B

Appendix B – Summary of Mapping Methodology

Methodology for identifying slope instability susceptibility area:

- Land with slopes steeper than 35 degrees have been included in the slope instability susceptibility area (including ridgelines).
  - AGS (2007a) identifies natural slopes steeper than 35 degrees as potentially susceptible to instability with the potential for rapid landslides.
  - Properties with retaining walls resulting in localised linear slopes greater than 35 degrees, where the remainder of the property is at less than 35 degrees and there is no evidence for previous slope instability features, have been excluded from the area.
- Ridgelines with slopes less than 35 degrees and less than 30 m wide have been included in the area potentially susceptible to slope instability. A 15 m setback from the break in slope was applied to hillslopes with mapped deep-seated failures to account for head scarp regression. This was reduced to 10m for other hillslopes.
  - Ridgelines with widths of less than 30 m, including consideration of the setback distances, are considered too narrow for residential development.
- Land with slopes steeper than 20 and containing features within the instability inventory have been included in the area:
  - Evidence of existing slope instability indicates the slope is susceptible to future instability.
  - Slopes adjacent to areas with mapped instability features and exhibiting similar topographic profiles and underlain by the same geologic unit are also susceptible to instability and are included in the area.
- Land mapped as ‘Undifferentiated Pleistocene - Holocene landslide deposits’ in 1:250,000 Geological QMap has been included within the slope instability area.
  - The distribution of landslide deposits identifies deep-seated landslides which may be re-activated during heavy rainfall, seismic events, and/or due to construction activities.
- Land with post-event reports and/or aerial imagery indicating previous slope failures has been included in the area.
  - Slopes with failures identifiable in the aerial imagery flown following the 2011 event, and evidence of previous failures in the Paired Stereo Aerial Photographs taken in 1948, 1969, 1976,1986 and 2000, and aerial imagery flown in 1940-1949 and 1980-1989 have been included in the area.
- Slopes underlain by geologic units considered highly susceptible to slope instability have been included in the area.
  - Previous studies have identified areas underlain by Separation Point Granite and Marsden Coal Measures as particularly susceptible to shallow instabilities.
- Land with slopes greater than 20 degrees and within 100 m downslope of mapped active faults have been incorporated into area. The distribution of active faults was taken from the GNS active faults database (GNS, 2020).
  - Rock near mapped active faults are generally highly fractured and/or sheared due to strong ground shaking during ruptures and accumulation of tectonic stresses. The rock subsequently has a higher susceptibility to instability and there are commonly areas of groundwater seepage associated with the fault zone. Material may additionally be dislodged and/or transported downslope during a fault rupture.

Methodology for assessing the run-out susceptibility area :

- Land previously impacted by the run-out of slope instability failures has been included in the area.
  - Land damaged or completely inundated by the run-out from debris flow and shallow instability failures was identified from the aerial imagery flown following the 2011 event and from local experience.
- Land with geomorphic evidence of instability run-out in the slope instability inventory has been included within the area.
  - Evidence of previous run-out indicates that the slope is susceptible to being impacted by the run-out from future slope failures.
- Land where the slope profile and 2 m contours indicate that there is potential for the area to be impacted by debris from upslope instability features has been included within the area.
  - Engineering judgement was used to assess run-out distances of features in the instability inventory including consideration of the feature size and slope profile.
  - Land adjacent to the run-out of previous debris flows and at similar elevations and/or geomorphic settings were included within the area.