TASMANIA DEPARTMENT OF MINES
UNPUBLISHED REPORT 1981/57

Examination of proposed house sites near Lalla

by W. R. Moore

An inspection was made of land at *La Provence* vineyard, east of Lalla, where it was proposed to construct a large homestead-type dwelling on one of two possible positions. A surface site inspection of the two proposed home sites was carried out, with site A (the old house site) being preferred from the viewpoint of slope stability to site B.

Both sites are situated on the same grey clay loam soil (CL) which is underlain by grey clay of an unknown thickness overlying bedded mudstone rock. Site B is located at the head of wide shallow valley and downslope from site A. Site B was extremely wet although no actual spring was located. Its slope angles were marginally steeper than site A and the clay layer above the mudstone is probably thicker at this location than at site A.

Because of the location of the site, its probable greater thickness of clay and its dampness, site B is considered to have a greater potential for landslip failure than site A. The type of failure likely to occur is a valley head collapse in the clay above the mudstone 'bedrock'. The possibility of this type of failure is likely to be increased by a house because of the increase in amount of water going into the ground from the septic tank, sullage and stormwater.

Site A has the advantage of being higher on the slope, with probably less clay present above the mudstone, and appeared from the surface to be dry.

Because of the size of the proposed house both sites will require a backhoe trench to confirm these conclusions. If site A is accepted a backhoe trench will still be required to be dug to the mudstone to ascertain the thickness of clay and its dampness before the site can be recommended to the Lilydale Municipality and the Tamar Regional Planning Authority.

Further investigations

Following the selection of site A for the proposed house a trench was dug and samples taken for testing in the soil laboratory.

The laboratory work appears to confirm the field and subsurface observations from the trench dug that this site is a sensitive area with a potential for slope failure if proper care is not taken in siting and designing the house and also providing adequate subsurface drainage.

Surface evidence

1. A very old landslide of the valley head collapse type is present in the shallow valley in front of the proposed house site.
2. This type of landslide extends by valley head collapse and with subsidiary head scarps occurring on its flanks or shallow tributary depressions.
3. The slope in front of the proposed house has potential for such a subsidiary head scarp.
4. These old landslips are shallow translational slides with failure occurring on the contact zone between the weathered mudstone and the overlying clay. The mudstone is hard, even though weathered, and is generally the point of refusal of a backhoe.

Subsurface evidence

1. In the trench dug to a depth of 2.5 m a surface organic clay soil layer of 0.3 m was exposed, underlain by 2.0 m of grey and orange clay, overlying weathered mudstone.
2. The soil layer and upper clay layer was dry and hard except at its basal contact zone of 0.5 m where it was soft and moist.
3. The contact zone clay has the lowest strength as shown by the pocket penetrometer.
4. The contact zone between the rock and clay made the 75 mm of water in the 45 minutes that the trench was left open.

Laboratory tests — Results

1. The clay in the contact zone appears to have the highest plasticity.
2. The shrinkage and expansion of the clay appears to be in the order of 18–20%.
3. Montmorillonite clay, the weakest clay mineral because of its high swelling factor and low shear strength, has been found to be present in the contact clay sample and the sample above by induced X-ray diffraction testing.
4. Shear testing of the samples is yet to be completed.

The evidence confirms that the house should be placed as far back from the slope as is practicable. The load should be minimised and spread as much as possible on top of this slope, within the design and site limitations, e.g. a slab foundation and having only light structures such as patio and verandahs etc. in front of the house close to the slope. The amount of water soaking into the ground around the house should be kept to a minimum by siting the septic tanks and sullage pits away from the house, and off the slope in front of the house.

Any retaining walls built behind the house should be well drained, with abundant seepage holes and gravel packing behind the walls with the water collected and drained off the house site.

[21 December 1981]

APPENDIX 1

Laboratory testing

The full Laboratory tests on the samples of clay collected from the proposed house site near Lalla have been completed.

The shear box tests do not alter what was stated in the main report. These tests gave a high angle of friction for the samples tested of 33 to 34°. This is a very high angle for the Lilydale clays tested to date, and would indicate that this bank has not failed as the field geology clearly shows. The presence of montmorillonite as the dominant clay mineral gives ample reason to be very cautious, especially as the linear shrinkage of the three clay samples is 18 to 19%. The liquid limit is average. With complete saturation the clays, with a 2.4 m thickness, have a theoretical potential movement of 0.4 metres.

These tests illustrate the problem associated with this site, and the necessity of keeping water off the site. Good drainage is the key to the problem, as stated previously.

[18 March 1982]

SOIL LABORATORY RESULTS
DEPARTMENT OF MINES TASMANIA

Samples: Test pit, Bryce's proposed house site

Sample No.	*Depth (m)*	*Liquid Limit (%)*	*Linear Shrinkage (%)*	*Shear Box Test*	
				Friction angle	*Cohesion*
S_2	0.6	73	18	33°	8°
S_3	1.8	74	19		
S_4	2.4	67	18	34°	4°

S_I surface organic soil layer not tested (sandy soil)

XRD

S_2 Montmorillonite, kaolinite, trace illite
S_3 Montmorillonite, kaolinite, trace illite