

between the Waiuku and the Awarua to carry barges at a cost, for excavation only, of a little more than £100,000.

In April, 1915, Mr. Hamar, Engineer to the Auckland Harbour Board, utilized the information obtained by Mr. Wright, and also information obtained by Mr. J. B. Thompson, Chief Drainage Engineer of the Lands Department, and, adding to it soundings taken by the members of his staff, placed on record the data available on plans and sections deposited with the Marine Department and recorded as M.D. 4454. From the data thus recorded, and after an inspection of the locality, we have worked out two alternative proposals for connecting the Manukau Harbour with the Waikato River. One scheme is for a canal of a similar character to the proposed Tamaki barge-canal, carrying high water through the hill, and the other is for a railway to carry barges over the hill from Waiuku to the upper end of the Awarua, that stream being improved by deepening and straightening until it discharges into the Waikato. The suggestion for a barge railway was made in evidence by Mr. M. H. Wynyard, a member of the Auckland Harbour Board.

In both schemes it is proposed to impound the waters at high tide in the upper end of the Waiuku River by the construction of a bank across the channel at a point about 3 miles below the town of Waiuku, locally known as the Needles, where the Ohorua and Moeatoa Points approach to within about 450 ft. of each other. On the Manukau side of these points the channel has good depths. Some local Waiuku residents urged that the bank connecting the east and west sides of the Waiuku channel should be placed farther to the northward, but we are satisfied that the advantages resulting from this to the residents in the Awhitu Peninsula and to be obtained by closing a large area at high-water level would not justify the additional cost.

The bank at the Needles would contain a lock similar in dimensions to those proposed for the Tamaki barge-canal, so that the same-sized vessels could be navigated right through from the Waitemata to the Waikato. A roadway would be formed across the top of the bank, with a light rolling bridge across the lock, so that the settlers on each side of the Waiuku River would have a more direct road communication than at present, and a wharf would be provided adjacent to the lock.

The divide between the Waiuku and the Awarua only rises to a height of some 70 ft. above the datum of the Auckland dock-sill, which datum corresponds to a depth of 12 ft. 7 in. below ordinary high-water neaps, at which level (high-water neaps) it is suggested that the impounded water should be kept. It is proposed to place a lock on the Awarua side of the hill about 140 chains from the commencement of the cutting at Waiuku, at a point adjacent to where the main road would cross over the canal. At the Town of Waiuku a road would be closed and diverted so as to be carried, with another road, over the canal, and a high-level bridge would also be required to carry a county road across a point near the deepest part of the cutting. Between the Awarua lock and the Waikato River there would be required considerable dredging and excavation so as to straighten and deepen the existing creek. This would have a material benefit in assisting the drainage of the surrounding low-lying lands.

The estimate for such a barge-canal, including the land required, amounts to about £475,000 at present-day prices.

The alternative scheme would be for a railway of special broad gauge designed for a cradle adapted to carry barges having a dead-weight of 100 tons, and hauled by electric locomotives which would derive power from the public supply. The ground lends itself admirably to such a proposal, as moderate grades can be obtained at comparatively small cost for earthworks, and without entailing serious alteration to the roads, which can be crossed on the level. There could be obtained a rising grade of 1 in 75 from Waiuku to the summit, at a level of about 65 ft. above datum. For a length of about 10 chains at the summit the railway would be level, and a crossing-place would be provided there, with locomotive-sheds, &c. On the down grade to the Awarua there could be obtained three grades of 1 in 83, 1 in 200, and 1 in 75, finishing in a dredged canal to the Waikato River, as in the canal proposal. These schemes are shown in outline on the accompanying plan marked M.D. 5354/B [not printed]. The estimate for such a barge-railway and