

Geological Society of New Zealand - Mt Mangere Guide



Auckland - City of Volcanoes

Many of the landforms and soils of Auckland, North Shore and Manukau Cities have been produced by basaltic volcanism in just the last 250,000 years, with the latest eruption, Rangitoto, being witnessed by the Maori 600 years ago. While the older (0.5 to 1.5 million years ago) volcanoes of the Franklin basaltic field around the Pukekohe / Bombay area are extinct, further eruptions from the younger Auckland field are considered likely.

The magma that fed Auckland's volcanoes originated some 80 km below the surface. Periodically, a large buoyant "bubble" of molten magma rose up through the overlying rocks to erupt at the surface. The hot, gas-charged magma rose to near the surface and was then forced out by the pressure of escaping gases.

Each volcano was formed during a single eruption, or sequence of short eruptions, generally lasting no longer than a year or two. It is possible however for a scoria cone or tuff ring to form in a matter of days. Once the magma source was exhausted, eruptions ceased and the subsurface plumbing solidified. Auckland's volcanoes all had short lives and have been once-only eruptions.

Three styles of eruption built these small basalt volcanoes and each style produced a different kind of rock and a different landform. While some of the volcanoes were created by only one style of eruption, many were built by a combination of all three. What kind of eruption occurs at any particular time depends on how much gas is dissolved in the magma, the rate of magma upwelling, and whether it comes in contact with water.

The three styles are: explosive eruptions producing tuff rings, fire fountaining and the quiet extrusion of lava flows. The styles and their sequence are explained and illustrated on the ARC "Volcanoes of Auckland" website. The amount of gas in the lava at the time it erupted varied. If there was less gas, the lava would solidify into dense basalt rock, or if there was more gas, it would cool as light weight, 'frothy' scoria containing gas vesicles.

Mangere Mountain

Mount Mangere dominates other smaller centres of volcanic eruption in the Mangere area, such as the explosion crater of the Mangere Lagoon and smaller cones like those on Puketutu Island. It has well preserved cones and craters and is the largest (8 million m³) and highest (107 m) of the volcanoes on the Manukau lowland. It also has the greatest area of any of the Auckland scoria cones (0.72 km²) and contains the largest scoria crater (400 m in diameter and 70 m deep). The Mangere volcano was formed about 20,000 years ago by vigorous lava fountaining which cooled to scoria. Many interestingly shaped lava bombs of all sizes were formed as molten lava flung into the air spun and twisted in flight, cooling before landing. Numerous 'bread-crust', 'cow-pat', spindle and ribbon-shaped bombs (some very large) now litter the walls and floor of the crater.

The crater was later filled by a dome of apparently solid lava about 12 m high, which has three small eruption pits around its base. The dome could be a plug of stiff, plastic lava pushed up the throat of

the volcano, or it may be an accumulation of viscous lava and late stage fountaining of soft, hot lava bombs which welded together.

During the period of eruption, activity switched from point to point. A later vent opened near the northern rim of the main crater and produced a small cone with a deep, steep-walled crater. To the north of the mountain there was formerly a small cone that has been removed by quarrying.

Around the base of the cone (except the south-west sector occupied by Mangere Lagoon) there are many diverging lava flows that spread out over about 4.5 km² of the present land surface. Lava flowed out from many points. A major flow breached the crater on the eastern flank of the main cone giving it its horse-shoe shape. The flow surface (East of the soccer fields) is now marked by a number of small mounds that appear to be material rafted away from the rim of the cone on the surface of the flow or on pressure ridges.

More extensive, very fluid flows emanated from other vents and spread to the west and north, some continuing nearly 1 km beyond the present coast. Many of these lava flows have smooth or ropy surfaces and are known as pahoehoe flows. Drillholes across Manukau Harbour indicate that 4 to 6 m thick lava flows are thinly covered with modern marine mud. The uneven surface of the lava flows was liberally coated with ash from Mangere and other adjacent volcanoes, and became the basis of fertile and easily worked soils, which for many years made Mangere an important market gardening area.

The vents of Mangere volcano occur on a north-northeastwards trending line. To the south-west of Mt Mangere, an earlier eruption had opened the wide crater of Mangere Lagoon and a small scoria cone in the centre, producing a 'castle and moat' form. The explosion crater was subsequently invaded by the sea around 7,000 years ago.

Maori Earthworks

The steep outer slopes on the northern, southern and western sides of Mangere Mountain have been extensively terraced from top to bottom by the prehistoric Maori. On the eastern rim of the small crater, there is a group of large storage pits, and on the southern summit terraces have been constructed among some solid rock outcrops.

More information about early Maori earthworks in the Auckland region can be found on the ARC "Volcanoes of Auckland" website.

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