

Examination of a road failure, Deviot Road

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In response to a request from the Beaconsfield Council a failure of the Deviot Road, in the Brickmakers Point area north of Deviot, was examined on 31 October. The failure consists of a subsidence of the road pavement combined with slippage and wholesale instability of the plastic clays between the road and foreshore. In addition to damage, the road drainage has been severely distorted and the main water supply pipeline damaged and placed in jeopardy.

Geology

The failure occurs on the road north of Deviot adjacent to a property owned by Mr T. R. Hodgetts. The road, and Mr Hodgetts property, is underlain by Tertiary clays but basalt occurs on the slopes behind Mr Hodgetts property and some talus and soil from the basalt have moved downslope to partially cover the Tertiary sediments. Springs emerge from beneath the base of the basalt and a stream from one of these flows through Mr Hodgetts property.

The Tertiary clays are exposed between the road and the foreshore, and consist of highly plastic mottled grey clay which is completely saturated and mobile. Extensive slippage has occurred and is continuing. The disruption of the drainage and water from the damaged water main has kept the clays in a thoroughly water logged and mobile condition. Wedges of clay and disruption of the slope between the road and foreshore indicate fairly extensive past movement and recent cracks show that this movement is continuing.

Discussion

The present situation is of some concern as it is possible that very considerable damage may take place to the road before the situation can be rectified and the ever present possibility of the water main being completely ruptured threatens the water supply for the area and would also possibly result in a total loss of some 50 metres of road.

A permanent solution to the problems would be very expensive, but it is considered that if several lines of action are taken immediately a reasonable degree of stability may be achieved. The area will continue to need constant observation and remedial attention for the foreseeable future.

Recommendations

1. The water supply line should be re-routed around the top side of the slip. It should be replaced by preferably welded steel pipes laid above the surface and carefully inspected at frequent intervals. If the pipeline shows any sign of stress immediate additional work should be taken to safeguard it. A disturbing feature of the present situation is that local residents report that on occasions recently the pipe has been ruptured and large quantities of water have therefore been allowed to enter the slip area.
2. Mr Hodgetts has two outlets of water from his property, the creek from the spring and his domestic drainage. It is recommended that these be combined and piped to the south off the slip area, an adequate culvert is necessary under the road to carry this water and it

must be piped to the foreshore. These pipes should also be laid above the ground surface and constantly inspected.

3. The continued saturation of the clays below the road has created and is perpetuating the present instability. Local residents report a similar situation existed about 20 years ago and that it was rectified by reconstruction of the road, table drains and culvert. The same procedure, carefully carried out and maintained, appears to be the most economic solution to the present slip, however it must be recognised that the failure is of long standing and geological conditions are such that no guarantee can be given that a permanent solution will be effected. However with care and careful maintenance it is reasonable to expect a further 20 years or so before similar failure occurs again. The object in designing the reconstruction should be to keep as much water out of the area of saturated clay as possible. Where water has to be passed under the road it must be piped to the foreshore and not allowed to continue to saturate the clay.

In outline the procedures recommended are:

1. Carry out (1) and (2) recommended above.
2. Reconstruct the culvert and pipe all effluent from it to the foreshore.
3. Reconstruct the road to a proper alignment and grade.
4. Reconstruct table drains and make them impermeable by use of concrete, plastic or any combination of suitable methods.
5. Consideration should be given to picking up the source of much of the water which lies in the springs below Mr Hodgetts property. This water could be conveyed by drains to areas north and/or south of the present slip. If this is carried out the water should be carefully channelled down under the road to the foreshore by surface conducts and suitable pipes. If it is simply transferred to another area and allowed to spill out onto the clays it will simply transfer the existing problem to another area.

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