



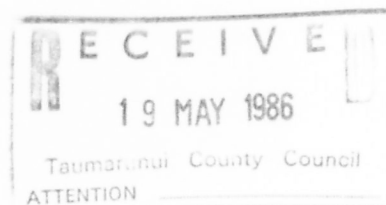
CARRYER & ASSOCIATES LTD.

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REPORT ON THE GEOTECHNICAL
ASPECTS OF THE WHAREROA VILLAGE
SUBDIVISION, LAKE TAUPO



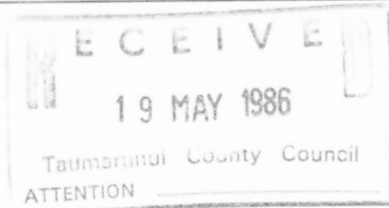
FOR: BLANCE & ASSOCIATES
TAUMARUNUI

BY: CARRYER & ASSOCIATES LTD
CONSULTING GEOLOGISTS
BOX 15483
AUCKLAND 7

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156/0764



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INTRODUCTION

On the instructions of Mr I Blance, Blance & Associates, Taumarunui, the writer visited the site on April 21, 1986 and carried out a walk over survey. An inspection of the topography, exposures of the subsurface materials and the lake front was made and the relationship of the lots to the landforms assessed. Copies of the Scheme Plan, aerial photos and the Council scheme statement were provided by Mr Blance for perusal.

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LOCATION

The site is located on the western shore of Lake Taupo on the south side of Whareroa Stream. It is described as part Hauhungaroa No.6A Block in Taumarunui County.

TOPOGRAPHY AND VEGETATION

The area is comprised for the most part of a gently sloping terrace, elevated some 18m above lake level. The face of this terrace falls steeply to low-lying flats near lake level. Above this a remnant terrace now appearing more as a broad ridge slopes up to the steep land beyond the area to be developed. The area is



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vegetated for the most part in grass but areas of scrub in the form of blackberry, broom, rosehip and lupin with some manuka and kowhai is to be found on the steeper slopes. Where stock have been excluded regenerating native bush is becoming established.

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GEOLOGY

Published data shows the area to be formed by pumice alluvium of Holocene age. My observations confirm that the lower terrace is of this material and indicate the deposits were formed by sediment from Whareroa Stream settling into the lake at a time when the level was some 15 to 20m above present.

To the south of the site the steep bluffs forming Rangitukura are formed by Haparangi Rhyolite of Pleistocene Age. The elevated ridge appears to be composed of a more competent material than the alluvium below and is likely to have been deposited as glowing avalanche material welding on deposition.

No sign of tectonic activity was observed in the deposits on the site. The Waihi fault mapped as forming the bluff to the north of the site is interpreted as lying some hundred metres offshore at this location.

ENGINEERING GEOLOGY

The materials that form the larger portion of the site consist of a variety of pumice sands and fine gravel with layers of silt. A thin cover of sandy topsoil



covers the formation. Where exposed these materials show signs of rapid erosion both by rilling and fretting under banks. Some evidence of subsurface erosion was evident on the steeper slopes but this could also have developed by other means. Extensive rill formation can be observed over the site and although these landforms are now almost all stable, several show signs of active rejuvenation where the grass cover has been broken. All the materials although quite loose are relatively stable in their natural form. Banks up to 2m high can be observed standing near vertical. These materials appear moderately dense in nature and no evidence of land movement of any significant scale was observed other than immediately above cut banks on steep slopes. No potentially compressable materials were observed below the top soil.

The permeable nature of the soils has precluded the development of any surface streams and it is expected that the ground water table is at considerable depth below the surface on all the elevated land. The rilled depressions noted above, indicate however, that considerable surface runoff results from concentrated storm precipitation.

DISCUSSION

My observations outlined above, confirm that the site is unlikely to suffer direct tectonic dislocation. No

*No test by
Carried out*



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faults are identified on the site so that any movement on faults mapped in this district will have only indirect effects on the site. Such impacts are unlikely to be any different than would be suffered elsewhere in the Taupo Basin.

The materials comprising the site are stable in their natural form and no reason was observed to suggest that the proposed development would affect such stability in any way. Provided standard engineering practice is followed in the design and construction of any buildings then these materials should form adequate foundations for these structures. The only potential problem identified, was from erosion resulting from the concentration of stormwater, particularly on the steeper slopes. The existence of rills right across the terrace does, however, indicate that there is a potential for such erosion over all the subdivision. During my survey I noted that on the road adjacent to lot 55, erosion is occurring and the gut formed will require a retaining wall to be built across it and backfill placed to rectify the situation.

I have discussed the proposed layout with Mr Blance and have been assured that all roading will collect stormwater which will be channeled to stormwater sewers. The roading layout generally running along the contour will effectively act to divert any downslope run off, so preventing concentrated downslope flow. Such design



will, in my opinion, effectively prevent the development of any stability problems from this source. Stormwater concentrations off house roofs and paved areas must be controlled to ensure their effective disposal. Disposal into the ground would be an effective method over most of the area, but on sites close to the crest of steep slopes, such disposal could precipitate subsurface erosion. The control of construction on such sites will need to take this factor into consideration.

To complete my survey, I inspected the lake foreshore to ascertain if any problems could arise from foreshore erosion. My observations are that a several metre wide accretional platform exists along the shore in front and for some distance either side of the area to be developed. This platform, nearly half a metre above present lake level, indicates that during a higher lake level, deposition occurred along all this foreshore. At present lake level an accretional berm is now being built indicating that this process has continued following a fall in lake level to that now observed. No reversal of this trend would be expected unless a substantial rise in lake level occurred. As the level is controlled for hydro electric operation such a rise is unlikely and problems from erosion of the foreshore are not contemplated.



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I note the District Scheme in section 26, entitled "Land Stability - Omori", has addressed the problems identified by me during my inspection of Whareroa Village. My impression is that the criteria adopted for Omori could be applied to Whareroa. In particular I note that very little of the Whareroa Village has a slope under 4° thus the provisions under 2603.1(b) of the District Scheme could be related to much of the terrace area. I note that the proposed control of stormwater from roads should be sufficient to meet the outlined requirements everywhere but at the crest of the steeper slopes.

Only a very limited number of residential sections are located on slopes in excess of 15° . These sections; 67-69, 88, 89, 131, 133, 143, 148, 149, 152-154, 156, 164-166; could only be developed with care and any proposal should be reviewed prior to issue of a building permit. Much of this area with slopes in excess of 15° is designated as reserve which should preclude any development which could be detrimental to stability. Planting of these areas in trees would further enhance the stability.

I note that a road (lot 513) cuts diagonally up a steep face with a slope in excess of 15° . Detailed engineering design to support and protect cut faces should be required to ensure the stability on the lots above is maintained. Also both the roads to the lake



front flats will require similar attention. Elsewhere in the subdivision I note several lots located across depressions along which stormwater flows are presently concentrated. Although the layout and the construction of roading will reduce flows through these lots, specific consideration of designs for any houses on these lots should prevent flooding becoming a problem. The lots noted as falling into this category are lots 61, 65, 94, 111-114, 124, 131 and 134.

Those lots on the crest of the steep slopes falling to the Whareroa Stream and Lake Taupo, will require controls on the location and/or type of building and method of stormwater disposal. It is my opinion that if any structure is proposed closer than 20m from the crest of these slopes, then detailed consideration as to the type of structure, its foundation design and the method of stormwater disposal from roofs and paved surfaces should be required. The lots affected are -: 1-3, 19, 21-23, 29-31, 55, 56-64.

Within the subdivision all slopes in excess of 30° have been retained for reserve. For the most part these areas are stable at present and could be left although such action could result in the rapid spread of noxious scrub. Planting of trees would enhance the stability and provide longterm protection against future misuse of these areas by inhabitants of the village. Several isolated locations are, however, currently suffering



erosion. Attention to these small areas and re-establishment of a ground cover should be a priority. Trenches for services could, particularly when directed down steep slopes, collect and channel water and promote subsurface erosion. To prevent this, trench breakers in the form of loosely filled bags should be installed. These bags should be of woven non-degradable material and the filling medium sand. The breakers should be extended to within 0.3m of the ground surface.

CONCLUSIONS

1. The proposed development of the site at Whareroa Village conforms with restrictions imposed by the geology of the area.
2. The site is currently stable and the development of housing with the proposed roading layout will tend to enhance this in all but a small portion of the area.
3. Within those parts of the area in which stability problems could arise specific control of house design and stormwater disposal will avoid any detrimental effects.
4. No known faults cross the area.
5. Accretion along Lake Taupo foreshore in front of this area will ensure that problems of stability will not develop from erosion of the toe of the terrace on which the subdivision is sited.



6. The engineering designs discussed with Mr Blance and outlined in this report should avoid the development of effects which could be detrimental to the stability of the site.

REPORT PREPARED BY:

S J CARRYER MSc., MAus. I. M. M.

April 22, 1986

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