6.8 WATER RESOURCES

6.8.1 Affected Environment

Surface Water

Precipitation and Surface Water Drainage

DMR is on the windward (north) coast of the Wai'anae Range. Prevailing winds are east or northeasterly trade winds from 4 to 24 mph (6 to 39 kph) in the summer and light south to southwesterly winds in the winter.

The average annual precipitation at DMR ranges from 20 to 30 inches (51 to 76 cm) but varies with elevation and time of year (USARHAW and 25th ID[L] 2001a). For example, at the summit of Mount Ka'ala, south of the installation, the average annual rainfall is greater than 70 inches. The variation with elevation affects surface water runoff and groundwater recharge.

Most of the rainfall occurs from November through April (Stearns and Vaksvik 1935). At DMR monthly average rainfall ranges from less than 1 inch (less than 2.5 cm) in summer to 5 inches (12.7 cm) in winter (USARHAW and 25th ID[L] 2001a).

Average annual rainfall along the approximate site of the proposed Dillingham Trail route from DMR to Kaukonahua Stream is less than 40 inches (102 cm), while the average annual rainfall along the route from Kaukonahua Stream to SBMR is between 40 and 60 inches (102 and 154 cm) (Oki 1998). DMR is in the Kawaihāpai watershed (see Figure 3-3 and Figure 6-11). There are several unnamed intermittent streams and no perennial streams on DMR. The State of Hawai'i DOH classifies the waters as Class 2.

DMR and most of the proposed Dillingham Trail are on the north slope or at the foot of Ka'ala Mountain and the northwest-trending ridge of the Wai'anae Range. Streams are incised in steep narrow valleys containing thin soil cover. Most of the streams carry intermittent flows and are subject to short duration flash flows following rainfall events. However, the lower reaches of some of the streams, where they encounter the alluvial deposits overlying caprock on the coastal plain, flow year round. The water supply for the farmland west of Waialua is supplemented by water conveyed by the Ito and Wilson ditches from surface storage in the Kaukonahua watershed to the east.

Stearns and Vaksvik (1935) noted that springs occur in many places along the northeast coast, including at Waialua, near sea level. They concluded that the springs discharge water mainly from the basal water table within the Ko'olau basalts. DMR and Dillingham Trail are underlain by Wai'anae volcanics or, on the coastal plain, by sedimentary caprock.

Figure 6-11
Watershed Boundaries and Drainage Features Dillingham Military Reservation

Wetlands

There is a wetland in DMR adjacent to proposed training activities. However, based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, this wetland area is nonjurisdictional, and is not regulated under Section 404 of the Clean Water Act (see letter in Appendix E). Another jurisdictional wetland at DMR is not adjacent to proposed training activities and it will not be affected by the Proposed Action. A more detailed discussion of the wetland is included in the biological resources section.

Flooding

A review of FEMA FIRMS indicates that the northeastern corner of DMR is mapped as a 100-year flood zone (FEMA 2000). The FEMA study area did not extend over the entire reservation. However, by comparing elevations on the unmapped portion of the reservation to the areas that were mapped, it appears that the 100-year flood zone extends inland from the shoreline to about the 15 to 20 foot elevation contour. Thus, much of the flat-lying area of DMR may be effectively within an area subject to a 100-year return period for flooding. At least part of the flood potential is likely the result of calculations of tsunami runup.

The probability of flooding from a tsunami (a series of large ocean waves generated by events such as earthquakes or undersea landslides) exists in low-lying coastal areas of Hawai'i. Tsunamis may be generated by events that occur within the Hawaiian Islands or at distant points around the Pacific Rim. Most locally-generated tsunamis result from earthquake activity associated with the active volcanoes of the island of Hawai'i. Tsunamis generated by large earthquakes or undersea landslides distant from the Hawaiian Islands have a greater likelihood of causing large runups on O'ahu than do locally-generated tsunamis. From 1946 to present, six tsunamis recorded in the Hawaiian Islands had wave run-ups of 2 meters (6.6 feet) or more (NOAA 2003). Wave runup can vary radically from location to location due to local bathymetry, differences in coastal configuration, direction of approach of the waves, and tide levels and other antecedent conditions. The maximum observed run-ups in each of the six events recorded since 1946 ranged from 15.7 feet to 55.8 feet (4.79 meters to 17.0 meters). The largest runup, 55.8 feet on April 1, 1946, was observed on the northeast coast of the island of Hawai'i. The largest runup reported from this event on O'ahu was 33.8 feet (10.3 meters). At Ka'ena Point the runup from this event was reported to be 33.2 feet (10.1 meters), while the runup at Wai'anae was only 13.1 feet (3.99 meters) (NOAA 2003). Five of the six tsunamis reported since 1946 were Pacific-wide tsunamis, from distant sources. The sixth and most recent Hawaiian tsunami, which occurred on November 29, 1975, was generated by a magnitude 7.2 earthquake centered south of the island of Hawai'i. The earthquake produced a tsunami with a runup of nearly 26 feet (7.92 meters) at Halapē on the south shore of the island of Hawai'i. However, this event did not produce a significant runup in O'ahu (NOAA 2003).

The State of Hawai'i is preparing revised tsunami inundation maps for the Hawaiian Islands, but these are not yet available. Tsunami evacuation maps prepared by the US Pacific Disaster Center provide an indication of the wave runup zone. Evacuation Map 13 indicates that the flightline at DMR is within the area to be evacuated, roughly 500 feet (152.4 meters) inland from Farrington Highway (PDC 2001). This area is generally within the 20-foot (6.1-meter) msl elevation contour.

Surface Water Quality

No surface water quality sampling has been performed at DMR.

Groundwater

Groundwater Occurrence and Flow

DMR is in the Mokulēʻia hydrologic unit of the North hydrologic sector. The State of Hawaiʻi Water Commission estimates the sustainable yield of the Mokulēʻia hydrologic unit to be 12 MGD.

Deposits of the coastal plain include clay, silt, sand, gravel, calcareous reef, and beach and dune deposits, with some post-Koʻolau volcanic deposits. Stearns and Vaksvik (1935) note that the permeability of deeply weathered, cemented, and poorly sorted sediments is low. However, limestone, lava, volcanic cinders, and beach and dune sands are highly permeable. The coastal plain is the area where the basal groundwater lens beneath the islands meets the sea and is found at shallow depths. It is also the area where surface water and shallow groundwater in intermittent drainages discharges to the sea. Due to its proximity to the coast, the basal groundwater is vulnerable to salt water intrusion. In the coastal area, tidal fluctuations and variations in groundwater discharge create a mixing zone in which the groundwater tends to be brackish. Stearns and Vaksvik (1935) mapped the coastal area from Waialua to near Kaʻena Point as an area of artesian groundwater (basal groundwater under confining pressure beneath a cap of less permeable rock that rises above the elevation of the ground surface in wells). Further inland, the basal groundwater is not artesian. DMR appears to overlie both regions. Stearns and Vaksvik attributed the artesian conditions to the presence of a cap of Koʻolau basalt over permeable beds in the Waiʻanae volcanic series.

Several wells have been installed on DMR, and a large number of wells are present on the ranchlands to the east of DMR (HDLNR 2002b). Existing water allocation permits in the Mokulēʻia aquifer system total 6.3 MGD, or about 52 percent of the sustainable yield of the aquifer system.

The water supply for DMR and several nearby residences is a well located about 700 feet (213 meters) south of the control tower. The well reportedly yields about 55,000 gallons (208.2 liters) per day (USARHAW and 25th ID[L] 1997). The well is reportedly completed at a depth of 180 feet (54.9 meters).

Groundwater Quality

No specific information about groundwater quality at DMR is available. The installation is located over an area underlain by caprock, with surficial deposits of dune and beach sands and soils derived from erosion of the nearby Waiʻanae Range. It is expected that basal groundwater beneath the caprock is of good quality, since there are no obvious sources of pollutants in the Waiʻanae Range inland of the installation. Shallow groundwater may be affected by local sources of pollutants, including agricultural runoff and surface spill;

however, no data are available to suggest that there has been any historical impact on groundwater quality.

6.8.2 Environmental Consequences

This section addresses the environmental consequences of the Proposed Action and No Action on water resources.

Summary of Impacts

Less than significant impacts on stormwater runoff, suspended sediment, and chemical spills are expected from the Proposed Action. No impacts are expected from No Action. A summary of impacts is provided in Table 6-16.

Table 6-16
Summary of Potential Water Resources Impacts at DMR

Impact Issues	Proposed Action	Reduced Land Acquisition	No Action
Impacts on surface water quality	⊙	⊙	○
Impacts on groundwater quality	○	○	○
Increased flood potential	⊙	⊙	⊙
Groundwater supply	○	○	○

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

LEGEND:

⊗ = Significant
⃠ = Significant but mitigable to less than significant
⊙ = Less than significant
○ = No impact
\+ = Beneficial impact
N/A = Not applicable

Proposed Action (Preferred Alternative)

Less than Significant Impacts

Increased flood potential. A portion of DMR lies within a designated 100-year flood zone, and it is likely that a portion of the unmapped part of DMR is also subject to a 100-year flood. The Proposed Action would not increase the potential for flooding, but it may increase the exposure of personnel or property to flooding. Also, storage of hazardous chemicals within a flood prone area can lead to the potential for chemical releases in the event of a flood. This is considered a less than significant impact.

The primary hazard from flooding at DMR is likely to be loss of property and the potential for chemical releases. The extent of the risk of flooding is not well established because flood zone determination has not been made for DMR. After determination of flood prone areas, it may be possible to reduce the hazards of flooding to less than significant levels through a combination of engineering controls, training, and planning. Engineering controls include modifying structures to withstand flooding; for example, through the construction of berms or elevated storage areas. Training and planning include preparing a flood evacuation plan that addresses the potential hazard, and training personnel to respond appropriately in a flood emergency. For example, vulnerable equipment and supplies could be stored in a way that would make them relatively easy to move to higher ground in the event of heavy runoff or a tsunami.

Impacts on surface water quality from nonpoint source pollution by suspended sediment. During construction of Dillingham Trail, grading and widening the trail, making cuts and fills, trenching to install fiber optic cable, and installing box culverts and other drainage controls would increase the short-term potential for stormwater runoff to come into contact with disturbed soils. This may result in increased sediment loading of stormwater runoff and could degrade water quality in receiving streams. These impacts would be reduced to less than significant levels by implementing standard construction BMPs for runoff control. These would be specified in the construction stormwater pollution prevention plan for the project, as required by the Clean Water Act for construction sites of one acre or more under new federal and state regulations beginning in March 2003. The identified impact would be less than significant.

Impacts on surface water quality from chemical spills or nonpoint source discharges. Vehicles would transport equipment and supplies along Dillingham Trail. Operating vehicles at safe speeds would minimize the potential for spills or releases along Dillingham Trail. Since accidents cannot be ruled out, there is a small potential for spills of petroleum products or other substances that may be transported along Dillingham Trail. The impact on surface water quality would be less than significant compared to existing conditions because in addition to the lower risk of not traveling on public roads, appropriate spill response equipment would be carried with any vehicles transporting chemical or petroleum products, and trained response personnel would be immediately dispatched to the spill site to begin cleanup, according to standard spill response procedures.

No live-fire training would be conducted at DMR, so no explosive residue is expected to be released. Maneuver training could involve the possibility of accidental spills of petroleum products (from fuel or hydraulic lines) or other chemicals. Any spills would be reported, contained, and cleaned up as soon as possible according to procedures described in the SPCC Plan.

Impacts on surface water quality from use of dust control palliatives. Controlling dust using calcium or magnesium chloride,calcium lignosulfonates, or other environmentally friendly materials or measures could affect surface water quality, either by increasing the biological oxygen demand or by increasing total dissolved solids concentrations. These impacts are expected to be less than significant because the chemicals would be applied according to industry standards (Parametrix, undated).

Impacts on groundwater quality. Perched groundwater occurs at shallow depth beneath DMR, and groundwater occurs at various depths along Dillingham Trail. Accidental spills or releases could occur during routine operations as described above and instead of affecting surface water quality could infiltrate the subsurface and affect groundwater quality. The impacts are expected to be less than significant because, as described for surface water, spills would be quickly contained and then cleaned up, using standard procedures described in the SPCC Plan. Furthermore, although there would be more mounted maneuver training at DMR under the Proposed Action, the increase would not result in significantly higher risk of spills.

Groundwater supply. Current groundwater use is small compared to available water supplies. The Proposed Action would not result in a significant increase in groundwater use, and would have a negligible impact on local groundwater supply.

Impacts on surface water quality from the dredge and fill of jurisdictional wetlands. In accordance with Section 404 of the CWA, any dredge or fill activities that may occur in a jurisdictional wetland must be reviewed by the Corps prior to construction to determine if a Department of the Army permit is required. If a Department of the Army permit is required, then a CWA Section 401 Water Quality Certification issued by the State of Hawai'i may also be required. Based on an evaluation by the Corps of Engineers, Honolulu District, Regulatory Branch, dated September 4, 2002, there are no jurisdictional wetlands that would be affected by or adjacent to proposed training activities (Appendix E).

Impacts on surface water quality from stream crossings. Construction of Dillingham Trail could potentially affect waters of the US via stream crossings at Poamoho Stream near SBMR or at smaller, unnamed streams that might require new crossings, such as on the unnamed streams that emanate from the foot of the Wai'anae Range between DMR and Waialua. All stream crossings would be reviewed by the Corps prior to construction to determine if the activity is regulated under Section 404 of the CWA. In accordance with Section 404 of the CWA, any dredge or fill activities in these streams associated with the crossings may require a Department of the Army permit. If a Department of the Army permit is required, then a CWA Section 401 Water Quality Certification issued by the State of Hawai'i may also be required. The Army would design the stream crossing to minimize any dredge or fill impacts on the stream to the fullest extent practicable in compliance with Section 404 of the CWA. If the Corps determines that a Department of the Army permit is required, the Army would abide by all appropriate CWA regulations and permit processes administered by the Corps and the State of Hawai'i.

Reduced Land Acquisition Alternative

The impacts associated with Reduced Land Acquisition would be identical to those described for the Proposed Action.

No Action Alternative

Less than Significant Impacts

Increased flood potential. The impacts of flooding are similar to those described for the Proposed Action, but they would be somewhat lower in magnitude because staffing and training intensity would be at approximately current levels.

Impacts on surface water quality from chemical spills on public roadways. One of the reasons for proposing construction and use of Dillingham Trail under the Proposed Action is to avoid the potential for traffic accidents on public roads. Army vehicles may drive at a slower speed than other traffic, and convoys or wide loads can cause impatient drivers to attempt to pass unsafely. Traffic accidents can result in releases of chemicals, including petroleum products and any chemicals that are being transported in the vehicles, whether civilian or military. Spills can result in significant impacts on surface water or groundwater. The potential for accidents would be kept at less than significant levels by implementing standard Army procedures when operating vehicles on public roads, such as driving at a safe speed, transporting hazardous materials in secure containers according to Army and state and federal regulations, and using appropriate signs and placards.