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Geological and land stability assessment: Lake Fenton pipeline

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INTRODUCTION

An assessment of the geological conditions along the eight kilometre section of the Lake Fenton pipeline between Barossa Reservoir and Waterworks Reserve has been completed. The investigation sought to provide basic information on the geology of the areas through which the pipeline passes and in particular, areas of potential or known instability.

The survey involved a preliminary half-day traverse over areas where it was considered there may be a potential for instability. This was subsequently followed up by a joint on-site inspection with the Hobart Regional Water Board's Mr C. Barnard to view specific sections of the route.

GEOLOGY

The provisional 1:25 000 scale engineering geology map of the greater Hobart area (Hofto, 1990) shows that the pipeline passes through a variety of rock types; their distribution is indicated in Figure 1. Jurassic dolerite underlies some 65% of the route, Triassic sedimentary rocks 25%, with Tertiary and Permian sedimentary rocks making up the balance.

The now ageing pipeline is reportedly buried with an average of about 1.0 m of cover and it is likely that the majority of the pipe will be located in the soil profile overlying bedrock. The physical properties and characteristics of the parent soils vary between rock types. Typically, the dolerite, Triassic and Tertiary sedimentary rocks form high plasticity expansive (reactive) clay soils. The potential for landsliding can occur on any moderate to steep slope with good soil development but is most prone in dolerite materials. Gully and tunnel erosion is not uncommon on cleared slopes underlain by Tertiary, Triassic and Permian sedimentary rocks.

SLOPE STABILITY

Whilst there appear to be few geological hazards along this section of the Lake Fenton pipeline that are considered to be of any real concern, there are isolated areas where the potential exists for problems to occur.

Existing slope instability and areas of potential instability are evident along sections of the pipeline between Lower Waterworks Reservoir and Romilly Street. These areas are indicated as sites 1 to 3 on Figure 1. A probable fossil landslide, some 200 m in length and 150 m across, was recognised from aerial photographs; the pipeline crosses this currently dormant feature approximately between chainages 350 and 500 m commencing from the Waterworks Reservoir (Site 1) . There are no obvious signs of active movement associated with this feature, but factors such as cut and fill, trenching, or removal of material from the toe region of a landslide is generally detrimental to the long term stability of the slope.

Evidence of a second landslide feature is readily apparent on the slope segment between the pipeline and the rivulet approximately between chainages 600 and 700 m (Site 2). It would appear from field examination that a series of shallow, recently active landslides (earth flows) has developed parasitically in the toe region of an older failure. These recently active features occur in close proximity to the existing pipeline and have the potential to develop further upslope and threaten the pipeline. The dimensions of the older failure are not known; the headscarp region was not determined during the field inspection.

A further potentially hazardous area is the steep slope segment prior to where the pipeline enters Romilly Street (Site 3). This area is underlain by relatively unconsolidated dolerite talus and under saturated soil conditions, there exists the potential for small-scale shallow earth flow type movement.

The steep slope segment between the Hobart Rivulet and Forest Road warrants comment (Site 4). The existing steel pipe is currently exposed in several places. The slope is underlain by dolerite talus which was observed to have a thickness in excess of 2.0 m in several places. There was no sign of bedrock cropping out, and although there were no signs of landsliding, the potential exists if the soil profile becomes saturated.

Two other locations along the pipeline were briefly inspected at the request of Mr Barnard. The first of these was in the vicinity of Newlands Avenue Reservoir (Site 5) where the pipeline passes close to the cut on the northern side of the Benjafield Terrace recreation oval. The cut exposed a typical weathered dolerite profile and it is unlikely that failures will occur in the cut and affect the pipeline.

The final site inspection occurred where the pipeline crosses New Town Creek along Lenah Valley Road (Site 6) . Again the area is underlain by dolerite, and although the slope is relatively steep, it is not anticipated that stability problems are of any real concern over this section.

In conclusion, geological hazards are relatively few and are restricted to small segments of the pipeline, however, there is the potential for landslides to re-activate or develop under certain circumstances.

REFERENCES

HOFTO, P. 1990. *Urban Engineering Geological mapping Project. Map 1. Engineering Geology Greater Hobart Area*. Division of Mines and Mineral resources Tasmania.

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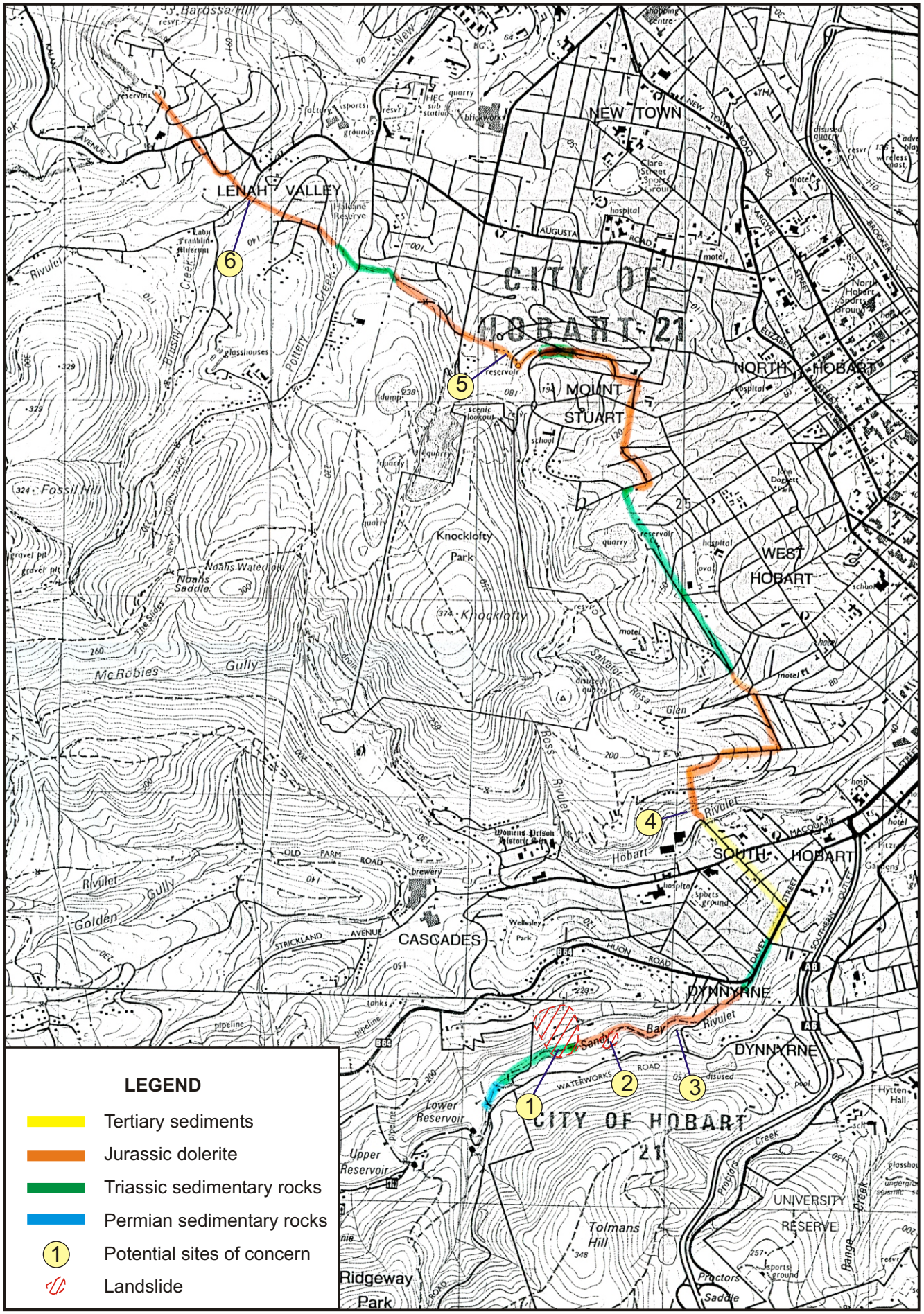
LEGEND
Tertiary sediments
Jurassic dolerite
Triassic sedimentary rocks
Permian sedimentary rocks
1 Potential sites of concern
Landslide
LENAH VALLEY
NEW TOWN
CITY OF HOBART
MOUNT STUART
NORTH HOBART
WEST HOBART
SOUTH HOBART
DYNNYRNE
CASCADES
Knocklofty Park
Fossil Hill
Noahs Saddle
McRobies Gully
Golden Gully
Rivulet
Ross Rivulet
Sandy Bay
Lower Reservoir
Upper Reservoir
Tolmans Hill
Ridgeway Park
UNIVERSITY RESERVE
Proctors Saddle
Hytten Hall
1
2
3
4
5
6

Figure 1