Effect of Seismic Activity on the proposed Burnt Ground Cemetry, Hanover

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Location and Geology
Burnt Ground is located on the parochial road to Copse which is off the B8 main road between Shettlewood and Ramble, all in Hanover. Geologically it is underlain by White Limestone seemingly with alluvial deposits of unknown thickness in places. Structurally the area borders the northwestern flanks of the Montpelier-Newmarket Belt, which is a series of faults all trending northwest-southeast from Montego Bay environs to the south coast of St. Elizabeth.

Seismicity
Instrumental records from the Jamaica Seismograph Network demonstrate seismic activity in the Montpelier-Newmarket Belt, but it is not possible to identify specifically the active from inactive faults. The earthquakes are concentrated near the centre of the belt in the vicinity of Quick Step, Trelawny and have **magnitudes** up to 4.2 that would yield low **intensities** not likely to cause structural damage. Of note is the Sykes and Ewing epicenter of the **magnitude** 6.6 to 6.8 of March 2, 1957 which is about 15 kilometers west of Burnt Ground. It caused **intensities** of VIII in Montego Bay and environs particularly to the west. No **intensity** was reported from Burnt Ground, however in Montpelier and Chester Castle, towns situated five to ten kilometers northeast and south west of Burnt Ground, respectively, the **intensity** was VI. Therefore, in Burnt Ground the **intensity** could have been no higher than VI (see excerpts below) barring extenuating circumstances such as extreme site or basin effects, which I have no knowledge of at this time. It is useful to be aware that this earthquake may be mis-located by fifty (50) or more kilometers because there was no local or regional seismograph to record the event.

Note that in seismology *magnitude* is the log-scaled instrument-based size of the earthquake whereas *intensity* is a description of the effects at a given location.

Seismic Hazard
Recently compiled seismic hazard maps for Jamaica predict horizontal ground accelerations of 50% of gravity on rock or shallow soil for the Burnt Ground area with a 98% probability that this value will not be exceeded. [the acceleration due to gravity 980 gals or cm/s/s)]. Such a level of ground movement will yield very damaging intensities of EMS VIII and higher.

Below please find relevent excerpts from the European Macroseismic Scale.

END of report.
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[DESCRIPTION OF INTENSITY LEVELS VI to VIII [European Macroseismic Scale]

EMS VI - VI. Slightly damaging

a) Felt by most indoors and by many outdoors. A few persons lose their balance. Many people are frightened and run outdoors.
b) Small objects of ordinary stability may fall and furniture may be shifted. In few instances dishes and glassware may break. Farm animals (even outdoors) may be frightened.
c) Damage of grade I is sustained by many buildings; a few suffer damage of grade 2.

VII. Damaging

a) Most people are frightened and try to run outdoors. Many find it difficult to stand, especially on upper floors.
b) Furniture is shifted and top-heavy furniture may be overturned. Objects fall from shelves in large numbers. Water splashes from containers, tanks and pools.
c) Many buildings of vulnerability class B and a few of class C suffer damage of grade 2. Many buildings of class A and a few of class B suffer damage of grade 3; a few buildings of class A suffer damage of grade 4. Damage is particularly noticeable in the upper parts of buildings.

VIII. Heavily damaging

a) Many people find it difficult to stand, even outdoors.
b) Furniture may be overturned. Objects like TV sets, typewriters etc. fall to the ground. Tombstones may occasionally be displaced, twisted or overturned. Waves may be seen on very soft ground.
c) Many buildings of vulnerability class C suffer damage of grade 2. Many buildings of class B and a few of class C suffer damage of grade 3. Many buildings of class A and a few of class B suffer damage of grade 4; a few buildings of class A suffer damage of grade 5. *A few buildings of class D suffer damage of grade* 2.

Table 2: Classification of damage to masonry buildings

Taken from the EUROPEAN MACROSEISMIC SCALE OF INTENSITIES

Grade I: Negligible to slight damage (no structural damage)
Hair-line cracks in very few walls; fall of small pieces of plaster only. Fall of loose stones from upper parts of buildings in very few cases only.

Grade 2: Moderate damage (slight structural damage, moderate non-structural damage)
Cracks in many walls; fall of fairly large pieces of plaster; parts of chimneys fall down.

Grade 3: Substantial to heavy damage (moderate structural damage, heavy non-structural damage) Large and extensive cracks in most walls; pantiles or slates slip off. Chimneys are broken at the roof line; failure of individual non- structural elements.

Grade 4: Very heavy damage (heavy structural damage, very heavy non-structural damage). Serious failure of walls; partial structural failure.