

35. Proposed dam site on Castle Forbes Rivulet

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A preliminary geological and refraction seismic investigation of a proposed dam site in the headwaters of Castle Forbes Rivulet was undertaken at the request of the Rivers and Water Supply Commission.

The headwaters of Castle Forbes Rivulet are covered with forest, most of which is very thick regrowth. Over a considerable area of the proposed reservoir the original tall trees have been felled and then left. Subsequent fires, followed by several periods of regrowth, have made this particular area almost impenetrable.

Such vegetation in a flat basin makes the detailed geological mapping required for a serious dam site investigation extremely difficult without a considerable amount of clearing and track cutting. The finance available for this type of work was limited to improving the access track to an all-weather, four wheel drive vehicle track, and to the clearing of a line across both abutments of the site and 240 m upstream along the western bank in the reservoir area for seismic spreads. Elsewhere old timber tracks were used for seismic spreads and access for traversing (fig. 31).

GEOLOGY

No attempt has been made to draw a geological map of the area since only four outcrops were found and because of the difficulty in accurately locating ones position when traversing in this type of country. Dolerite boulders frequently occur on the surface of the orange-brown clayey soil in the abutments area. Large dolerite boulders occur in the stream near the abutments and dolerite crops out downstream from the site on a sharp bend of the rivulet.

Small dolerite boulders are scattered on the surface in similar clayey soils in the reservoir area.

There are low, flat outcrops of dolerite in a patch of partly cleared land at the end of the access track. Similar outcrops occur along the low divide separating Castle Forbes and Scotts Rivulets. Grey-white sands with some cemented sand blocks and a poor outcrop of grey-white clay overlying deeply weathered mudstone of suspected Permian age were found on this divide along the track to Benders Old Mill.

No outcrops were found during the traverse up Castle Forbes Rivulet but fine quartz sands were seen in the stream bed at the junction of the headwater tributaries. These sands are thought to have been derived from the Triassic sandstones known to occur on the forest road, north of Castle Forbes Rivulet and mapped by Ford and Mather. (Ford, 1954).

No outcrops were found during the traverse across the low col. on the western side where a potential leakage path into Scotts Rivulet valley is likely to occur. Seismic spread Reservoir 3 was located as close as possible to this col. with the view of trying to find the nature of the underlying rock at this locality.

SEISMIC REFRACTION INVESTIGATIONS (fig.31)

Four spreads each of 90 m and two cross spreads were fired on the abutment area of the site. In the reservoir area two further approximately parallel spreads were fired along the east and west banks of Castle Forbes Rivulet.

The third reservoir spread was fired near the col. area between the valleys of Scotts and Castle Forbes Rivulets.

Abutments Area

A surface layer with a seismic velocity of 600-900 m/s was recorded in all the abutment spreads: it was separated from a second 3,000 m/s, velocity layer by a distinct interface. In Spread 1 on the southern abutment the velocity for the second layer varied from 2,300-3,000 m/s. Higher velocities 4,500-6,000 m/s were recorded in many of the spreads with increasing depth.

The surface layer is thought to be a clay horizon containing dolerite boulders; the second layer weathered dolerite with open joints and the higher velocities probably represent compact dolerite.

The thickness of the surface layer varies from 12-1.5 m across the north abutment. The interface between the surface layer and the second layer follows the general slope of the ground, but occurs at shallower depth near the rivulet. The surface layer is thinner on the south abutment and varies in depth from 1.5-9 m: it is thickest at the break of slope approximately half way up the abutment.

Reservoir Area

The seismic velocity recorded for the surface layer 600-750 m/s in Reservoir Spreads 1 and 2 was similar to that for the abutments; the layer was 6-8 m thick. A velocity of 4,500-5,000 m/s was recorded for the second layer in Spread 1 and 2,700 m/s in Spread 2. The second layer is estimated to be 12-15 m thick in Spread 2 where it was underlain by a third layer with a seismic velocity of 5,500-6,000 m/s. The three layers are interpreted as clay overlying weathered and open-jointed dolerite overlying hard compact dolerite.

Seismic velocities higher than 3,000 m/s were not recorded in Spread 2.

Three layers were recorded in Spread 3 with seismic velocities of 600, 1,500 and 3,000 m/s respectively. The thickness of the upper layer varies from 1.5-5 m and that of the second layer from 15-18 m. A 1,500 m/s layer was not found in any of the other spreads: it may possibly represent very deeply weathered dolerite in the col. area. Alternatively, it is equally possible that the surface layer here is composed of sands and clays similar to those exposed on the track to the south-west which leads to Benders Old Mill, the second layer is weathered Permian mudstone and the third layer unweathered Permian sediments.

CONCLUSIONS

Much of the Castle Forbes basin is underlain by a thick deposit of clay with dolerite boulders - probably produced by deep weathering and solifluxion in the Pleistocene.

Dolerite underlies this clay on the abutments and in the reservoir area and crops out above the north abutments and to the south-west of the reservoir area. More of these outcrops probably occur in the reservoir area but were not located.

Permian mudstones probably occur on the col. in the western part of the reservoir area and to the south-west. These may occur as 'windows' as mapped by Ford in the neighbouring Scotts Rivulet. Alternatively the dolerite

may be thin on the divide between Scotts and Castle Forbes Rivulets and has been removed by erosion in the col. area. The contact between the dolerite and Permian sediments as mapped by Ford in the headwaters of Scotts Rivulet may extend across the divide into the western col and the south-western section of the reservoir area.

RECOMMENDATIONS

If this dam site is to be considered as a viable economic project further finance is needed for more bulldozing and track cutting in the area.

The minimum amount of work needed to bring this site investigation from its present reconnaissance stage to a preliminary feasibility study would require:

- (a) Two diamond drill holes to be drilled on the abutment areas to prove the present seismic interpretation.
- (b) Seismic spreads on the west divide between Scotts and Castle Forbes Rivulets, particularly in the col. area. This seismic work would require confirmatory drilling.
- (c) Some cleaning and track cutting on the south-western section of this divide (above the south abutment area) to allow further geological mapping. Also some survey and level lines should be run in this area because the present contours are thought to be in error in this section of the Basin.

REFERENCES

FORD, R.J. 1954. The geology of the Franklin-Glendeview area. *Pap.Proc.R.Soc. Tasm.* 88:153-159.

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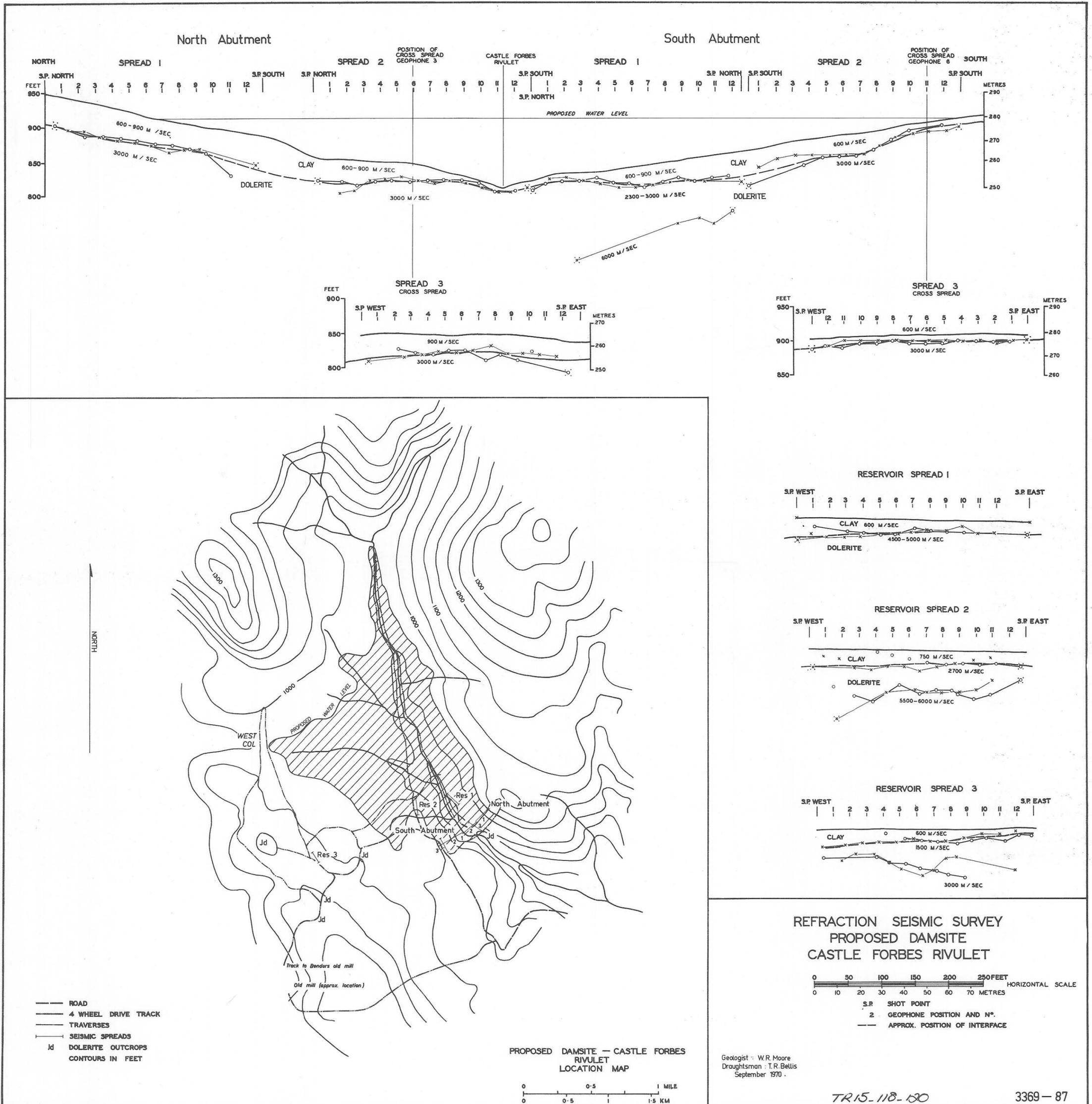


Figure 31.

