

# Northern Guam's Basement Topography

The limestone bedrock of northern Guam is a very permeable aquifer, which rests on volcanic basement rock of much lower permeability. Wells drilled into the limestone yield hundreds of gallons per minute of potable water while wells that are accidentally drilled into the basement rock do not yield economical quantities of fresh water. The basement rock of northern Guam thus constitutes a regional aquitard, which partitions the bedrock aquifer into discrete sub-basins. On the other hand, the basement topography also determines the location of the premier water-bearing zone of the aquifer: the relatively narrow strip along which the lens laps up onto the basement rock and the basement slope plunges below sea level. In this "parabasal" zone, the lens is not only thickest, but also tends to be freshest, since it is underlain by the virtually impermeable basement rock rather than the seawater that elsewhere permeates the porous limestone bedrock. The parabasal zone also constitutes the "headwater" where rainwater percolating down to the slopes of the basement rock where it stands above sea level concentrates to form the flank of the lens. The best wells are thus those placed in the parabasal zone. However, attempts by drillers to intercept the parabasal zone run the risk of intercepting the nearby basement instead, thus producing a "dry hole." In 2000, WERI updated the map of the volcanoclastic basement rock beneath the Northern Guam Lens Aquifer (NGLA) originally developed by the 1982 Northern Guam Lens Study. This update incorporated subsequent data on the location of the basement obtained from exploratory drilling of water wells and Installation Restoration Program (IRP) contaminant monitoring wells on current and former military reservations, and from accidental interception of the basement during exploration and installation of water production wells. The map is maintained in WERI's NGLA Database and will be updated as new discoveries or insights are gained.

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- Production Wells
- Route
- Road
- Sub-basin Boundary
- ▨ Parabasal Zone

Blue crosshatch estimate of parabasal zone (Dupuit-Ghyben-Herzberg model)

