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1986/13. Examination of a development proposal for a former clay pit site, Kings Meadows

B.D. Weldon

Abstract

A former brickmaking clay pit was examined to assess the impact of residential development upon the stability of the land. A slope below a former landslide area and the area in the vicinity of the former quarry face were identified as unsuitable for development. The presence of fill and sheetwash materials on the property indicates that careful consideration should be given to the design of building foundations and their approval.

INTRODUCTION

A geological assessment of property owned by Clifton Brick Pty Ltd at Kings Meadows was requested by Campbell Smith, Phelps, Pedley Pty Ltd. The area of concern is a former clay pit from which materials were mined for brickmaking purposes. A residential development is proposed on a portion of the property with the balance being given over to public open space (fig. 2).

The majority of the property has gently sloping to undulating slopes. A subvertical quarry face, about 10 m high, occurs in the north and north-eastern section of the property with a rolling to strongly rolling slope to the north and north-west. The area is classified as landslip Zone II (*i.e.* stable ground but on soft rocks) on the advisory Tamar Valley Landslip Zone Map sheet 3878. A landslip Zone IV area (old landslides and adjacent areas) occurs to the north and north-west of the property (fig. 1).

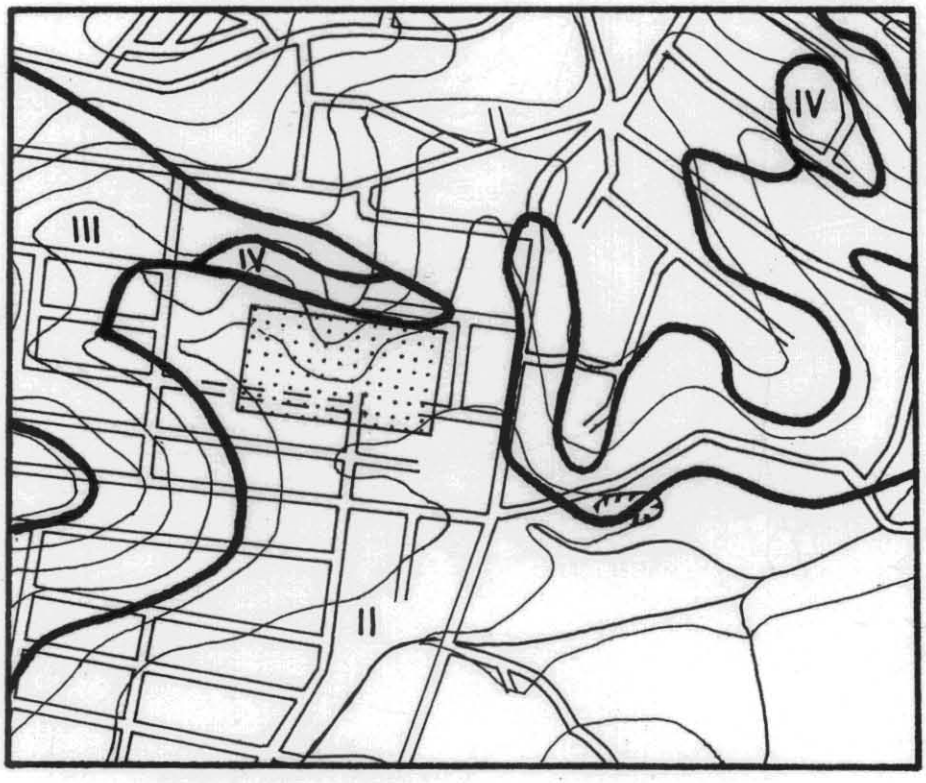

Figure 1. *Location of site and landslip zones.*

5 cm

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SITE INVESTIGATION

Several back hoe test pits were opened and examined on 6 December 1985. The locations of these pits are shown on Figure 2. In general the pits encountered from the surface a variable thickness (90-1200 mm) of fill or sheetwash materials derived from erosional processes within the clay pit. This is underlain by the Tertiary age Launceston Beds.

The fill and sheetwash materials have variable but usually very low to low unconfined compressive strengths (10-25 kPa). This material is unlikely to be suitable as a road foundation and may require excavation and either be relaid with suitable compaction if not too wet, or be replaced with imported materials. Building foundations should not be founded in this material as it is likely to be:

- susceptible to overloading and thus failure
- easily eroded
- susceptible to piping failure
- potentially a very high shrink-swell material
- poorly drained

The Launceston Beds are variable in composition, ranging in the test pits from very high plasticity, very high shrink-swell potential clays through medium plasticity sandy clays to minor beds or lenses of sand. The clayey materials have an unconfined compressive strength in excess of 100 kPa immediately beneath the fill and sheetwash materials, increasing to usually in excess of 200 kPa some 500 mm below the fill or sheetwash materials. The sand is medium dense.

The Launceston Beds should prove adequate for road foundations and have sufficient bearing capacity for normal residential development.

A dark grey sandy layer was encountered at about 1.8 m depth in test pit 5. This layer is associated with wet orange sandy clay, clay pellets, and banded clay. These materials appeared disturbed and are considered to represent former landslide debris. Given the proximity of the landslip Zone IV area, this is not unexpected.

DEVELOPMENT POTENTIAL

Several areas are considered unsuitable for development. These are:

- the area in the vicinity of the quarry face.
- the slope below the landslip Zone IV area.

In the former area, apart from the steepness of the slope, the risk of falls from the old quarry face obviously increases as the materials relax under the influence of weathering, erosion and gravity. Lots 26 and 27 (refer fig. 2) should be unaffected, although it would be prudent to site houses on these lots away from the private right-of-way. Development on the latter area may expose the old landslide debris, remove toe support, adversely load the slope, allow water ingress, *etc.*, all of which may contribute to destabilising the slope and reactivating the old landslide.

Figure 2. *Proposed subdivision of clay pit, Kings Meadows.*

The areas unsuitable for development are delineated on Figure 2.

DISCUSSION

The property is not a natural site, having been used by an extractive industry. The natural drainage has been interfered with. In places the slopes have been partially groomed. Residential or similar development should be possible but it must be kept in mind that the site is an artefact and not a natural site. House foundations need to be properly engineered as portions of the site (and possibly individual allotments) are covered with fill and sheetwash materials which have little mechanical strength and lack the texture and structure of natural soils. Subsurface drainage will be haphazard and is likely to be controlled largely by depressions created during mining operations.

A co-ordinated approach is needed with respect to drainage, landscaping, soil improvement, slope grooming, and foundation engineering. With this approach more extensive residential development of the site should be possible. A detailed site investigation to delineate the extent of the former landslide debris below the landslip Zone IV area may allow some development on this otherwise excluded area.

CONCLUSIONS

The proposed development of Lots 10-24 and Lots 26 and 27 is possible.

Due to the occurrence of poor quality materials, such as fill and sheetwash materials, on the property the foundations for any buildings should be prepared by a civil engineer and diligently inspected during construction.

More extensive residential development of the site in the first instance would be limited to the area delineated on Figure 2. This area could be extended onto the slope below the landslip class IV area upon the favourable completion of a more detailed site investigation into the stability of the slope.

[8 January 1986]