Lake Hall.

This lake lies at an elevation of 2,625 ft. above the sea-level on the north shore of Gear Arm, Bradshaw Sound. It discharges into another small lake at a level lower by 25 ft. A dam at the outlet of this second lake should easily divert all water back into Lake Hall (unless the conditions are very unfavourable); and thus the water from a drainage-area of about seventeen square miles would be rendered available for a power scheme on the shore of Gear Arm. The combined area of the lakes in the drainage-basin is about 2·7 square miles, as shown on the maps, but no accurate survey of the locality has yet been made. With the rainfall probable in this locality about 40,000 to 50,000 b.h.p. should be available, if there were no loss of water by overflowing. It depends, however, on the height to which the lakes can be dammed whether this condition would obtain or not. The lake is about a mile from the sea. Supposing there is safe ground to carry a pipe-line, and good ground to drive a short tunnel through, this should be perhaps the easiest scheme to develop in the colony. It may be that at the high elevation of the lake frost would in winter seriously interfere with the supply of water. On this point no information is available. The conditions appear favourable for the establishment of electro-chemical or electro-metallurgical industries, either on the shore of the Sound at the power-station, or at the islands at a short distance opposite. Deep-water access to a power scheme of this magnitude for sea-borne traffic may yet be found of value.

There should only be a short length of mountainous country to cross with a transmission-line *via* Lake Cecil. If there is no pass, or the ground is unfavourable on this route, a line could be tried *via* Lake Hall, down Gorge Burn. This line need not rise higher than the level of Lake Hall, as the line could be taken through a tunnel if the mountains are too high. There would be a distance of about ten or eleven miles to traverse to reach the shore of Lake Te Anau; twenty miles along the south shore of the lake would bring the line to the outlet of Te Anau—in all a distance of thirty-one miles. The stability of the ground between the power-station and Te Anau outlet would be a governing factor as to the value or otherwise of the scheme for transmission purposes. From the outlet of Te Anau to Lumsden is forty-three miles, all on good country, and from this to Invercargill fifty miles, and to Gore thirty-seven miles. In the future such a source of power could be used for an electric-traction line to Te Anau and Manapouri, and from Lumsden onwards for all classes of industrial uses.

Lake Cecil.

I think investigation would show that Lake Cecil and the three lakes in chain with it would give a considerable amount of power. The lowest lake is given as 900 ft. above Lake Te Anau, and the distance from the lowest lake to the end of the South Fiord of Lake Te Anau appears to be barely two miles. The drainage-area is about fifteen square miles. A drive and pipe-line should be possible. The only question unknown at present is the stability of the hillsides. About 15,000 b.h.p. should be obtainable, or more, by damming the lakelets. The combined area of these is two and a quarter square miles approximately.

Lake Hilda.

This lake lies at a height of 1,190 ft. above Lake Te Anau. Lake Te Au and Lake Duncan drain into it. There appears to be a drainage-area of about forty-five square miles, and the area of the lakes is three square miles. The distance from Te Anau is about five miles. A drive of about this length and pipes should take the water to the same power-station site at the end of the South Fiord as the conduit from Lake Cecil. About 55,000 b.h.p. should be available.

The flow from the drainage-area of this system of lakelets should be considerably above the Te Anau average, and the same remark should hold good for the Lake Hall and Lake Cecil schemes. It is unfortunate that these schemes are not nearer to good country

Te Anau–Manapouri Lakes.

The first suggestion I made regarding these lakes was to utilise the difference of level between them, augmented as much as possible by raising the level of Te Anau by a dam. The second was to utilise the difference of level between Manapouri and the sea-level, at the mouth of the Lyvia River at the head of Smith's Sound. This latter scheme divides into two if the first is abandoned—one between Manapouri and Smith's Sound, and one between Te Anau and the head of George Sound, as the length of tunnelling on this latter route is likely to be less than on the Manapouri–Smith Sound route, and 80 ft. more fall is got for the Te Anau water. In connection with these latter schemes, I collected all the information I could get from the survey Department relative to the chains of lakes between the South Fiord, Te Anau Lake, and Gear Arm, Bradshaw Sound. The lakes are too high to be of any use to aid in connecting Te Anau with the sea, but a direct connection by tunnels is possible by this route.

The shortest distance between Lakes Te Anau and Manapouri is about four miles and a half. Te Anau could be dammed to a height of 50 ft. If 20 ft. of this height were devoted to giving extra head, and 30 ft. to storage, a very large power scheme would be possible. Two tunnels would be required to take the water. If lined, they would be about 26 ft. diameter. If it were found that the gneiss rock would stand without lining, the diameter would have to be about 32 ft. depending on the finish of the excavation. At the Te Anau end, the tunnels would begin a very short distance from the lake. At the Manapouri end there would probably be a short length of canal. At about 20 chains from the lake the terrace is about 100 ft. high above the lake-level. This would be at some height above the water-level at the end of the canal. The ground slopes to a low swamp. The power-station would be at the foot of the slope, and draw-off canals would be cut through the swamp for a length of about 12 chains to the lake. The power obtainable here may be put at 90,000 b.h.p. The cost of the dam, canals, sluices, pipes, and all accessory hydraulic works may be put at £2,100,000. Compared with