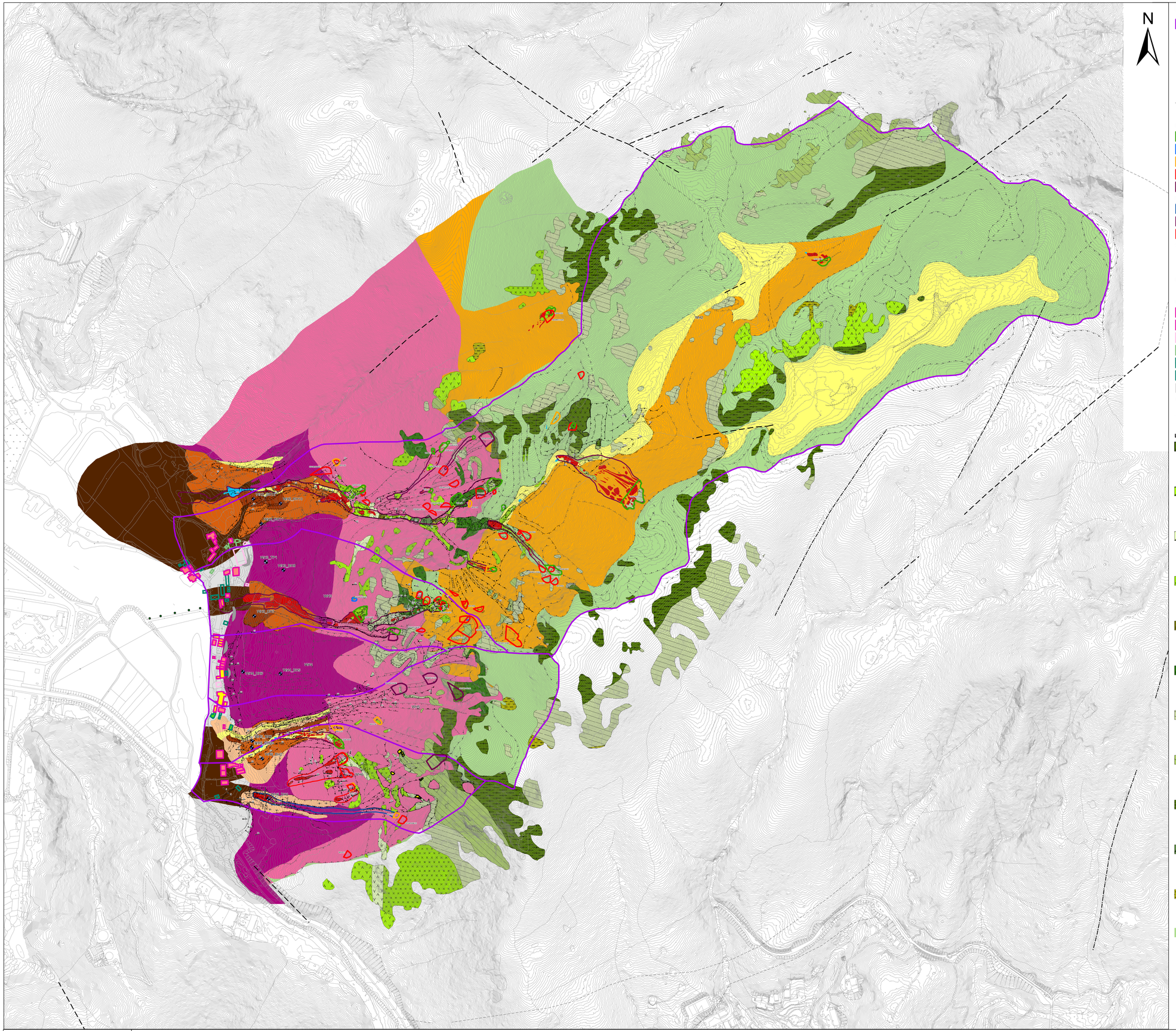

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Legend

Study Area & Catchments

Field Geomorphology

- Concave change in slope
- Concave break in slope
- Break in slope
- Convex change in slope
- Convex break in slope
- Rounded spurline
- Rounded ridgeline
- Joint Readings
- Slope Angle,lyr

Landslide Source Areas

- 2008
- 1985
- 1973
- Relict
- Rock/Debris Avalanche?

Landslide Runout Trails

- 1976
- Recent
- Relict

Site Specific Ground Investigations

- Drill hole
- Trila pit

Existing GI

- Existing GI

Facility Survey

- Occupied, Group I
- Habitable, Group I
- Group II
- Group III
- Group IV
- Derelict, Group IV
- Registered Slopes

Geological lines (1:20,000-scale map)

- Geological boundary, solid rock (uncertainty present)
- Photogeological lineament
- Fault (uncertainty present)

Lithology and Outcrop Location

Porphyritic Fine Ash Tuff:
Purplish grey interbedded with light yellowish white moderately decomposed fine ash tuff which is <20% lapilli and fractured quartz crystal bearing, but does include >20% euhedral phenocrysts of feldspars.

Fine Ash Tuff:
Typically contains less than 20% fractured crystals of quartz and volcanic glass ranging in size from 1mm-2mm with a sub-angular to sub-rounded appearance. Some angular lithics are present (10-15%).

Eutaxitic Fine Ash Tuff:
Typically contains less than 20% fractured crystals of quartz and volcanic glass ranging in size from 1mm-2mm with a sub-angular to sub-rounded appearance. Some angular lithics are present (10-15%) The Tuff has a eutaxitic fabric.

Crystal Bearing Fine Ash Tuff:
Contains >20% fractured crystals of quartz and volcanic glass ranging in size from 1mm -2mm with a sub-angular to sub-rounded appearance. Some angular lithics are present (10-15%).

Rhyolite Lapilli Bearing Fine Ash Tuff:
Rhyolite Lapilli inclusions within Crystal bearing fine ash tuff Light grey on fresh surface with red oxidation surrounding fractured quartz crystals. Fine ash tuff which is crystal bearing with less than 20% quartz crystals (1mm-4mm), Rhyolite Lapilli upto 12mm are present. A fine volcanic foliation fabric is present within the unit.

Tuff Breccia (25-75% blocks and bombs):
Comprises, large (up to 0.5m) angular to sub rounded, unsorted lithics of crystal bearing (<20%) fine ash tuff within a crystal bearing (>20%) fine ash tuff matrix. The homogenous nature of the lithics suggests the breccia may be related to a volcanic origin rather than a lahar and suggests a nearby volcanic vent.

Shallow Dipping Flow Banded Fine Ash Tuff:
Relatively horizontal with preferential weathering high accentuating flow banding. Greater than 20% fractured crystals of quartz ranging in size from 1mm-3mm with a sub-angular to sub-rounded appearance. Lithics are present within the unit ranging from 2mm-5mm. Areas of auto-brecciation are evident at the base of the unit providing possible evidence of flow.

Steeply Dipping Flow Banded Fine Ash Tuff:
Greater than 20% fractured crystals of quartz and volcanic glass ranging in size from 1mm-3mm with a sub-angular to sub-rounded appearance. Lithics are present within the unit ranging from 2mm-5mm. Areas of auto-brecciation are evident at the base of the unit providing possible evidence of flow.

Lithophysae Bearing Fine Ash Tuff:
Lithophysae comprise sub rounded nodules of quartz dominant fine ash tuff, occasionally infilled with well formed crystals. The lithophysae occur within a fine ash matrix with <40% of the nodule consisting of fractured quartz crystals up to 5mm in size. Clasts range from 2cm to 20cm in size. Lithophysae form from high temperature devitrification of coherent silicic glass, possibly from being deposited in water.

Fine Ash Tuff With Silica Nodules:
Typically contains less than 20% fractured crystals of quartz ranging in size from 1mm-2mm with a sub-angular to sub-rounded appearance. Some angular lithics are present (10-15%) and individual siliceous nodules and lenses up to 0.5m in size.

Tuffaceous Sediments:
Fine ash tuff including bands of coarser crystal bearing tuff displaying laminations, graded bedding and possible cross stratification, suggesting a possible fluvial environment.

Saprolite (Undifferentiated)

Superficial Geology

Offshore Extension of Debris Fan:
Possibly Mid to Early Pleistocene in age?

Colluvium C1:
C1 colluvium is predominantly present in the Middle Terrain. Its location suggests that this colluvium may be relatively older than the C2 colluvium. This material is mainly exposed in landslide scars where reaches up to 2m in thickness. The age of the C1 is unknown but given its location in the Middle Terrain and the age of the C2 colluvium, it is possible that the C1 colluvium is Mid-Pleistocene or earlier.

Taluvium T1 (Interbedded with Colluvium C2):
T1 talluvium forms a footslope drape (Lower Terrain 2). The T1 talluvium typically comprises sub angular to angular moderately decomposed boulders of crystal bearing fine ash tuff or metamorphosed fine ash tuff, which are either clast supported or are within a thin matrix. The T1 talluvium is interbedded with C2 colluvium with the thickest individual talluvium unit being 3.5m thick. The full thickness of the foot slope drape (talluvium and colluvium) varies from 5.7m (WH4 DH6) to 9.5m (WH3 DH8). The processes which led to the formation of this material appear to be predominantly dormant, although limited open hill slope landslides and occasional rock falls add to it. This material has been incised into at the toe of the study area, possibly by marine erosion during a period of sea level high stand approximately 6000 years BP, suggesting this is a minimum age for the commencement of the processes forming this unit. A sample from the colluvial deposits which appear to be contemporaneous to taluvium (T1) gave an age date of approximately 20,000 years BP, suggesting the T1 taluvium deposition was ongoing in the Late Pleistocene.

Taluvium T2:
T2 talluvium typically comprises thin (<1.0m) discreet pockets of taluvium surrounded by, or adjacent to, areas of rock outcrop. T2 talluvium is typically exposed in recent landslide scars. The formation of this material is on going with slope wash, landslide debris and rock fall collecting in depressions of areas of flatter terrain, as such is it considered to be Holocene in age.

Esturine Deposits:
Holocene in age

Recent Landslide Debris:
Recent landslide debris varies from matrix supported, subangular cobbles and occasional boulders, with the matrix typically comprising a light yellowish brown clayey sandy silt to clast supported, sub-rounded cobbles and gravel with minimal fines indicating processes varying from debris slide/avalanches to debris flow to debris flood.

Wash Out:
Silty sand with much gravel and cobbles

Type 1 Debris Lobe:
Predominately Cobbles and fines with occasional boulders.

Type 3 Debris Lobe:
Boulder dominated typically <3m in size often mixed with cobbles and fines.

Type 2 Debris Lobe:
Boulder dominated typically >3m in size often mixed with cobbles and fines.

Alluvium:
Extensive deposits of alluvium are present in the Upper and Middle Terrain in catchment WH2. Minor deposits of recent alluvium, typically forming localised pockets, are present lower reaches of all the drainage lines, typically extending from below the lower rock cliffs with material being derived from undercutting and fluvial reworking of talus and taluvium, together with reworked landslide debris.

Dilated Blocks

YOUNGING AGE

0 125 250 500
Meters