N

LAI PING ROAD

Salt Water Covered Reservoir

Landslide Scar 5

Landslide Scar 4

Landslide Scar 4A

Landslide Scar 3A

Landslide Scar 3

Landslide Scar 2

Landslide Scar 1

Landslide Scar 3B

AREA OF DENSE VEGETATION

Sub-vertical scarp composed of Colluvium over Residual Soil. Colluvium up to 3m thick along western flank

Large 1.5m by 0.75m oval soil pipe at Colluvium-Residual Soil Interface

Extremely weak to weak medium yellowish-brown mottled buff and reddish-brown completely to highly decomposed lapilli-bearing coarse ash TUFF with medium spaced light smooth planar slickensided joints infilled with kaolin and manganiferous deposits.

Seepage from six soil pipes developed at the Residual Soil-Saprolite Interface

1997 failure surface joint-controlled

1997 failure surface-joint controlled

Pre 1997 failure surface

Original cut slope face

Extremely weak medium reddish-pink mottled white and orange brown and streaked dark brown completely decomposed fine ash TUFF with relict crinulated very closely spaced extremely-narrow joints infilled with kaolin and manganiferous deposits.

Weak to moderately weak light brown to buff fine-grained highly to moderately decomposed RHYOLITE with very closely-spaced narrow smooth stepped joints infilled with stiff white clay (kaolin). Grading into a firm to stiff whitish-yellow mottled pinkish-red and dark brown clayey SILT (280mm zone on up-slope boundary of exposure at interface with coarse ash tuff).

Weak to moderately strong orangish-brown highly to moderately decomposed coarse ash crystal TUFF with widely-spaced narrow slickensided planar joints infilled with kaolin and manganiferous deposits.

Extremely weak medium orangish-brown mottled pinkish-red inequigranular completely decomposed coarse ash TUFF with deformed joint infills (c. 10mm thick) of stiff white and buff clay (kaolin) rimmed by firm brown silt (manganiferous deposits).

Disrupted rock mass-Toppled rock blocks

c. 10-20mm wide

c. 250mm wide

Gully erosion into veneer of debris

Vegetated slope

Failed pre-1997

Eroded Debris

Extremely weak to very weak medium yellowish-brown mottled reddish-brown completely decomposed coarse ash-bearing lapilli TUFF with medium-spaced, moderately wide smooth slickensided joints infilled with firm to stiff white silty clay (kaolin) and dark brown silt (manganiferous deposits). Rectangular corestone 1.3m long composed of moderately strong to strong bluish grey slightly decomposed lapilli-bearing coarse ash crystal TUFF.

Gully erosion

Eroded failure surface

Gully erosion into failure surface

Complex tension crack system

Gully erosion into debris

Fill Mound

Debris from April 1997 erosion of landslide 3

in situ vegetation

Dense vegetation

Loose yellowish-brown slightly clayey silty coarse SAND with many angular boulders of moderately to completely decomposed tuff (LANDSLIDE DEBRIS).

Very loose brown silty fine to coarse SAND (REWORKED DEBRIS).

Soft dark red very clayey sandy SILT with much angular gravel and cobbles of completely to moderately decomposed tuff (LANDSLIDE DEBRIS).

Loose orangish-brown and reddish-brown very clayey, very silty, very sandy well graded GRAVEL with much angular cobbles and occasional boulders of moderately to completely decomposed tuff (LANDSLIDE DEBRIS).

Soft to firm yellowish-brown mottled dark red very silty very sandy CLAY with much angular gravel and cobbles of slightly to completely decomposed tuff (LANDSLIDE DEBRIS).

Soft orangish-yellowish-brown mottled white very silty very sandy CLAY with much angular gravel, cobbles and boulders of completely decomposed tuff (LANDSLIDE DEBRIS).

Reworked debris extends further down slope

Colluvium 1m to 1.5m thick

Plane of rupture. Soft medium brown silty CLAY with much coarse angular quartz sand and fine angular quartz, feldspar and completely decomposed tuff gravel. Slickensides on plane dip/plunge 32°/196° and 45°/189°.

Firm medium yellow mottled dark pinkish-red silty CLAY (RESIDUAL SOIL).

Soft to firm reddish-brown very silty very sandy CLAY with much angular gravel and cobbles and occasional boulders (c. 1m) of moderately to completely decomposed tuff (LANDSLIDE DEBRIS)

Thin veneer of debris on left flank of landslide scar 1(c. <0.5m)

Soft orangish-brown very silty very sandy CLAY with much angular gravel cobbles and boulders (up to c. 300mm Ø) of moderately to completely decomposed tuff (LANDSLIDE DEBRIS)

Sub-horizontal accumulation zone of firm medium orangish-pinkish brown clayey SILT with much coarse angular quartz sand and fine to medium gravel (REWORKED DEBRIS)

Landslide debris pushed-up against vegetated raft

Limit of raft as surveyed 26/8/97.

Limit of raft as estimated from oblique photograph taken 4/7/97.

Limit of raft estimated by Highway Department's emergency works term contractor on 3/7/97.

830320 N
830300 N
830280 N
830260 N
830240 N
830220 N
830200 N
830960 E
830980 E
831000 E
831020 E
831040 E
831060 E
831080 E
831100 E
831120 E
831140 E

User notes.

1. Each landslide and its associated debris are identified by different chroma's of the same colour, with the scar, or zone of depletion, in the darkest chroma. Landslide debris, or the accretion zone, is coloured in progressively lighter chroma, the darker being the oldest in terms of depositional history. Reworked debris (i.e. debris that has been transported by surface water action and redeposited further down-slope) is also shown on the map and is coloured in accordance with its assumed parent landslide.
2. Reworked debris is heterogeneous, cannot be considered as a single material type and has been described individually where observed. The distribution of some of the reworked debris has been interpreted from oblique air photographs (taken on 4/7/97).
3. Main and minor scarp complex above landslide scars 1 to 4 is shown on Drawing No. EG502.
4. Broken lines denote uncertainty.

1. THE SURVEY IS BASED ON THE HONG KONG (1980) GRID SYSTEM.

Base topography taken from CED Survey Division Drawing Number GCS2627/A1-2)

Contours in metres above Hong Kong Principle Datum

2. LEGEND :

- Concave break in slope - sharp
- Concave break in slope - rounded
- Ridge line - sharp
- Boundary of fill mound - post 1997 failure
- Failure scarp - main
- Failure scarp - minor
- Tension crack
- Stream, arrow shows flow direction
- Concrete surface water U-channel
- Retaining structure
- Seepage point with persistent flow (1a - seepage point used in Table 3)
- Seepage point with imperistent flow
- Block sample location
- Sand replacement test location
- Dip and strike of surface of rupture
- Dip and strike of joint
- Surface of rupture containing slickensides with trend and plunge direction shown by the arrow
- Dip and strike of joint controlled surface of rupture
- Dip and strike of joint controlled surface of rupture containing slickensides with trench and plunge direction show by the arrow
- Dip and strike of flow banding
- Manganiferous infill to planar discontinuity
- Kaolin infill to planar discontinuity

- Made ground
- Colluvium
- Residual soils - also including old colluvium
- Coarse ash crystal TUFF rock mass weathering grade
  - PW0/30
  - PW30/50
  - PW50/90
  - PW90/100
- Zone of intense alteration
- Rhyolite dyke
- Landslide debris
- Disrupted vegetated raft of landslide debris
- Reworked landslide debris
- Boulder of moderately to slightly decomposed coarse ash crystal TUFF or *in situ* corestones

no.	date	description	initial
3	7/9/98	Minor amendents	NPK
2	23/3/98	Final draft	NPK
1	11/2/98	Second draft	NPK

REVISION

	name	date
surveyed	N. P. Koor and S. D. G. Campbell	8/97
designed	N. P. Koor and S. D. G. Campbell	
drawn	N. P. Koor	11/97
traced	Y. L. Lee	
checked	N. P. Koor	
examined	C. Fletcher	8/98

contract no.

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job no.

project

LAI PING ROAD LANDSLIDE INVESTIGATION

drawing title

GEOLOGY AND MORPHOLOGY OF LANDSLIDE SCARS 1 TO 5

drawing no. EG499

scale 1:200

office

PLANNING DIVISION

GEOTECHNICAL ENGINEERING OFFICE

CIVIL ENGINEERING DEPARTMENT