High-level water is absent or occurs only in meager amounts in the lavas of the Napali formation in Nonou, Kalepa, and Haupu ridges. Water perched on soil, ash, or dense lava flows occurs widely in the Koloa volcanic series in the Lihue District. The water discharges mostly in seeps and small springs in the valleys cut into the rocks of the Koloa, but in a few places it occurs in quantities adequate for municipal supplies.

Tunnel 8, which is west of Lihue on Nawiliwili stream, was excavated by the Lihue Plantation Co. in 1935 at a site selected by W. O. Clark, where the flow of the stream increased from 0.25 mgd to about 2.4 mgd in a distance of about 1,000 feet. The tunnel is about 790 feet long and follows roughly the course of the stream (fig. 30). The floor of the tunnel is 187 feet above sea level. The perching bed under the lava-flow aquifer is red clay. At the time the tunnel was constructed the zone of saturation above the perching member was 15 to 20 feet thick. Water is pumped from the tunnel into the Lihue Plantation Co. domestic-water system at the average rate of about 1.2 mgd.

Tunnel 9 was excavated in 1928 to intercept the water flowing from springs at an altitude of about 300 feet in a tributary to Huleia Stream. The aquifer is lava flows of the Koloa volcanic series, and the water apparently is perched on a red soil. The tunnel is in three sections which have a total length of nearly 1,600 feet. Most of the water discharged by the tunnel seems to come from the sections marked tunnel 1 and tunnel 2 on the sketch in figure 31. The tunnel supplies about 0.6 mgd to the Kauai County water systems in Lihue and Nawiliwili. About half a mile west of tunnel 9 a perched spring discharges 0.13 to 0.15 mgd from lava flows. Test of a red soil that probably contains much of this water in a

The Koloa District and east of the Hanalei make up the south slope of the upper two crop out also in irregular district. Lavas of the area, irregular banded patches being p valley.

**Basal ground water**

The south slopes of the 30 to 45 feet and chlor; Grove Farm Co.'s. Mas made the basal aquifer basal water in the well; which were drilled in and had a chloride content quently, however, deter in well 14N showed a cl salinity may have been occurring above the bf

![Figure 30. Plan of tunnel 8, Lihue Plantation Co. Nawiliwili tunnel.](image-url)