

possibilities of an alternative site for treatment-works for the Southern District to that suggested in the report, and he expressed the opinion, in which we concur, that the requirements of a treatment-works site are as follows :

- (i) That it should be as near as possible to the main freezing-works, so enabling trade wastes to be treated while fresh.
- (ii) That it should be a gently sloping site on satisfactory geological strata. The latter requirement is desirable to minimize construction costs and difficulties.
- (iii) That it should be so placed that, if possible, a main outfall line across the Manukau Harbour near Mangere Bridge is eliminated.
- (iv) That it should have a minimum area of say, 60 acres to provide room for future expansion.
- (v) That it should not be unduly close to residential properties.

(b) Mr. Porter also stated that, having regard to these requirements, he had come to the conclusion that the most suitable site was on certain lands to the south of Favona Road Causeway at Mangere East, and he therefore proposed this site instead of the alternative sites at Mangere Peninsula and Southdown previously recommended. He pointed out that an advantage of the Favona Road site was that it would be practicable for the main collecting sewer (from Southdown to the site) and some of the sedimentation tanks and other works to be constructed in advance of the completion of the main scheme, so providing for early alleviation to some degree at least of the existing pollution of the Manukau Harbour. Mr. Porter proposed that the outfall should be in a tunnel or trench to a suitable point on the Mangere Peninsula and from there by pipe-lines on piles to an approved place in the Purakau Channel.

(c) In his evidence Mr. Porter also proposed certain alterations in the scheme for the drainage to Brown's Island. He stated that for technical reasons he thought it was advisable that the main pumping-station should be situated on the island instead of on the mainland, and he pointed out that this would involve the construction of a sewer in a submarine tunnel which would operate by gravitational flow to a deep pumping-well on the island.

(d) It will be convenient to mention here that evidence was given by Mr. C. W. Firth, Assistant Engineer of the Auckland City Waterworks and a professional geologist, as to geological matters in connection with the Board's schemes. This included an examination of the rock types and other geological features of the proposed submarine line from West Tamaki Head to Brown's Island, and of the results of the borings which have been made in connection therewith. His opinion is that, "provided it is kept below the depth of weathering, no unusual difficulty should be experienced in driving a tunnel to Motukorea in the Waitemata Series"—that is, the series of alternating sandstone and mudstone of mid-tertiary age. It would appear from the evidence that considerable investigation involving drilling over a wide area may be required before the final location of the tunnel can be determined, and that the decision should be made only following investigation by an engineering geologist, whose services should be retained during the whole of the construction period. Great care will have to be exercised in determining the level at which the tunnel is to be driven. It is not possible for us, on the information available, to make any recommendation as to the site of the tunnel, nor is it necessary that we should do so. We are satisfied, however, that, provided proper investigation is made and sound engineering construction practice is followed, there should be no difficulty in constructing a satisfactory tunnel.

(e) Mr. Porter also prepared certain other modifications of Scheme No. 1, but in the circumstances it does not appear to be necessary to refer to them.