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TASMANIA.

DELORAINE RAILWAY.

REPORT OF MR. W. T. DOYNE, C.E.

Presented by the Colonial Treasurer, and ordered by the House to be printed,
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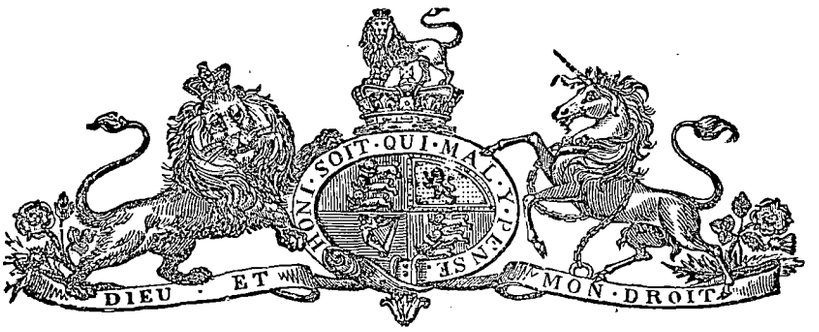

REPORT on the LAUNCESTON *and* DELORAINE RAILWAY, *by* W. T. DOYNE, M. INST. C. E., *February*, 1862.

Launceston and Deloraine Railway Office,
Launceston, 25th February, 1861.

GENTLEMEN,

I HAVE now the honor to report to you the results of the investigations that I have undertaken, under your instructions, upon the subject of a Railway between Launceston and Deloraine, and to present to you the plans and estimates that I have prepared for its construction.

The following will be found a convenient order in which to consider the questions involved:—

(*a*) The mode and the cost of constructing the Railway.
(*b*) The traffic which will be carried upon it.
(*c*) The expenses of working it.
(*d*) The conclusions to be drawn from the results of those questions.
(*e*) General observations on the proposed undertaking.

(*a.*) MODE AND COST OF CONSTRUCTING.

The plans which accompany this Report show the position of the line that I recommend you to adopt, commencing on the land enclosed by the flood-embankment on the north side of the North Esk River, at Launceston. I propose to construct the general station on that portion of the land which lies opposite to the present shipping wharf, and to construct the passenger and inland goods station on the portion opposite the Gas Works, making the frontage of the passenger station look into the George Town Road on the right hand, and the frontage of the general station on the River Tamar, below the Bar. These sites possess important advantages over any others that are available for the Railway Terminus at Launceston. The station for passengers and inland goods will be more conveniently situated with respect to the centre of population than in any other open space in the neighbourhood, except the Commissariat Store, which, besides being unsuited in form and extent, can only be reached by carrying the line along the public streets, or by purchasing a large area of building property at considerable cost. The site that I propose for the general station is the only one on which can be obtained the quantity of land required for the accommodation of the whole business of the Railway, and having the indispensable advantage of a river frontage. The distant separation of the departments of a terminus always seriously increases the cost and difficulty of management: but in the site chosen for the terminus in this case, that objection does not arise; for on the ground taken for the general station will stand the engine-sheds, carriage-sheds, workshops, stores, warehouses, and other buildings, while the shipping-wharves in connection with the Railway will form the river boundary of the terminus.

On leaving the passenger station, the Railway line crosses the North Esk River by a bridge at the bend above the Gas Works, passing over the glebe lands keeping to the

north of the Magazine and the Cemetery; crosses the St. Leonard's Road and the North Esk, near Hobler's Bridge; crosses the river again at the foot of the hill on which stands Captain Wettenhall's house; thence runs along the valley of the Esk past Mr. Clayton's house and up Jingler's Valley to the base of the range of hills reaching from Franklin, by Breadalbane, to near Evandale. The line ascends the slope of this range in a southerly direction; curves to the west through Mr. Kirby's farm; crosses the Evandale road near his house, and attains the summit of the range close to the South Esk River, on Mr. Stancombe's farm; thence it proceeds past Hunter's Mill, and through Perth; it crosses the junction of the South Esk and the Lake Rivers near Mr. Clarke's bridge, and crosses the junction of Wellington-street, Longford, with the road leading from Mr. Clarke's Bridge. From Longford, the line runs nearly straight to Westbury, passing near Mr, Clayton's lagoon, and crossing the road between Bishopsbourne and Carrick, about half way between them, leaving Hagley about three-quarters of a mile to the right. The line passes through the unbuilt portion of the Township of Westbury, at the south side of the town; thence to the south of Mr. Thomas Field's house, crossing the Deloraine road at Exton turnpike gate; and then, following the north side of that road, and passing north of Mr. T. K. Archer's house, terminates at Deloraine, on the land in the angle formed by the Meander River and the turnpike road, on the east side of Deloraine Bridge. The total length of this line will be 44 miles and 20 chains.

I am led to the adoption of this line by the following reasons:—the direct routes from Launceston to the Westward could not be traversed by a Railway without the introduction of gradients, which, if not quite impracticable for locomotive engines, could only be worked with them at great cost and inconvenience, and the direct route would afford the most limited amount of accommodation to the cleared and settled country; but, by the route which I have described, the gradients will be nowhere steeper than 1 in 70; the Railway can be constructed and worked economically, and will pass through and accommodate the Districts of Evandale, Perth, and Longford, and the settled country to the south of them; while it still affords full accommodation to the important places on the direct route, and is available to a large population who would have been entirely excluded by the more costly line.

The line which I have adopted is fourteen miles longer than the direct route; but the lightness of the works, and the improved gradients, more than counterbalance that disadvantage, and the increased length of line carries the Railway through a country offering a rich return in traffic.

My estimate for the construction of this Railway amounts to £364,351, or £8287 per mile; and includes all works, buildings, rails, rolling stock, stations, and terminal arrangements, and the engineering and management required to complete the Railway for traffic, and to maintain the works in good repair for one year after the opening. This estimate I believe to be most ample, and to be one for which competent contractors will be found to undertake the works.

My estimate provides for a single line of Railway, of the guage adopted in Victoria; five feet six inches between the rails; and provides for sufficient terminal buildings at Launceston and Deloraine, and eight intermediate stations, with double line of rails at each. This arrangement will enable the line to be worked with perfect safety and regularity, by the aid of the telegraph.

In view of the much greater cost of Railways in the adjoining Colonies and elsewhere, it may at first sight be doubted whether this estimate will be sufficient; and it is therefore necessary that I should explain the causes which enable this Railway to be so cheaply constructed. A comparison of the sections of this line with those of the Railways in Australia and in England will demonstrate that the earthworks here are in amount only about one-third of the average of those countries. Indeed, with the exception of the few miles at the back of the Cocked Hat range of hills, where there are some heavy cuttings and embankments, the earthworks are unusually easy, and for about twenty miles the line will follow the natural surface of the ground so nearly that the works will be reduced to the very minimum, requiring only levelling

and the laying of the permanent way. The Railways in Australia have been executed in a most expensive manner, and much of the works contracted for at a time when labor was at nearly double the present rates. For example, on the Victorian Railways, broken stone ballast has been paid for at eighteen shillings, and even now costs ten shillings a cube yard, while here the ballasting can be done at half-a-crown a yard, because the line passes through fine ballasting gravel. The items of expenditure on English lines embrace many that form a very considerable addition to the costs of those lines, but which form no part of the requirements of this line, and are consequently entirely saved; while many other items, as for example, parliamentary and law expenses, and land compensation, have been enormous on English lines, and here will be but trifling in comparison. In England the number of bridges carrying public and private roads over and under the Railways usually amounts to about three in a mile, equal to at least a hundred bridges in the length of this Railway; but between Launceston and Deloraine there is not one bridge for this purpose, while the bridges for all other purposes only amount to eight in number, and may be almost all cheap wooden structures.

In Europe and in Australia the Stations are usually constructed of stone, brick, or other permanent material, and built on a grand scale. Here I only propose to build the simplest and cheapest Stations that can be made to answer the purpose, and in all the works to limit the expenditure to essentials, devoting no money to mere ornament.

Comparison of the following items of expenditure on the Irish Railways with those on this Railway will further elucidate the question of comparative cost. In a paper read by Mr. Hemans, the Engineer of several Railways in Ireland, before the Institute of Civil Engineers, in 1858, he divides the expenditure on ten of the principal Railways in Ireland into the following items, of which I give the averages in £ sterling, and the amount due to each item by the Launceston and Deloraine Railway:—

	Ireland. Per Mile.	L. & D. Railway. Per Mile.
1. Preliminary Expenses, Act of Parliament, &c.	231	70
2. Land and compensation	1,627	50
3. Contract works	6,924	3,629
4. Permanent way	2,738	2,684
5. Stations, sheds, and workshops	782	500
6. Rolling stock	1,254	682
7. Engineering and survey	421	400
8. Law and valuing	540	50
9. Sundries and interest	1,096	1,000
10. Direction and office expenses	335	114
Total	£16,048	£9,179*

It is perhaps unnecessary to call attention to the great reduction of items 1, 2, and 8. Item 3 embraces in Ireland the cost of the numerous bridges before referred to, and also includes tunnels and viaducts, of which there are none of the former, and only one small viaduct on this line. This item is greatly increased by the heavier character of the earthworks on Irish Railways, and by their being constructed generally for double lines; for this last reason this line is greatly below Irish lines in cost, the line being single throughout, except for a short length at each Station. In items 5 and 6, it is to be observed that the Stations are, on Irish lines, of far more expensive character than it is intended to construct here.

It can now be more easily understood how this Railway can be constructed at so cheap a rate—the high price of labor in these Colonies notwithstanding. My estimate provides for a rate of expenditure two, three, or even four times as great as English prices of labor; but the extraordinary facilities afforded by the line of country that I have selected, more than counter-balance that sort of increased cost. The quantity of work required to be executed for this Railway is much below the easiest forty miles of Railway I have ever seen; even the so-called level plains of Bengal are traversed by a Railway having works three times as heavy.

* The item interest is not included in my estimate *ante*.

Under the head of Permanent Way are included the iron rails, joint-plates and fastenings, the sleepers, the ballast, and the labor of laying them. My estimate has been made for the following system of permanent way, which I recommend in this case for its safety and economy. The rails to be of the pattern usually known as American or contractor's rails, having one wearing surface and a broad base to rest upon the sleepers; the rails are united longitudinally by wrought iron joint-plates, fixed by bolts and nuts through the ends of the rail; the rails rest on transverse wooden sleepers, to which they will be spiked, and the sleepers embedded in gravel ballast eighteen inches deep. The rails and joint-plates will weigh 70 lbs. a yard.

In my estimate for Rolling Stock I have provided for six locomotive engines, at a cost of £2,500 each, erected on the Railway. These will give sufficient power to work the line in the beginning, but additions to their number will have to be made as the traffic is developed. £15,000 will amply supply carriages for passengers and goods, but the apportionment of this sum to the different classes of carriage need not be gone into at present.

I propose to devote to stations, sheds, and workshops, £21,000. At Launceston, £12,000; Deloraine, £3,400; and £5,600 to the eight intermediate Stations, at St. Leonard's, Evandale Road, Perth, Longford, Bishopsbourne and Carrick Road, Hagley Road, Westbury, and the *Marsh Inn.*

Direction and Office expenses, under the system that I recommend in another part of my Report, should not exceed £5,000 during the construction of the line; equal to about £120 a mile.

The Government and the Landed Proprietors are so deeply interested in securing the construction of the Railway, that I assume that they will readily give all the land required, without making a charge for it; and I have, therefore, only included in my estimate a sum sufficient to compensate tenants and small holders. With this expectation in view, the line has been laid out so as to avoid all property of a higher value than ordinary agricultural ground.

(*b.*) The Traffic to be Carried.

Having considered the cost of making the Railway, it becomes my next duty to enter upon the question of the amount of traffic reasonably to be expected upon it in the first year or two after its opening. The means at my disposal are the Custom-house Returns of Exports from Launceston; a Return of the Passengers and Goods passing through the Launceston Turnpike gates for a year between May 1859 and June 1860; and some valuable information collected and communicated by gentlemen acquainted with the essential requirements and resources of the districts through which the line passes.

The Custom-house Returns show that in 1858, 1859, 1860, and 1861 respectively, there were exported the following quantities; appearing in the original return in bushels, but reduced here to tons for convenient comparison:—

	1858.	1859.	1860.	1861.
Wheat	6060	4957	4176	6836
Oats	5051	6889	9008	7788
Barley	109	23	89	41
Flour	4486	3513	1843	2413
Potatoes	2025	5656	4212	5950
Wool	1010	1041	978	904
Bark	287	776	908	505
Hay	694	284	36	152
Bran	349	339	402	376
Butter and Cheese	30	87	76	106
Tons	20,100	23,565	21,728	25,071

And the same returns show that the value of the Exports and Imports in those years was—

	1858.	1859.	1860.	1861.
Exports	£617,054	£639,351	£483,908	£455,990
Imports	£517,426	£501,510	£443,792	£ 53,360

The return of traffic for one year at the Turnpike Gates on the Westbury and Hobart Town roads, shows:—

	TONS.
Wheat, Oats, and Barley	15,047
Flour	3,877
Potatoes	677
Wool	476
Bark	1,787
Hay and Straw	3,703
Bran	954
Wood	10,589
Sundries	8,551

Number of cattle and horses, 4,415; sheep, 23,215; and pigs, 2,983.
Number of passengers on horseback, or in carriages, 108,757.

Accepting these figures, inadequately as they probably represent the through traffic, and applying to them an average mileage of the lowest standard, and a uniform charge at less than half the present cost of cartage on the Turnpike road, we have this result:—

21,000 tons of goods for export, carried 21 miles, at 6*d.* per ton per mile	£11,025
Half the excess of goods which passed the Turnpike Gates above the quantity exported, 6,000 tons	3,150
Cattle and horses, 4,500 head, 21 miles, at 3*d.* per head per mile	1,180
Sheep and pigs, 26,000 head, 21 miles, at per head per mile	..
And, taking the passengers at 110,000, travelling an average distance of 15 miles, at 2*d.* per mile	13,750
	£29,105

Making a total of £29,105 for the through traffic alone.

It is not unreasonable to expect that the local traffic, which neither arrives at nor departs from Launceston, should produce £250 a week, or £13,000 a year; bringing up the receipts upon traffic to £42,105 a year.

That a large development of traffic is to be expected, I cannot doubt; and the opinions of those gentlemen who have given me the benefit of their local knowledge and experience are most strong upon the subject. Admirable stone, lime, and it is believed slate, for building purposes, are plentiful near Deloraine and Westbury, and will command a certain market through the whole district, when they can be carried at a reasonable price, and in quantities sufficient to keep in operation quarries large enough to be remunerative. In a country abouuding in fine timber, it is only necessary to be reminded of its value when brought to market, to perceive that that which is now destroyed merely to clear the ground will become a large source of traffic on the Railway. Agriculturists will purchase lime and manure, and will find a sale for crops and produce that at present would not pay for production and cultivation, but which the Railway will carry to market cheaply, and in good condition; and passenger traffic would very largely increase when the rapidity and certainty of the Railway make travelling easy and pleasant, whether the errand be one of business or recreation; villas will arise in the picturesque neighbourhood of some of the stations nearer to Launceston, and the same scenery will attract holliday folks when the Railway makes that scenery cheaply and quickly accessible. All these things tending to a development of traffic, scarcely to be believed in unless supported by the experience of all Railway time. Out of this increased traffic will arise the system of season tickets and excursion trains, affording by the reduction of fares a direct bonus to the regular customers of the Railway.

We have at present in Launceston a most remarkable example of the want of Railway communication with the grazing country in the interior, in the fact, that the

market is to a very large extent supplied with fat sheep and cattle from Victoria, a day and a half's voyage by sea; while, were the Railway constructed, fat sheep and cattle would be sent down by it daily, from the rich grazing grounds near Deloraine, whither they had been previously sent by rail from Perth, the nearest station on their way from their breeding place.

Thus it becomes apparent from an analysis of the existing traffic of the country through which the line will pass, that the receipts will be very large; but I think that a safer and more satisfactory mode of estimating the results that may be expected, is to ascertain what has been the effect of Railways elsewhere, under circumstances which will enable a comparison to be made. For this purpose, I shall state what has been the result in two countries in Europe in which the Railways pass only through agricultural districts, occupied by a very poor population. And in order to enable those who are acquainted with the country through which the Launceston and Deloraine Railway will pass, to judge of the relative advantages possessed by this district, and those possessed by the parts of Ireland through which Railways now pass, I make the following quotation from the "Second Report of the Commissioners appointed to consider and recommend a general system of Railways for Ireland;" published in 1838:—

"The northern portion are better lodged, clothed, and fed than the others; the wages of laborers are higher, being on an average about a shilling a day, and their food consists of meal, potatoes, and milk. They are frugal, industrious, and intelligent race; inhabiting a district for the most part inferior in natural fertility to the southern portion of Ireland, but cultivating it better, and paying higher rents in proportion to the quality of the land, notwithstanding the higher rates of wages. In the southern districts we find a population whose condition is in every respect inferior to that of the northern; their habitations are worse, their food inferior, consisting at best of potatoes and milk, without meal; the wages of laborers are found reduced to eight-pence a day; yet the peasantry are a robust, active, and athletic race, capable of great exertion, often exposed to great privations, ignorant, but eagar for instruction, and readily trained under judicious management to habits of order and steady industry. The population of the midland districts does not differ materially in condition from that of the south, but the inhabitants of the western district are decidedly inferior to both in condition and appearance; their food consists of the potatoe alone, without meal, and in most cases without milk; their cabins are wretched hovels, their beds straw, the wages of labor are reduced to the lowest point, upon an average not more than sixpence a day; poverty and misery have deprived them of all energy; labour brings no adequate return, and every motive to exertion is destroyed. Agriculture is in the rudest and lowest state, and the great mass of the population exhibits a state of poverty bordering on destitution."

The Commissioners who made this report, were Mr. Thomas Drummond, Under Secretary of State, the present Sir John Burgoyne, Sir Harry Jones, Sir Richard Griffiths, and Mr. Barlow, the Civil Engineer. The picture they have painted of the wretched condition of Ireland in those days does not describe half of the wretchedness and poverty that then existed. Yet can any one on reading this conceive an apparently more hopeless country in which to construct Railways with a view to profitable investment? Yet in 1856 there were open in Ireland twenty-two Railways, of the aggregate length of 998¾ miles, constructed at a total cost of £15,031,568. In 1858 these Railways were yielding returns on the average of £21 a mile per week, and paying to the shareholders dividends ranging from four to eight per cent.* Turning now to the picture of Northern Tasmania, we see a country blessed by perhaps the most delightful climate in the world, rich in natural resources, which are unable to develope themselves for want of means of transport, and inhabited by a people amongst whom real poverty is almost unknown; where the working members of the community receive wages ten times beyond what the poor Irish peasant ever got, and nothing but the blindest infatuation could prevent us from seeing the certainty of remuneration that must follow the construction of a cheap Railway in this Country. Again, we have the case of the French Railways to refer to; though not presenting so wretched a picture as that of Ireland, France is also an agricultural country, inhabited by a very poor people, and yet in 1854, when the railway system was still in its infancy in France, the President announced that the shareholders were receiving a dividend of nine per cent.

An illustration of the effect produced by Railway facilities upon the travelling propensities of a people is afforded by the official returns of the number of persons who travelled by the Railways of the United Kingdom in the year 1860; by which it appears

* Hemans on the Railway System in Ireland: Minutes of Institution of Civil Engineers, vol. 18: Sess. 1858-59.

that they were no less than 163,435,678;* about seven times the whole population of Great Britain and Ireland, Taking this fact and applying it to the present case. We have a population of at least 30,000 living within the influence of this Railway, all engaged in active pursuits and constantly on the move; and we may fairly expect that the number of passengers by Railway will be at least equal to ten times that population—that would be three hundred thousand passengers a year, who, at two-pence a mile for an average distance of fifteen miles, both of which figures are below the truth, would produce thirty-seven thousand five hundred pounds a year.

Again, we have the telling fact that the Irish Railways were in 1858 receiving £21 per mile per week,† and are now, I believe, receiving £25 a mile per week; and these receipts drawn from fares very much lower than those that I propose to charge on this Railway, and from a much smaller traffic. I believe that I am making a moderate estimate when I assume that the Launceston and Deloraine Railway will, shortly after its opening, draw total traffic receipts of at least £30 a mile per week, or a gross sum of nearly seventy thousand a year.

(*c.*) Working Expenses.

I think that in this case also a comparison of the actual facts proved elsewhere with our reasonable expectations here will be a safer and more satisfactory mode of treatment than an estimate in detail, based on figures which are open to doubt. Again I refer to the Irish Railways: the average cost of working them is £400 per mile per annum. This includes the maintenance and repair of all the works and rolling stock, the cost of fuel, salaries, wages, &c., &c.; but this average includes several double lines, and is increased by the wear and tear resulting from running trains at high speeds, while it also bears the maintenance of numerous bridges and other expensive works, all of which are excluded from the expenses of this line. Such a line as this would be maintained in Ireland for £300 per mile per annum. If then we assume that the working expenses here will be double what they are in Ireland, we have £600 a mile, a total of £26,000 a year for the whole working of this line. This is a high estimate when we take into consideration that over the greater part of the line there are really no works to maintain, beyond packing up the ballast, and that the haulage will be done over a road that, except eight miles, is practically a level road. The exceedingly favorable climate of Tasmania will cause far less damage to works than does the weather in Ireland; for here we have no frosts and much less moisture than Irish Railways are exposed to. This estimate is not calculated upon the supposition that my estimate of certain traffic is not to be exceeded, but is capable of the efficient working of a traffic of double the amount, and therefore my anticipation of contingent and increased traffic is to be looked upon chiefly as a source of profit.

(*d.*) Conclusions Drawn.

The conclusions to be drawn from the foregoing considerations are manifest. They are, first—That the natural features of the country afford such facilities for Railway construction, that a line can be made between Launceston and Deloraine at the small cost of three hundred and sixty-four thousand pounds. Secondly—That the traffic which may be expected upon it will produce, in a short time after its completion, nearly seventy thousand pounds a year. Thirdly—That the working expenses for the carriage of this traffic will not exceed twenty-six thousand pounds a year. And fourthly—That, after defraying all working expenses, there will be a balance of at least forty thousand pounds a year to pay interest and redeem the debt.

(*e.*) General Observations.

Before concluding, I must call attention more prominently to some points already alluded to in this Report, and state generally some of the advantages which will follow the construction of this Railway.

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* Parliamentary Papers in Companion to the Almanack, 1861-2; Knight and Co., London.

† Hemans on the Railway System in Ireland: Minutes of Institution of Civil Engineers, vol. 18: Sess. 1858-59.

In making my estimate of traffic, I have assumed that the charges by the Railway will not be more than half the rates at present paid for the carriage of produce; if, therefore, it should so turn out that the receipts at first are not equal to my anticipations, it will only be necessary to raise the charges to more nearly those paid at present, and thus ensure that the Railway shall be self-supporting; while if on the other hand, the Railway can be supported by half the present charges, by reason of the great development of traffic, of which I have no doubt, then it is clear that the present freighters will, on that one account only, be benefited by the opening of the Railway, to the extent of one-half of what they pay now for carriage of all heavy goods between Launceston and the Districts affected by the Railway. Again, it must be remembered that the expenditure upon the Railway will provide, not merely the road upon which passengers and goods will be conveyed, but also the vehicles and power necessary for their transport, and efficient agents, responsible officers and servants, storehouses, weighbridges, and other facilities. Thus, while much greater certainty and security will attend the conveyance of goods and passengers, the whole of the plant of waggons and horses now used to carry on the trade of the Districts will be set free for profitable employment locally, never touching the Railway traffic except to bring it up to the Stations. The saving of time will in itself form no small item of profit.

The ratepayers at present expend on the Western Road an annual sum amounting to double that which will be required to keep in repair the Railway. It is reasonable to expect that the road rates will be considerably reduced when the road is relieved from the heavy through traffic, and employed only for its local uses; and herein again, those who now use the road for the carriage of the produce of the District will find their profit. The same reasoning applies to the Districts along the main road from Launceston to Perth and Longford.

My anticipation that the increased facilities afforded by the Railway would develope new traffic, is most fully supported by many gentlemen of large experience residing in the Districts, and who have taken the trouble to fully state their views on the question, in reply to a circular which I sent to them. They point out that, while great benefit would undoubtedly immediately follow improved means of carrying the existing traffic, there are immense resources in the country for the creation of new traffic, which the Railway would open up. The documents sent to me by these gentlemen contain much valuable and interesting information, and I therefore forward them for the information of the Committee.

Appended are the details of the estimate by which I have arrived at the cost of the line as given in the body of this Report.

I think that I have now fully exhausted the examination of the subject, and I hope that I have placed you in a position to proceed with the execution of the Railway, without further delay. I feel that I can most conscientiously advise you to make this Railway, fully believing that it will be directly a source of profit, and the means of raising largely the value of all property in the district, including crown lands at present unsaleable, facilitating and improving agricultural operations, stimulating and extendiug trade, encouraging population, employing the working classes, and in fine, instilling into the whole district a new life which will promote the permanent interests of the Colony. I speak thus confidently, because I have seen what Railways have done elsewhere.

I have the honor to be,
Gentlemen,
Your obedient Servant,

W. T. DOYNE, M. Inst. C.E.

To the Chairman and Members of the Launceston and Deloraine Railway Committee.

ITEMS OF ESTIMATE.

LENGTH OF LINE 44 MILES 20 CHAINS.

321,930 superficial yards soil removed from base of embankments and surface of cuttings, and placed by the fences .....

3520 double chains of post and rail fence .....

496,561 cubic yards of excavation in clay, loam, marl, gravel, sand, &c., carried to form embankments .....

127,930 cubic yards ditto, thrown to spoil.....

26,029 cubic yards of rock cutting, carried to form embankments .....

140,409 cubic yards of side cutting to form embankments .....

321,930 superficial yards laying soil upon slopes of cuttings and embankments, and sowing ditto with grass seeds .....

93 leneal yards culvert, 6 feet diameter .....
726 ditto ditto 3 feet ditto .....
322 ditto ditto 1½ feet ditto .....

144 ditto cast iron pipe, 12 inches diameter, under embankments .....

7 turnpike road level crossings .....

60 public road and occupation road level crossings .....

BRIDGES—
North Esk River, 20 bays, 10 feet span, 6 feet high .....

2. ditto iron, 150 feet span, 12 feet high .....
3. ditto ditto ditto .....
4. ditto 5 arches, 45 feet span, 30 feet high .....

South Esk and Lake Rivers.—Iron, 2 bays, each 250 feet span, 22 feet high .....

6. ditto, wood, 6 bays, 10 feet span, 10 feet high .....

River Liffey.—Wood, 30 bays, 10 feet span .....

Quamby River.....

47 miles of permanent way .....
Terminal and station arrangements. .....
Rolling stock .....
Engineering .....
Management.....
Sundries, road diversions, side drains, &c.....
Land and compensation .....
Contingencies .....
Maintenance of works one year .....

JAMES BARNARD,
GOVERNMENT PRINTER, TASMANIA.