

MEMORANDUM for the UNDER-SECRETARY for PUBLIC WORKS.

Auckland, 1st September, 1899.

Opotiki-Rotorua Reconnaissance.

HEREWITH I send you (under separate cover) sheets Nos. 4 and 5 of the published four-mile-scale maps. On these I have shown, as requested in your telegram of yesterday's date, a possible route, in so far as my present knowledge extends, of the extension of my late Gisborne-Opotiki exploration to Rotorua.

I would have accompanied my report of 28th ultimo with this delineation had I had sufficient detail knowledge of the hills and broken country to be traversed to satisfy myself as regards even an approximation; but, as you deem it necessary, I have done my best to pick out a feasible route.

It will be gathered from my report that the location of the line between the Waioeka and Waiotahi, the rounding of the Ohiwa Harbour, the crossing of the Tarawera to the plateau of the lake-country, are the points on which I had no detail knowledge. I have drawn the line after a close study of the one-mile-to-the-inch section maps, but it is quite possible that considerable variations, even in the general location, may be necessary to get the proper grades and avoid expense.

JAMES STEWART.

APPENDIX J.

WELLINGTON-NAPIER RAILWAY.

REPORT ON ALTERNATIVE ROUTES FOR DEVIATION OF LINE IN ORDER TO AVOID THE FELL INCLINE OVER THE RIMUTAKA, BY MR. P. S. HAY, M.A., M.INSR.C.E.

Mr. P. S. HAY to the ENGINEER-IN-CHIEF.

SIR,—

Public Works Office, Wellington, 19th August, 1899.

I have the honour to make the following report on the various possible routes for the proposed deviation of the railway-line over the Rimutaka, to avoid the steep gradients and sharp curvature between the Upper Hutt and the Summit Station and the Fell Incline. This report is based on the results of Mr. J. H. Dobson's surveys and explorations, and on my own inspections of the country through which the proposed deviations *via* the Coach-road Saddle and the Tauherenikau would pass.

To avoid the Fell Incline a trial line was surveyed by Mr. Dobson, starting from a point about three-quarters of a mile beyond Kaitoke Station and ending at Featherston. This line follows the coach-road gullies; it has been levelled and cross-sections have been taken, so that the quantities and estimates may be taken as correct, except in so far as they might be altered by minor deviations of the finally located line. From about the two-mile peg on the above line a traverse has been run *via* the Tauherenikau River to Woodside Station, but only aneroid levels have as yet been taken along this route to determine the heights of the principal points.

To avoid the 1-in-35 grades and numerous 5-chain curves on the existing line from the Upper Hutt to Kaitoke, a trial traverse with aneroid levels has been run from the Upper Hutt Station along the slopes of the Hutt Valley and through a low saddle near Kaitoke into the Pukaratahi Valley, to join the Road Saddle and Tauherenikau routes near the Pukaratahi River; this is No. 1 line on the plan. A variation of this line, No. 2 on plan, has been run to get flatter grades and a crossing of Mungaroa Valley without a viaduct. These lines do not utilise any portion of the existing line. To ascertain if any portions of the existing line could be advantageously used, No. 3 trial line was run, and a variation of it, No. 4. The ruling gradient adopted in running all these lines was 1 in 60, and the sharpest curve allowed for was 10-chains radius. The gorge of the Hutt River was also examined to ascertain if it was possible to take the line *via* the Hutt River and Pukaratahi River to join the Tauherenikau or Road Saddle routes.

In addition to the above, Mr. Dobson examined a suggested route starting from the existing line at Ladle Bend and crossing the Rimutaka by Lucena's Pass. This he reports impracticable. He also examined a suggested route starting from the Mungaroa flats, and thence through the lowest country to Cross Creek and Pigeon Bush; this he reports impracticable, except with a five-miles tunnel. He also examined the proposed route *via* the Wainui-o-mata, Orongaronga, and Wairongomai, and confirmed Mr. Rochfort's condemnation of it. The length of line to be constructed by this route would not be less than thirty-four miles, of which over twenty miles would be on 1-in-40 gradient. It is evidently not a promising route, though it is urged in its favour that it would be better for settlement than any of the other routes, and would not cut off any of the country now served by the railway.

The trial line from Kaitoke to Featherston *via* the Road Saddle shows that a line can be got of the following general character: Grades—Kaitoke to the Summit Tunnel, 1 in 55; sharpest curve on this gradient, 10-chains radius; Summit level, 995 ft. above datum (present Summit 1,244 ft. above datum); length of Summit tunnel, 143 chains; grade in tunnel, 1 in 60, falling towards Featherston (in the final location this grade would be put all on the straight, a flatter grade being put where the curve occurs); grade tunnel to Featherston, 1 in 40; sharpest curve on this grade, 10-chains radius. In addition to the tunnel 143 chains long, the other works of any note are a bridge across the Pakuratahi River, also bridges over the Rimutaka, Tidswell's, Beal's,