

undulating top from 100 ft. to 130 ft. above the sea, though at its base the scoria cone of Kirikiripu rises to 381 ft. Karioi (2,420 ft.), a wooded, much-dissected volcano with rich farm lands on its wide lower slopes, lies six miles south-west of Raglan and dominates the landscape. To the south-east is the deforested Kiorewaro Plateau (1,154 ft.) with patches of basalt, and to the east the bushed Hakarimata highlands separate the Whaingaroa basin from the lowlands of the Waikato. Opposite Raglan, north of the inlet, there is an extensive and much-dissected plateau with tops from 400 ft. to 500 ft. above the sea.

OUTLINE OF GEOLOGY.

The oldest rocks of the district are the folded and indurated Mesozoic mudstones, sandstones, and conglomerates that form the high country to the east and south-east. Three miles east of Raglan outcrops of these rocks occur along the shore of the south lobe of Karakaringa Peninsula which, projecting three miles from the east, divides the upper inlet into two large basins. The old rocks appear at a few points round the northern basin, but are known neither along the north shore of the lower half of the inlet nor at or near any part of its south shore.

The land of early Tertiary time, consisting of Mesozoic strata, was reduced to a surface of low relief, and in the Raglan district during depression was planed by the waves before the next series of beds was laid down. These are sandstones, mudstones, limestones and their intergradations, marine strata of early middle Tertiary age, and all calcareous. The basal beds of the series, terrestrial coal-measures, thick and extensive in other regions, are not known to occur about Whaingaroa Inlet. The rocks form nearly all the shore on the north side of the inlet and round Karakaringa Peninsula. On the south side they extend for a mile east from Raglan and along both shores of Ohira estuary, whence they extend west across the root of the peninsula to Kaitoki and Opoturu Arms. Round the inlet these beds everywhere lie flat or undulate gently. They belong to the lower part of the group, and near Raglan the contact with the underlying Mesozoic strata is probably nowhere more than 200 ft. below sea-level.

The district was above the sea toward the close of Tertiary time, earth stresses were being adjusted, and volcanoes were active, the land for miles south and south-west from Raglan being covered with basaltic scoria and lava. The broad features of the topography were much as at present and volcanic, and much other debris accumulated in low parts. The area since this time has been both higher and lower than it now is; the inlet with its branching arms indicates depression, whereas shore benches and dissected terraces indicate uplift. The low flats on which the town and dairy factory stand are formed of loosely consolidated beach sands and prove a recent uplift of some 15 ft., and the flat-topped terrace (100 ft. to 130 ft.) at the back is part of a higher bench built of somewhat older clays, sands, and gravels.

SPRINGS.

Water seeps out at several points from the terraces at the back of the Raglan flat, probably marking the outcrops of the more porous lenses of fluvial and estuarine deposits that form them. The beds as exposed in road-cuttings about Raglan are decidedly clayey, and even the pebbly lenses can have but small permeability. These deposits form the upper part of the shore-cliff east of the wharf, their base, consisting of fine gravels with a tight sandy matrix, seems more promising as a water-carrier than other parts of the sequence. Altogether the deposits cover perhaps 300 acres of the Raglan Peninsula north of Kaitoki Arm. Any water-supply from them is likely to be small and exposed to contamination; some of the springs show rusty deposits of iron hydrate.

Waipatukahu Spring, two miles south of Raglan, has been suggested as a possible supply for the town. Beautifully clear water rises in a pool perhaps 6 ft. across on the floor of Omahina Creek at a point some 10 chains up from the south end of the tidal flat and a few chains above sea-level. Mr. W. Arthur Gray has gauged the flow as amounting to 900,000 gallons per day, and has reported on the means of getting the water to Raglan.

The water from the spring is not derived from Omahina Creek, which is a small stream with a large estuary joining Opoturu Arm from the south. There are a few outcrops of Tertiary limestone on the valley-bottom near the spring, but the rest of the basin is entirely in volcanic rocks which extend for miles west, south, and east. Half a mile to the east Tertiary rocks outcrop at sea-level in Takapanui Creek, extend along both sides of this stream and its estuary in narrow strips for over a mile, and farther east make contact with the Tertiary area at the base of Raglan Peninsula. Here they rise to 200 ft. above the sea and, as judged from the distribution of the Tertiary and the overlying volcanic rocks, this contact has a general westward slope. Waipatukahu Spring is at the most westerly exposures of this contact and very little above sea-level. The volcanic rocks are loose and highly porous, whereas the Tertiary beds are compact and impervious, and undoubtedly the spring is one of the points of outflow for the water which, sinking into the volcanic rocks, seeps along the contact with the tight Tertiary beds to the most convenient places of escape.

BORES.

In the bore at the back of the hotel at Raglan the water rises to about 8 ft. from the surface, the same height as in an adjacent well, and this may be taken as the ground-water level at this point. The well yielded at the rate of 80 gallons per hour, an amount increased to 180 gallons after shooting with six plugs of gelignite. The water is somewhat hard, tastes slightly of iron, and as it might readily be contaminated is not suitable for all domestic purposes. The drillers, M. Welsh and Son, of Ngaruawahia, report that the bore was $2\frac{1}{2}$ in. in diameter