

**GEOLOGY AND EXCAVATION CONDITIONS AT THE ALVERSTONE TO
FRASER'S RD 400mm TRUNK MAIN.**

To: Ms. Leisel Bowes: Water Design, Prior Rd.

From: Dr. T.E. Francis.

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1. INTRODUCTION.

A drive-over survey was conducted to observe soil profile exposures in the vicinity of the proposed pipeline route. Sufficient information was obtained to map the geology and estimate likely variations in soil and rock hardness for calculation of quantities.

2. GEOLOGY.

The pipeline route is underlain by quartzitic and feldspathic sandstones of the Natal Group, with the rock being moderately to deeply weathered over the entire route. Localised intrusions of Karoo dolerite may occur in places, usually deeply weathered to a red clayey soil overlying yellow-brown saprolite. Soil profiles overlying bedrock consist of deep, mature soil profiles of reddish brown to grey brown sandy clay or clayey sand soil overlying mottled to lateritic clay that grades into highly weathered bedrock. Localised landslips occur in road cuttings that are oversteep, triggered by heavy rainfall.

3. DETAILED DESCRIPTION OF GEOLOGICAL AND EXCAVATION CONDITIONS.

From Gevers Road intersection down Assagay Road to Kassier Road.

This section crosses moderately steep ground underlain by deep, sandy clay to clayey sand soils grading into firm, medium weathered sandstone bedrock. Estimated excavation classes as defined under contract specifications part DB are 0-0.8m soft, 0.8-1.8m hard and rock >1.8m. Localised zones of harder, fresher sandstone bedrock may occur at shallower depths where the route crosses steep convex slopes.

Kassier Road to Bona Terra Road intersection.

The low-lying valley bottom area between Hlupeka Place and Bona Terra Road is drained by a gully flowing through a culvert under Kassier Road. High water conditions occur, with seepage flowing through sandy soil layers. Very rapid sidewall collapse will follow excavation, requiring the use of temporary lateral support, or stream deviation with dewatering. Average excavation classes will be 0-1.5m soft, 1.5m-2.6m hard and >2.6m rock

Up Assagay Crescent to Alverstone Road.

This section crosses relatively steep ground underlain by moderately deep, sandy clay to clayey sand soils grading into firm becoming hard, medium weathered sandstone bedrock. Estimated excavation classes as defined under contract specifications part DB will be 0-0.8m soft, 0.8-1.6m hard and rock >1.6m. Localised zones of harder, fresher sandstone bedrock may occur at shallow depths where the route crosses steep convex slopes. The steep slope

below the Assagay Crescent in the vicinity of Kingfisher Lane is subject to soil creep, as shown by tension cracks along the asphalt road surfacing. Soils in the pipe trench base may be very loose, requiring excavation and compaction in thin [200 mm] layers.

Alverstone Road to Fraser Road tie-in

This area is underlain by deep, sandy clay grading into soft to firm, highly to medium weathered sandstone bedrock. Estimated excavation classes as defined under contract specifications part DB will be 0-0.9m soft, 0.8-2.2m hard and rock >2.2m.

COMMENT ON BEDDING AND BACKFILL.

Materials excavated from the pipe trench will comprise sandy clay, fine clayey sand and soft to firm, clayey sandstone rock. In built-up areas these materials are normally unsuitable for pipe bedding unless sieving or secondary crushing is carried out on site. However, much of the soil and weathered rock will be adequate for backfilling above the pipe, provided individual rock block size does not exceed 2/3 of fill layer thickness, or about 140 mm. These normal requirements could be relaxed for the open field conditions through which much of the pipeline will be laid, provided settlement of the trench backfill is tolerated. It will be necessary to use selected, non plastic to slightly plastic, granular material compacted to high density for backfill under any road or driveway crossings to prevent ground settlement and lateral creep that may lead to loss of lateral support.

Many existing road cuttings in Assagay Road are oversteep, being battered at angles of more 45 degrees to the horizontal. Slip scars indicate that previous small landslides have occurred on these slopes during high-intensity storms. After pipe laying and trench backfilling all finished slopes should be trimmed to angles not exceeding 34 degrees [1v:1.5h] in cut and 26 degrees [1v:2h] in fill to ensure that they remain stable in the future. This recommendation is also applicable to Assagay Crescent, in the vicinity of Kingfisher Lane.

Dr. T.E. Francis.