater from the vehicle wash-down area would be treated by a sedimentation basin followed by an intermittent sand filtration system prior to discharge to an adjacent stormwater retention pond. The proposed biosecurity facility at the Port of Tinian is estimated to generate an average daily wastewater flow of 576 gallons (2,180 liters) per day. Due to the biosecurity facility's proximity to the coastline, it is anticipated that the domestic wastewater would be stored in a holding tank that would be periodically emptied and contents transferred to the base camp wastewater treatment plant for treatment and disposal.

Wastewater generated on the ranges would be collected in portable toilets and emptied at the base camp wastewater treatment and disposal system periodically by a licensed contractor. The proposed independent military wastewater infrastructure would be designed and constructed to handle the projected increase in wastewater generated during operation. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to the existing wastewater infrastructure.

4.14.3.1.2.4 Stormwater Management

Tinian Alternative 1 would result in newly created impervious surfaces including roads, airport improvements, base camp facilities, port improvements, and minor structures associated with training facilities, as described in Section 2.4.1.1, *Construction and Improvements*. In accordance with local and federal guidance on water quality, a Low Impact Development approach to stormwater management would be utilized to maintain existing hydrology conditions to the maximum extent technically feasible. The Low Impact Development strategies include detailed modeling and design alternative analyses to both maximize infiltration of treated stormwater for groundwater recharge and prevent the transportation of pollutants resulting from proposed facilities or operations. Low Impact Development devices and other structural and non-structural best management practices would be selected and sited based on specific land use activities, anticipated pollutant characteristics, and pollutant treatment capabilities.

Stormwater management systems require regular maintenance to ensure the systems operate as designed and continue to provide adequate storage capacity, conveyance, and treatment. The use of a Low Impact Development approach requires additional maintenance specific to water quality and the operation of the Low Impact Development devices. A Stormwater Management Plan would be developed taking into consideration the climate, site conditions, operations, pollutant generation, and specific Low Impact Development devices such as vegetated swales and bioretention and nonstructural best management practices such as range clearance procedures. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to stormwater management. Drainage and Low Impact Development is described in Section 4.3, *Water Resources*.

4.14.3.1.2.5 Solid Waste

There are currently no permanently established U.S. military solid waste facilities on Tinian. The existing solid waste facility on Tinian consists of a non-compliant open disposal site that is operated under a the CNMI Bureau of Environmental and Coastal Quality, Division of Environmental Quality Administrative Order dictating specific operation and maintenance measures. The estimated total solid waste demand for operation of the proposed action is shown below in Table 4.14-8.

Table 4.14-8. Estimated Total Solid Waste Generation

Waste Stream	*Estimated Percent*	*Projected Waste Amount*[1]
Paper and Cardboard	28.5%	6,185 pounds per day (2,811 kilograms per day)
Glass	4%	868 pounds per day (395 kilograms per day)
Plastics and Polystyrene	19.5%	4,232 pounds per day (1,924 kilograms per day)
Metal (including aluminum and expended brass cartridges estimated at 300 pounds per day)	6%	1,302 pounds per day (592 kilograms per day)
Organics	34.5%	7,487 pounds per day (3,403 kilograms per day)
Construction and Demolition from operations and maintenance	5%	1,085 pounds per day (493 kilograms per day)
Electronics	1%	217 pounds per day (99 kilograms per day)
Remaining/Composite MSW	1.3%	282 pounds per day (128 kilograms per day)
Household Hazardous Waste	0.2%	43 pounds per day (20 kilograms per day)
Total Solid Waste Generation		**21,700 pounds per day (9,864 kilograms per day)**
40% Recycle Rate		**8,680 pounds per day (3,946 kilograms per day)**
Remaining Solid Waste Disposal		**13,020 pounds per day (5,918 kilograms per day)**

Note: *Based on 7.0 pounds per person per day generation rate and 40% of the generated waste would be recycled (7.0 pounds per day X 3,100 X 0.60 = 13,020 pounds per day disposal requirement). The requirement is based on the peak number of personnel supported during the CJMT training cycle.

The disposal requirements for the projected solid waste generated as a result of the proposed action would initially be met by establishment of a solid waste transfer station, recycling center, and associated open storage areas within the base camp area. The municipal solid waste would be collected in dumpsters and recycling containers located throughout the base camp and training areas. Solid waste container trucks would transport the waste containers to the transfer station and recycling center at the base camp, where the municipal solid waste would be separated, shredded, compacted, baled, and stored in holding areas. The processed waste would then be shipped to a facility in compliance with U.S. Environmental Protection Agency/Resource Conservation and Recovery Act requirements. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to solid waste management.

4.14.3.1.2.6 Information Technology/Communications

The current commercial information technology/communications facilities have adequate capacity to serve the proposed new facilities. The island's telephone and internet provider, IT&E, and the island's television provider, Docomo Pacific, have stated that there are sufficient capacities to provide commercial telephone and internet to the new planned facilities. New service lines to the new facilities would be routed via a combination of aerial cables and underground cables in concrete encased duct banks.

Military use of the existing information technology infrastructure would be limited to a leased line (for security) or Satellite connection to Guam. Since the high security connections to the fiber optics system would be a line lease, capacity of the existing civilian portion of that cable is not expected to be significantly impacted. The Tinian information technology infrastructure in the Military Lease Area would not be connected to the commercial services. Therefore, Tinian Alternative 1 operations would result in less than significant impacts to the current information technology/communications utilities.

4.14.3.2 Tinian Alternative 2

4.14.3.2.1 Construction Impacts

The impacts to the electrical power, potable water, wastewater, and information technology/ communications utilities and stormwater management resulting from Tinian Alternative 2 construction activities are nearly the same as those described for Tinian Alternative 1. See Section 4.14.3.1, *Tinian Alternative 1*, for a discussion of impacts.

The overall impacts to solid waste management during construction of Tinian Alternative 2 would be similar to those described in Section 4.14.3.1, *Tinian Alternative 1*, with the difference being the quantity of green waste produced (an additional 32,382 tons [29,377 metric tons]), which is a result of differences between the footprint of the training facilities under Tinian Alternative 2 as compared to Tinian Alternative 1, and the future relocation of the International Broadcasting Bureau facilities, which would generate increased construction and demolition waste. Construction and demolition waste would be generated during the construction phase in the quantities summarized in Table 4.14-9.

The differences in the quantity of green waste (439,808 tons [398,991 metric tons] versus 472,190 tons [428,368 metric tons]) and construction and demolition waste (8,100 tons [7,349 metric tons] versus 8,649 tons [7,847 metric tons]) would not have a notable effect on the impact to the solid waste management. For the reasons discussed above, Tinian Alternative 2 construction activities would result in less than significant impacts to the existing electrical, potable water, wastewater, and information technology/communications utility and less than significant impacts to stormwater management and solid waste management.

Table 4.14-9. Tinian Alternative 2 Projected Construction Waste

	Waste Description	*Waste in Tons (metric tons)*
Green Waste		
Tinian Base Camp	Vegetation Clearance	60,984 tons (55,324 metric tons)
Training Range Alternative 2	Range Clearance	411,206 tons (373,044 metric tons)
Construction and Demolition Waste		
Base Camp	Construction and demolition waste from construction of base camp facilities (3.89 pounds per square foot of facility space)	766 tons (695 metric tons)
Base Camp Road Demolition	Asphalt waste from planned demolition of 8,563 feet of existing roads located within the base camp	6,668 tons (6,049 metric tons)
Munitions Storage Area	Construction and demolition waste from planned construction of MSA facilities (3.89 pounds per square foot of facility space)	168.2 tons (152.6 metric tons)
Tinian International Airport Improvements	Construction and demolition waste from planned construction of Tinian Airport Improvements (3.89 pounds per square foot of facility space)	468.4 tons (425.8 metric tons)
Port of Tinian	Construction and demolition waste from planned construction of Port of Tinian facilities (3.89 pounds per square foot of facility space)	29.7 tons (26.9 metric tons)
International Broadcasting Bureau Fuel Tank Demolition		
Steel Debris	Scrap metal debris generated by the planned demolition of the two existing above ground storage tanks in the International Broadcasting Bureau compound	92.7 tons (84.1 metric tons)
Concrete Debris	Concrete debris generated by the planned demolition of the above storage tank foundations in the International Broadcasting Bureau	455.6 tons (413.3 metric tons)

**Source:* Appendix A, Version 4, CJMT Solid Waste Study, August 2014.

4.14.3.2.2 Operation Impacts

The total power demand for the Tinian Alternative 2 associated with the base camp, Munitions Storage Area, and proposed facilities at the Port of Tinian, along with the projected potable water demand, proposed water distribution system, projected wastewater flows, proposed wastewater collection and treatment system, and the information technology/ communications infrastructure would be almost identical to that described in Section 4.14.3.1, *Tinian Alternative 1*.

Tinian Alternative 2 would result in impervious surfaces including roads, airport improvements, base camp facilities, port improvements, and minor structures associated with training facilities, as described in Section 2.4.1.2, *Construction and Improvements*. The stormwater management system for Tinian Alternative 2 would utilize the same approach as described in Section 4.14.3.1, *Tinian Alternative 1*.

Specific drainage elements including Low Impact Development device selection and best management practice sizing and locations would be modified to accommodate the proposed site improvements within Tinian Alternative 2. As with Tinian Alternative 1, Tinian Alternative 2 would follow strict operation and maintenance protocols to ensure the stormwater management system functions as designed and that the system does not create any adverse effects to downstream or off-site facilities.

The planned solid waste transfer station, recycling center, off-island shipment, and open storage areas planned in Tinian Alternative 1 would also be planned in Tinian Alternative 2. Therefore, the impacts during Tinian Alternative 2 operations would be nearly the same as presented in Section 4.14.3.1, *Tinian Alternative 1*.

As such, operation of Tinian Alternative 2 would result in less than significant impacts to the existing electrical power, potable water, wastewater, and information technology/communications utilities and less than significant impacts to stormwater management and solid waste management.

4.14.3.3 Tinian Alternative 3

4.14.3.3.1 Construction Impacts

The impacts to the electrical power, potable water, wastewater, and information technology/ communications utilities and stormwater management resulting from Tinian Alternative 3 construction activities are nearly the same as those described for Tinian Alternative 1. See Section 4.14.3.1, *Tinian Alternative 1*, for a discussion of impacts.

The overall impacts to the solid waste management during Tinian Alternative 3 construction activities would be similar to those described in Section 4.14.3.1, *Tinian Alternative 1*, with the difference being the quantity of green waste produced (an additional 24,789 tons [22,481 metric tons]), which is a result of differences between the footprint of the base camp area and the training facilities, and the future relocation of the International Broadcasting Bureau facilities, which would generate increased construction and demolition waste. Construction and demolition waste would be generated during the construction phase in the quantities summarized in Table 4.14-10.

The differences in the quantity of green waste (439,800 tons [398,991 metric tons] versus 464,589 tons [421,472 metric tons]) and construction and demolition waste (8,100 tons [7,349 metric tons] versus 8,649 tons [7,847 metric tons]) would not have a notable effect on the impact to the solid waste management. Therefore, Tinian Alternative 3 construction activities would result in less than significant impacts to the existing electrical, potable water, wastewater, and information technology/ communications utility and less than significant impacts to stormwater management solid waste management.

Table 4.14-10. Tinian Alternative 3 Projected Construction Waste

	Waste Description	*Waste in Tons (metric tons)*
Green Waste		
Tinian Base Camp	Vegetation Clearance	60,984 tons (55,324 metric tons)
Training Range Alternative 3	Range Clearance	403,605 tons (366,148 metric tons)
Construction and Demolition Waste		
Base Camp	Construction and demolition waste from construction of base camp facilities (3.89 pounds per square foot of facility space)	766 tons (695 metric tons)
Base Camp Road Demolition	Asphalt waste from planned demolition of 8,563 feet of existing roads located within the base camp	6,668 tons (6,049 metric tons)
Munitions Storage Area	Construction and demolition waste from planned construction of Munitions Storage Area facilities (3.89 pounds per square foot of facility space)	168.2 tons (152.6 metric tons)
Tinian International Airport Improvements	Construction and demolition waste from planned construction of Tinian Airport Improvements (3.89 pounds per square foot of facility space)	468.4 tons (425.8 metric tons)
Port of Tinian	Construction and demolition waste from planned construction of Port of Tinian facilities (3.89 pounds per square foot of facility space)	29.7 tons (26.9 metric tons)
International Broadcasting Bureau Fuel Tank Demolition		
Steel Debris	Scrap metal debris generated by the planned demolition of the two existing above ground storage tanks in the International Broadcasting Bureau compound	92.7 tons (84.1 metric tons)
Concrete Debris	Concrete debris generated by the planned demolition of the AST foundations in the International Broadcasting Bureau	455.6 tons (413.3 metric tons)

**Source:* Appendix A, Version 4, CJMT Solid Waste Study, August 2014.

4.14.3.3.2 Operation Impacts

The total power demand for the Tinian Alternative 3 associated with the base camp, Munitions Storage Area, and proposed facilities at the Port of Tinian, along with the projected potable water demand, proposed water distribution system, projected wastewater flows, proposed wastewater collection and treatment system, and the information technology/ communications infrastructure would be almost identical to that described in Section 4.14.3.1, *Tinian Alternative 1*.

Tinian Alternative 3 would result in newly created impervious surfaces including roads, airport improvements, base camp facilities, port improvements, and minor structures associated with training facilities, as described in Section 2.4.1.2, *Construction and Improvements*. The stormwater management system for Tinian Alternative 3 would utilize the same approach as described above in Tinian Alternative 1. Specific drainage elements including Low Impact Development device selection and best management practice sizing and location would be modified to accommodate the proposed site improvements within Tinian Alternative 3. As with Tinian Alternative 1, Tinian Alternative 3 would follow strict operation and maintenance protocols to ensure the stormwater management system functions as designed and that the system does not create any adverse effects to downstream or off-site facilities.

The planned solid waste transfer station, recycling center, open storage areas, and off-island shipment and disposal in Tinian Alternative 1 would also be planned for Tinian Alternative 3. Therefore, the impacts during Tinian Alternative 3 operations would be the same as presented in Section 4.14.3.1, *Tinian Alternative 1*. Tinian Alternative 3 operations would result in less than significant impacts to the existing electrical power, potable water, wastewater, and information technology/communications utilities and less than significant impacts to stormwater management and solid waste management.

4.14.3.4 Tinian No-Action Alternative

The periodic non-live-fire military training exercises that occur in the Military Lease Area on Tinian consist of troop maneuvering, ground vehicle movements, and helicopter and fixed-wing aircraft operations. The training exercises that have occurred in the Military Lease Area on Tinian during the 2012 to 2014 timeframe were of short duration and had minimal needs for utility support. In addition, there would be less than significant impacts to wastewater and potable water and no impacts to power and solid waste when establishing and using the four live-fire training ranges on Tinian (see Table 15.2-4, DoN 2014b). No impacts to utilities would be anticipated due to the Mariana Islands Range Complex training. Therefore, the no-action alternative would have less than significant impacts on utilities.

4.14.3.5 Summary of Impacts for Tinian Alternatives

Table 4.14-11 provides a comparison of the potential impacts to utilities for the three Tinian alternatives and the no-action alternative.

Table 4.14-11. Summary of Impacts for Tinian Alternatives

Resource Area	***Tinian (Alternative 1)***		***Tinian (Alternative 2)***		***Tinian (Alternative 3)***		***No-Action Alternative***	
Utilities	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**
Electrical Power	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Potable Water	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Wastewater	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Stormwater Management	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Solid Waste	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*
Information Technology/ Communications	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*	*LSI*

Legend: *LSI* = less than significant impact.

4.14.4 Pagan

4.14.4.1 Pagan Alternative 1

4.14.4.1.1 Construction Impacts

There is no current electrical power utility, potable water utility, wastewater infrastructure, or information technology/communications infrastructure on Pagan. All requirements for these utilities during construction would be provided by temporary camp style systems (generators, alternative energy devices, etc.). Since there are currently no utilities on Pagan, there would be no impact to existing utilities.

No permanent wastewater infrastructure exists or is being proposed for Pagan. It is anticipated that wastewater generated on Pagan would be managed with field sanitation devices and expeditionary procedures would be followed. Field sanitation devices would include toilets with collection bags or burn-out latrines and field urinals. It is anticipated that the ash produced by the burn-out latrines would be collected in containers and shipped to an approved disposal facility.

The stormwater management system for Pagan would be consistent with the level of site improvements. The majority of stormwater system improvements would consist of vegetated swales for conveyance and control of stormwater, gravel low water crossings along dirt trails, and detention ponds where increased imperviousness occurs, such as at the airfield. The proposed airfield improvements on Pagan would impact infiltration rate due to the compaction associated with the proposed training activity and may contribute to increased stormwater flows. Phasing of these stormwater improvements would follow the phasing of site improvements to ensure continued control of stormwater and would mimic pre-development hydrology to the maximum extent technically feasible. Construction activities would require a Stormwater Pollution Prevention Plan and appropriate use of erosion control procedures to protect downstream water resources.

The primary solid waste impact would consist of green waste generated during the clearing and grubbing phase. Green waste would be managed on site through size reduction and through the use of chipping. Any waste generated during construction that cannot be processed and reused on Pagan would be shipped to an acceptable off-island location for proper handling and disposal or reuse. Therefore, construction of Pagan Alternative 1 would result in no impacts to the electrical power utility, potable water utility, wastewater infrastructure, or information technology/communications infrastructure and less than significant impacts to stormwater management and solid waste management.

4.14.4.1.2 Operation Impacts

Requirements for electrical power during operation would be provided by temporary camp style systems (generators, alternative energy devices, etc.). No permanent potable water infrastructure is being proposed for Pagan. It is anticipated that potable water would be provided by the use of portable de-salinization units, water totes brought to Pagan, or other portable devices. No information technology/communications utility is being proposed besides portable devices that do not require infrastructure.

It is anticipated that wastewater generated on Pagan would be managed with field sanitation devices and expeditionary procedures would be followed. Field sanitation devices would include toilets with collection bags or burn-out latrines and field urinals. It is anticipated the ash produced by the burn-out latrines would be collected in containers and shipped to an approved facility.

The stormwater management system for Pagan would be consistent with the level of site improvements. The majority of stormwater system improvements would consist of vegetated swales for conveyance and control of stormwater, gravel low water crossings along dirt trails, and detention ponds where increased imperviousness occurs, such as at the airfield.

The solid waste generated during training operations on Pagan would be minimal. The waste would be collected in containers and shipped to an approved facility. Therefore, Pagan Alternative 1 operations would result in no impacts to the electrical power, potable water, wastewater, or information technology/communications utilities and less than significant impacts to stormwater management and solid waste management.

4.14.4.2 Pagan Alternative 2

4.14.4.2.1 Construction Impacts

The potential construction impacts to all utilities for Pagan Alternative 2 would be nearly the same as for those discussed in Section 4.14.4.1, *Pagan Alternative 1*. Therefore, Pagan Alternative 2 construction activities would result in no impacts to the electrical power, potable water, wastewater, and information technology/communications utilities and less than significant impacts to stormwater management and solid waste management.

4.14.4.2.2 Operation Impacts

The potential impacts to all utilities resulting from Pagan Alternative 2 operations would be the same as for those discussed in Section 4.14.4.1, *Pagan Alternative 1*. Therefore, Pagan Alternative 2 operations would result in no impacts to electrical power, potable water, wastewater, and information technology/communications utilities and less than significant impacts to stormwater management and solid waste management.

4.14.4.3 Pagan No-Action Alternative

Only periodic low impact visits for eco-tourism, scientific surveys, and military training for search and rescue are anticipated to occur on Pagan. There are currently no existing utilities on Pagan, and no impacts to wastewater, potable water, power, stormwater and solid waste would occur under the no-action alternative. Therefore, the no-action alternative would have no impacts on utilities.

4.14.4.4 Summary of Impacts for Pagan Alternatives

Table 4.14-12 provides a comparison of the potential impacts to utilities for the two Pagan alternatives and the no-action alternative.

Table 4.14-12. Summary of Impacts for Pagan Alternatives

Resource Area	*Pagan (Alternative 1)*		*Pagan (Alternative 2)*		*No-Action Alternative*	
Utilities	**Construction**	**Operation**	**Construction**	**Operation**	**Construction**	**Operation**
Electrical Power	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*
Potable Water	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*
Wastewater	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*
Stormwater Management	*LSI*	*LSI*	*LSI*	*LSI*	*Not applicable*	*Not applicable*
Solid Waste	*LSI*	*LSI*	*LSI*	*LSI*	*Not applicable*	*Not applicable*
Information Technology/ Communications	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*	*Not applicable*

Legend: *LSI* = less than significant impact.