ASSESSMENT OF THE HAZARDS AND RISKS ASSOCIATED WITH THE SOUFRIERE HILLS VOLCANO, MONTSERRAT

Ninth Report of the Scientific Advisory Committee on Montserrat Volcanic Activity

Based on a meeting held between 1 and 3 October 2007 at the Montserrat Volcano Observatory, Montserrat

Part I: Main Report

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Summary

(i) Lava extrusion and dome growth ceased in early April 2007, ending an episode of eighteen months of extrusion at a high average rate. The dome that remains has a height of about 1050 metres above sea level, a volume of about 203 million cubic metres and is situated about 100 metres further to the northwest relative to the dome of mid-2003. There are two main lobes to the dome: one to the east and one to the southwest that just overtops the crater rim next to Galway's Wall and a separate mass to the northwest that spills over into Gage's Valley and Tyre's Ghaut. Since April there have been rockfalls, small pyroclastic flows and lahars, though the first two have been much reduced in frequency.

(ii) The lack of lava extrusion over the past six months indicates that the volcano has entered a paused state, possibly similar in many ways to those of 1998-99 and 2003-05. We have assessed whether this presumed paused state might instead represent the end of the eruption. By this we mean that the eruption will probably end when basalt magma no longer enters the volcanic system at depth to power the extrusion of andesite lava. Using MVO's measurements of sulphur dioxide, surface deformation and long-period earthquake swarms we have tested three criteria that we set up during the 2003-2005 pause in order to make this assessment. We have a high degree of confidence that these measurements currently show that the volcano has not stopped being active, and is in a state of pause in terms of eruption at the surface. Our current estimate is that this pause may continue for many more months, possible 15 months or more.

(iii) Even though no new lava is emerging from the volcano, a large mass of still hot lava sits at a high level above the crater rim. In particular, the northwestern lobe of lava, which was emplaced over two weeks at the beginning of 2007 at very high rates, has sufficient mass, residual heat and gaseous content to produce energetic large pyroclastic flows that could reach the sea to the west or northwest, following a large enough collapse in those directions. The probability of this happening is reduced by the cessation of extrusion and gas loss from the dome rocks. Much more probable (about 40%) is that the next major event over the coming year will be another major

collapse of the dome to the east down the Tar River Valley. Almost as likely as that is that there will be no major collapse or renewal of extrusion in the next year.

(iv) Using the same assessment areas north of the Belham Valley as we used in the July 2007 analysis, and taking the new southern boundary to the Exclusion Zone into account (see Fig.1 below), we have estimated the annual risk of death to individuals. For a person living full-time in Area 1, extended to the new boundary, the risk is 1-in-1,700 (3.1 times the background risk of accidental death in the north of Montserrat). In Area 2, immediately to the north as far as Nantes River, the risk is 1-in-21,000 (1.2 times the background risk). Between Nantes River and Lawyers River (Area 3) the risk is 1-in-6 million (1.001 times the background risk). These individual risk levels are much lower than six months ago and slightly lower than our assessment in July 2007. However, because more people have moved back into Area 1, the societal risk of a few people being killed by the volcano has actually increased since July.

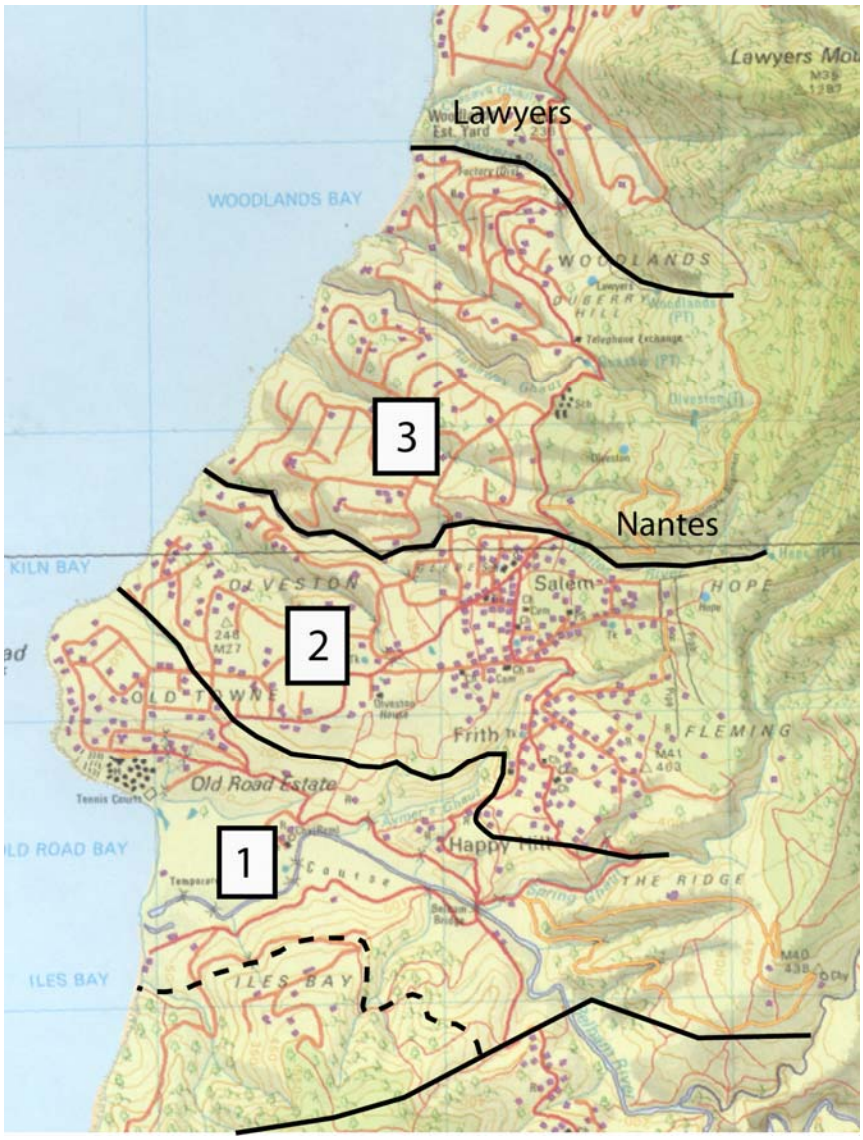

Fig.1
Map showing revised population Areas [1], [2], and [3] following the reoccupation of Iles Bay Hill. The dashed line is the southern boundary of the 20 million cubic metres normal dome collapse pyroclastic flow surge, the northern boundary of which is the the solid line between Areas 1 and 2.