Crown battery site

Crown Battery, c. 1906. DoC Thames

Eric Lens 2024

The original plant was at the old Railey's site, some distance up the Waitawheta gorge. Cyaniding was first established there. The new battery, sited well below Battery Flat on the Ohinemuri, would be cyaniding from the start. Dry crushing before changing to wet crushing.	
1891	August. McGruer gets go-ahead to erect new Crown plant. [1] The new works will consist at first of 20 head dry stampers (provision being made for 40 eventually) and the appurtenances of the Cassel Company's process. This will mean an immediate expenditure of about £10,000, exclusive of the road which will have to be made, which will cost another £1200. [2] [Tramway from river level adit to battery. The section beside the Waitawheta we now call the Crown tramway] Contractors for excavating the battery site make good progress. [3]
1892	May. Crown Company: the water for the race is taken from the Ohinemuri River, and carried 85 chains [1708m] in the ordinary fluming to the plant. It will be a very complete and capable race, and has taken over 180,000 ft. of kauri timber in construction. The tramway is 80 chains [1609m] in length, running from the Crown Mine to the site of their reduction-works, and has been a difficult and trying undertaking, a great deal of the cutting being the face of the Waitawheta Gorge cliff… [4] August. Crown battery at Railey's site stops. [5] The tramway leading from the mine to the new mill site is completed. [6] [from Battery Flat this tramway slopes up to the top of the new battery]
1893	30 May. New Crown battery starts. [7] October. Electric light is now being used in the Crown Company's ore reduction works. [8]
1894	27 July. Flood and slip destroy Crown water race. [9] November. Talisman carting ore to Crown battery for treatment. [10] [11] Argy bargy results.
1895	February. Mr. Hutchinson has the management of the plant and machinery,

[1] https://paperspast.natlib.govt.nz/newspapers/THS18910806.2.8
Thames Star, Issue 6953, 6 August 1891, Page 2
[2] https://paperspast.natlib.govt.nz/newspapers/WT18910818.2.37
Waikato Times, Volume XXXVII, Issue 2979, 18 August 1891, Page 4
[3] https://paperspast.natlib.govt.nz/newspapers/OG18911226.2.6.2
Ohinemuri Gazette, Volume 1, Issue 2, 26 December 1891, Page 3
[4] https://paperspast.natlib.govt.nz/parliamentary/AJHR1892-I.2.1.4.4
GOLDFIELDS AND WATER-RACES (REPORTS ON, BY WARDENS, INSPECTORS OF MINES, AND WATER-RACE MANAGERS)., Appendix to the Journals of the House of Representatives, 1892 Session I, C-03a
[5] https://paperspast.natlib.govt.nz/newspapers/NZH18920820.2.8
New Zealand Herald, Volume XXIX, Issue 8962, 20 August 1892, Page 3
[6] https://paperspast.natlib.govt.nz/newspapers/NZH18920812.2.7
New Zealand Herald, Volume XXIX, Issue 8955, 12 August 1892, Page 3
[7] https://paperspast.natlib.govt.nz/newspapers/NZH18930531.2.60
New Zealand Herald, Volume XXX, Issue 9214, 31 May 1893, Page 6
[8] https://paperspast.natlib.govt.nz/newspapers/NZH18931031.2.5
New Zealand Herald, Volume XXX, Issue 9345, 31 October 1893, Page 3
[9] https://paperspast.natlib.govt.nz/newspapers/THA18940727.2.29
Thames Advertiser, Volume XXVI, Issue 7878, 27 July 1894, Page 3
[10] https://paperspast.natlib.govt.nz/newspapers/NZH18941031.2.5
New Zealand Herald, Volume XXXI, Issue 9656, 31 October 1894, Page 3
[11] https://paperspast.natlib.govt.nz/newspapers/NZH18941210.2.39
New Zealand Herald, Volume XXXI, Issue 9690, 10 December 1894, Page 5

	and Mr. Napier, the well-known cyanide expert, has charge of the Cassel process and assay department. [12] August. Two percolating vats erected to re-treat the accumulating tailings. [13] December. Mr Daw to superintend the Crown. [14]
1896	February. Additions underway at battery. [15] September. Crown battery has 40 stamps at work. [16] A new electric lighting plant erected at the battery. [17]
1897	March. Crown works to be converted from dry to wet crushing plant.[18] July. Crown battery has 20 stamps running wet. [19] September. Crown battery 40 stamps wholly running wet. [20] December. Crown low grade ore made to pay by wet process. [21] …the whole plant was converted from dry to wet crushing. Additions were at once made to the battery in the shape of 13 new steel percolation tanks and five large steel sump tanks, at a cost of £2000. Now, with a view to still further increasing the battery power, foundations are being laid for another 40 head of stampers, thus making 80 head in all. [22]
1898	August. Crown battery start extra 20 head stamps, now 60. [23] [the battery will never be enlarged to 80]
1899	December. Crown Company are to construct a new tramway to the battery, on the level (our current walking track). [24] The trucks of quartz are hoisted up an incline tramway on the outside of the crushing plant up to the rock-breaker with an engine erected near the bottom of the incline. [25]
1900	February. New (level) tramway to Crown battery complete (current

[12] https://paperspast.natlib.govt.nz/newspapers/NZH18950211.2.49
New Zealand Herald, Volume XXXII, Issue 9741, 11 February 1895, Page 6
[13] https://paperspast.natlib.govt.nz/newspapers/NZH18950809.2.70
New Zealand Herald, Volume XXXII, Issue 9894, 9 August 1895, Page 1 (Supplement)
[14] https://paperspast.natlib.govt.nz/newspapers/NZH18951227.2.75
New Zealand Herald, Volume XXXII, Issue 10013, 27 December 1895, Page 1 (Supplement)
[15] https://paperspast.natlib.govt.nz/newspapers/NZH18960221.2.71.12
New Zealand Herald, Volume XXXIII, Issue 10060, 21 February 1896, Page 2 (Supplement)
[16] https://paperspast.natlib.govt.nz/newspapers/THA18960904.2.24
Thames Advertiser, Volume XXVIII, Issue 8524, 4 September 1896, Page 3
[17] https://paperspast.natlib.govt.nz/newspapers/AS18961116.2.8
Auckland Star, Volume XXVII, Issue 272, 16 November 1896, Page 2
[18] https://paperspast.natlib.govt.nz/newspapers/NZH18970319.2.78.4
New Zealand Herald, Volume XXXIV, Issue 10394, 19 March 1897, Page 1 (Supplement)
[19] https://paperspast.natlib.govt.nz/newspapers/NZH18970709.2.51
New Zealand Herald, Volume XXXIV, Issue 10490, 9 July 1897, Page 6
[20] https://paperspast.natlib.govt.nz/newspapers/NZH18970903.2.60.4
New Zealand Herald, Volume XXXIV, Issue 10538, 3 September 1897, Page 1 (Supplement)
[21] https://paperspast.natlib.govt.nz/newspapers/NZH18971223.2.68.3
New Zealand Herald, Volume XXXIV, Issue 10633, 23 December 1897, Page 1 (Supplement)
[22] https://paperspast.natlib.govt.nz/newspapers/NZH18971223.2.68.3
New Zealand Herald, Volume XXXIV, Issue 10633, 23 December 1897, Page 1 (Supplement)
[23] https://paperspast.natlib.govt.nz/newspapers/NZH18980805.2.73.4
New Zealand Herald, Volume XXXV, Issue 10824, 5 August 1898, Page 1 (Supplement)
[24] https://paperspast.natlib.govt.nz/newspapers/NZH18991222.2.55
New Zealand Herald, Volume XXXVI, Issue 11252, 22 December 1899, Page 1 (Supplement)
[25] https://paperspast.natlib.govt.nz/parliamentary/AJHR1900-I.2.1.4.3
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1900 Session I, C-03

	walkway). Hoisting apparatus being installed beside battery (an incline tram), to lift ore from new tramway to top of battery. Will be run by pelton wheels. [26] [the concrete foundations beside the walkway maybe belong to these pelton wheels] Crown Company. Erecting an engine at the battery to supplement water power [27] [this is the boiler and engine at the back of the battery].
1901	July. Large slip blocks tramway and carries away water race. [28] September. Installation of a powerful steam plant at the back of the battery under way. Two large Babcock boilers, 180 h.p. steam engine. [29]
1902	December. The new steam plant at the battery is working well.[30]
1905	March. The battery is at present only working one shift per day. [31]
1907	July. New (replacement) water race being constructed. New electrical plant at the battery is proposed. [32] The battery has been run on steam. [33]
1908	December. Commenced the power station, and excavated for the turbine site. [34] For the first time for over 25 years mining and milling operations in the New Zealand Crown mines at Karangahake have been suspended. At the earliest work is not likely to be resumed for several months, during which the new electrical pumping plant for unwatering the mine to a greater depth will be installed… Part of the new plant, which in all cost from £12,000 to £13,000 in England, is on the ground, and the estimated cost of the water-race now in course of construction is £6000. [35]
1909	February. The concrete foundations for a powerful electrical plant are now being prepared at the Crown mine. The site is on the banks of the Ohinemuri river.[36] August. The power station near the company's reduction works is finished.[37]

[26] https://paperspast.natlib.govt.nz/newspapers/NZH19000216.2.58.5
New Zealand Herald, Volume XXXVII, Issue 11298, 16 February 1900, Page 1 (Supplement)
[27] https://paperspast.natlib.govt.nz/parliamentary/AJHR1901-I.2.2.2.4
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1901 Session I, C-03
[28] https://paperspast.natlib.govt.nz/newspapers/NZH19010726.2.78.3
New Zealand Herald, Volume XXXVIII, Issue 11716, 26 July 1901, Page 1 (Supplement)
[29] https://paperspast.natlib.govt.nz/newspapers/NZH19010906.2.73.3
New Zealand Herald, Volume XXXVIII, Issue 11752, 6 September 1901, Page 2 (Supplement)
[30] https://paperspast.natlib.govt.nz/newspapers/NZH19021211.2.77.3
New Zealand Herald, Volume XXXIX, Issue 12141, 11 December 1902, Page 1 (Supplement)
[31] https://paperspast.natlib.govt.nz/newspapers/NZH19050329.2.97.22
New Zealand Herald, Volume XLII, Issue 12827, 29 March 1905, Page 2 (Supplement)
[32] https://paperspast.natlib.govt.nz/newspapers/NZH19070724.2.21
New Zealand Herald, Volume XLIV, Issue 13498, 24 July 1907, Page 5
[33] https://paperspast.natlib.govt.nz/parliamentary/AJHR1908-I.2.2.2.5
THE GOLDFIELDS OF NEW ZEALAND. (REPORT ON), Appendix to the Journals of the House of Representatives, 1908 Session I, C-03
[34] https://paperspast.natlib.govt.nz/newspapers/OG19081218.2.12
Ohinemuri Gazette, Volume XVIV, Issue 2438, 18 December 1908, Page 2
[35] https://paperspast.natlib.govt.nz/newspapers/NZH19081117.2.11
New Zealand Herald, Volume XLV, Issue 13909, 17 November 1908, Page 3
[36] https://paperspast.natlib.govt.nz/newspapers/AS19090219.2.13
Auckland Star, Volume XL, Issue 43, 19 February 1909, Page 2
[37] https://paperspast.natlib.govt.nz/newspapers/NZH19090814.2.68

	The machinery was started on the 10th July, and worked without the slightest hitch. [38]
1915	Crown mine closes[39]
1917	Powerhouse sold to Gisborne Borough Council[40]
1919	Crown Quarry granted by Warden[41]
1927	New Zealand Crown Mines, Karangahake. —The area held by this company was forfeited by the Warden early in July[42]

New Zealand Herald, Volume XLVI, Issue 14139, 14 August 1909, Page 6
[38] https://paperspast.natlib.govt.nz/parliamentary/AJHR1910-I.2.1.4.9
THE GOLDFIELDS OF NEW ZEALAND (REPORT ON)., Appendix to the Journals of the House of Representatives, 1910 Session I, C-03
[39] https://paperspast.natlib.govt.nz/newspapers/NZH19150810.2.29
New Zealand Herald, Volume LII, Issue 15992, 10 August 1915, Page 5
[40] https://paperspast.natlib.govt.nz/newspapers/PBH19170716.2.31
Poverty Bay Herald, Volume XLIV, Issue 14350, 16 July 1917, Page 4
[41] https://paperspast.natlib.govt.nz/newspapers/OG19190310.2.6
Ohinemuri Gazette, Volume XXX, Issue 4040, 10 March 1919, Page 2
[42] https://paperspast.natlib.govt.nz/parliamentary/AJHR1928-I.2.2.2.3
MINES STATEMENT BY THE HON. G. J. ANDERSON, MINISTER OF MINES., Appendix to the Journals of the House of Representatives, 1928 Session I, C-02

This is a MM White photograph, No B3571.

This is the earliest photograph of this battery. 1893-94?

The Staples collection version of this image (follow hyperlink) is dated 1892, but this seems too early.

30 May 1893 the Crown battery starts, with 20 stamps, dry crushing [43]. Two ore drying kilns are installed, and each has a chimney, which can be seen near the top of the building. When twenty more stamps are added, two more kilns are added, so four chimneys.

The kilns are responsible for the masonry work at the top of the current remains of this battery.

The trestle work at the top of the battery delivers ore from the ground tramway to the stone breakers at the very top of the battery. The ground tramway cutting can be seen on the spur to the left of the battery. It descends on an angle to Battery Flat. This tramway will be replaced with a level tramway in early 1900.

It is difficult to know if the battery is already functional, but no smoke can be seen from any chimney.

There is a graded track from the bottom of the site to the river. Is this how material was brought to the site?

Note the Furnace house in the distance (middle).

There are two horses in the photograph; one may be the photographer's. Is the male rider Albert Reed, who becomes Margaret White's husband in 1900? Photographer stood at edge of road.

Staples Collection.

1892

4 May

> The crushing plant will consist of 20 9cwt stampers, provision being made in the foundations and buildings for adding another 20 head when required, as the company intend to crush for the public. The dry crushing process is to be the only one used, but the ore will not be roasted in kilns as at the Waihi, although a patent furnace will be used for drying it.

[43] https://paperspast.natlib.govt.nz/newspapers/NZH18930531.2.60
New Zealand Herald, Volume XXX, Issue 9214, 31 May 1893, Page 6

The tramway is at such an elevation that the ore is delivered into the stone-breaker direct, and after treatment there it will pass into a hopper, from which it is received into the drying furnace. From thence it runs into a hopper above the stampers which supplies the self-acting feeders to the stamper-boxes. There is a hopper below the stamper-boxes to catch the pulverised ore, which is then conveyed by revolving tubes to the Cassel plant, to be treated either by the agitation or percolation process, as may be found most suitable. The whole of the operations are on the gravitation and automatic principle, so that there will be no second handling of the ore from the time it is delivered from the trucks, and every labour saving appliance seems to have been studied out and adopted. [44]

AJHR 1893

Crushing-battery. —The crushing-battery consists of a Lamberton rock-breaker, and twenty heads of stamps of the American pattern, 900lb. each stamp. The building where the rock-breaker is placed is on trestle-work 45ft. in height, strongly braced together. The ore as it is brought into the building is first dumped on to a grizzly, and what will not go through the bars of the grizzly runs down to the rock-breaker, and is broken up to a maximum size of 2in. in diameter, and then falls into the same hopper where the fine material goes that passes through the bars of the grizzly. It then passes from this hopper into the drying-kilns, which are built of brick, the hot air being confined in a long flue, having a series of steps to prevent the ore from travelling down too fast before it gets thoroughly dried. There is a cast-iron plate at the bottom of this flue which can be turned, to allow of the dried ore to pass down into a large hopper, made of steel plates 5/16in thick, from which the Challenge ore-feeders are fed. These kilns are only for drying the ore, and not in any way to calcine it. There are two of these kilns built on a stone foundation, and placed about 6ft. apart; the foundation going all the way across. The kilns themselves stand about 30ft. in height, the step-flue being at an angle of about from 30° to 40° from the vertical. There is a furnace at the bottom, where either coal or firewood can be used to dry the ore.

Stamp-mortars. —There is first a concrete foundation put in for the stamps, and on the top of the concrete the stamp-mortars are each placed on the end of a log of kauri, each 18ft. in length, 4ft. 8in. one way, and 2ft. 2in. the other. These are firmly embedded in the concrete, and all bolted together so as to form a solid block of timber standing on end, having a length of 18ft. 8 in. by a width of 2ft. 2in., and on this the four mortars are placed. They are fitted with screens, having the top standing outwards at a slight angle, and held to the face of the mortars by means of a long wedge, the gratings being 30-mesh, equal to 900 holes to the square inch.

Stamps. —The stamps are similar to those used by the Waihi Company, and are fitted with the latest appliances for raising and holding them up, the cams and tappets being all constructed on the American type by Price Brothers, of the Thames. They are intended to make about ninety-two blows per minute, having a drop of 6in. The guides and framing are made of wood, and the framing and erection reflects credit on the contractor. Each ten-head battery is driven by a separate belt, and there is further provision made so that twenty

[44] https://paperspast.natlib.govt.nz/newspapers/NZH18920504.2.47
New Zealand Herald, Volume XXIX, Issue 8869, 4 May 1892, Page 6

additional stamps can be erected should they at any time be required. The pulverised material from the stamps falls into a chute and is conveyed into another set of hoppers at a lower level than the stamp-mortars, and from these hoppers the pulverised dust is taken to the leaching-vats.

Cyanide Plant. —This consists of twenty-four wooden vats, each 11ft, long by 9ft. wide and 3ft. 9in. deep. In the bottom of these vats there is a false bottom, or grating, placed about 3in. above the ordinary bottom, and on this false bottom a filter-bed is placed, about 4in. in thickness, the bottom layer being of coarse quartz-gravel, and gradually getting finer up to the top, the last coating being fine sand, having a coarse cloth placed over the top of the filter-bed to prevent the sand from being disturbed as the vats get cleaned out after every charge of pulverised ore. There are also fourteen agitators, eight of which are 5ft. deep by 4ft. 9in. in diameter, and six of them 6ft. deep, and 5ft. 6in. in diameter. The agitators and vats are all made of kauri timber, the staves of the agitators being 3in. in thickness, and the vats being made of partly 3in. and partly 4in. timber, and all bolted together. Into each of these vats are placed three pipes, under the false bottom, so that the first, second, and third solutions can be drawn off into separate channels. On one side of each vat there is a door, which can be opened to admit of the material being sluiced out after the whole of the cyanide solution is completely washed out of the ore, the solution passing through a long series of boxes filled with zinc-shavings, which precipitates both the gold and silver in the form of a blackish powder. There are also three concrete sumps, each 15ft. by 12ft. and 6ft. deep, capable of holding about thirty tons of the cyanide solution; this is pumped up to the vats on the floor above as required. It is in these concrete sumps where the solution is always made up to the proper strength before being used.

It is also-proposed to use a vacuum pump to assist the filtration of the solution through the pulverised material in the vats, and by this means Mr. McConnell hopes to be able to leach the ore in about half the time he was able to do so at the old plant. However, this has yet to be tried. Where there are a great deal of slimes in the ore, it is very difficult to filter even with a vacuum pump. This proved to be the case at the Sylvia Company's plant at Tararu Creek, where Dr. Scheidel adopted this method to assist the leaching.

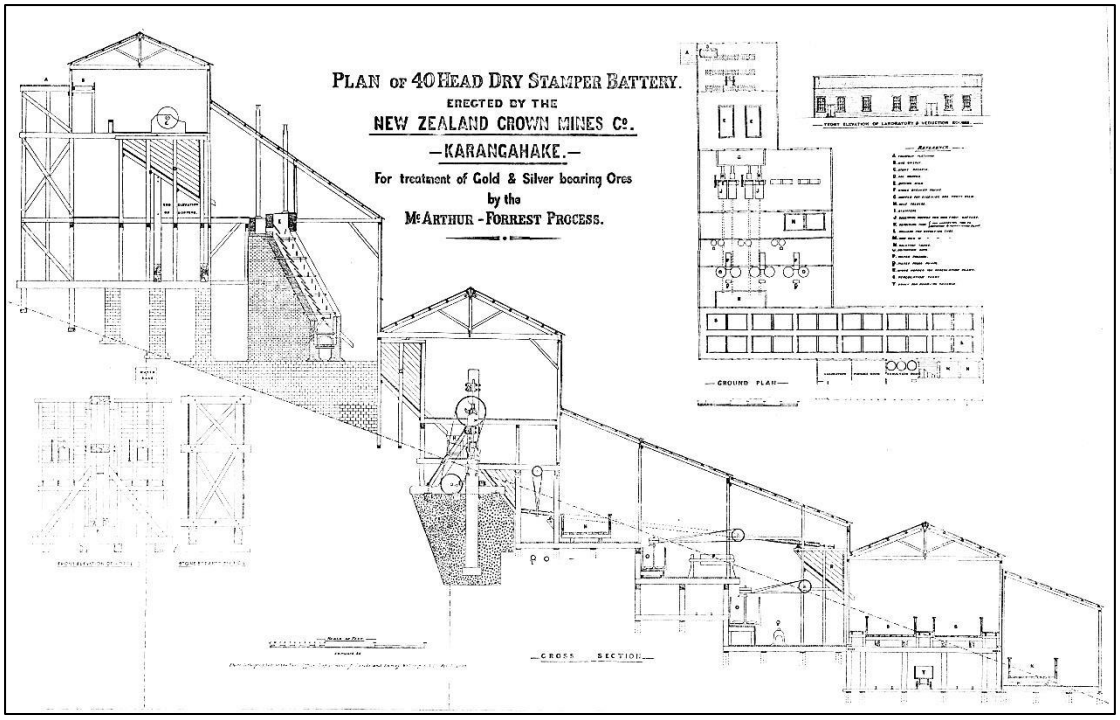
Annexed are plans of the company's plant, to which the following description or reference applies. The explanation of the plans was handed me by Mr. McConnell, the manager: —

"At point A the ore is delivered at the battery, and tipped on to grizzly, B; the fines pass through and are conveyed to hopper, D; the roughs pass over the grizzly on to the stone-breaker floor, and are passed through stone-breaker, C, and fall into hopper underneath, marked D; the drying-kiln E is charged from this hopper. The ore, after passing through the kiln, being perfectly dry, is run into an iron hopper G, from where it is automatically fed into stampers I, by self-feeders, H; the ore, after passing through the stampers, is received in hoppers J, and then conveyed by means of revolving tube X, either into truck for conveying ore to agitation-cylinders for treatment, or, if the ore can be better treated by percolation, to store-hopper, R, in connection with percolation plant, from where it is trucked along the top of and tipped into percolation tanks, S, for treatment.

"The plant is so arranged that the ore, after it is delivered above the stone-breaker, falls from the stage by gravitation, requiring the least possible handling, and thereby reducing the cost of labour to a minimum.
"Water-power: By means of a 4in. by 2in.[ft] fluming the water is taken from a point in the Ohinemuri River above Karangahake, and conveyed to the battery a distance of 85 chains, giving a fall there of 70ft., which, with three Pelton wheels, 140-horse power can be obtained. The diameter of the water column is 44in.
"Crushing Machinery: One Lamberton stone-breaker, capable of reducing 70 tons of ore per day fine enough to feed into stamps; and twenty heads of 9cwt. dry stamps, erected by A. and G. Price, which are guaranteed to crush 30 tons of ore per day sufficiently fine to pass through a 30-mesh screen.
"Percolation Plant: This plant consists of twenty-four tanks, capable of holding each a charge of 7 tons of finely-pulverised ore. The bottom of each tank is covered with a sand-and-gravel filter. The finely-pulverised ore is trucked from the store-hoppers and tipped into the tanks. A dilute solution of cyanide is then run on to the top, and allowed or assisted to percolate through the body of the ore. As the solution percolates it is carried away from underneath the filters by means of iron pipes, and allowed to run through a series of boxes filled with zinc-turnings. The cyanide in the solution having a much stronger affinity for gold and silver than the baser metals, dissolves these precious metals in its course through the ore, and again deposits them in the form of a black slime on the zinc-turnings. This black slime is collected and melted down into bars direct.
"Agitation Plant: This plant consists of sixteen wooden tubs fitted with revolving paddles, in which the ore and cyanide solution are agitated together until the gold and silver is dissolved. The solution is then filtered, and the bullion deposited on the zinc-turnings, as already described." [45]

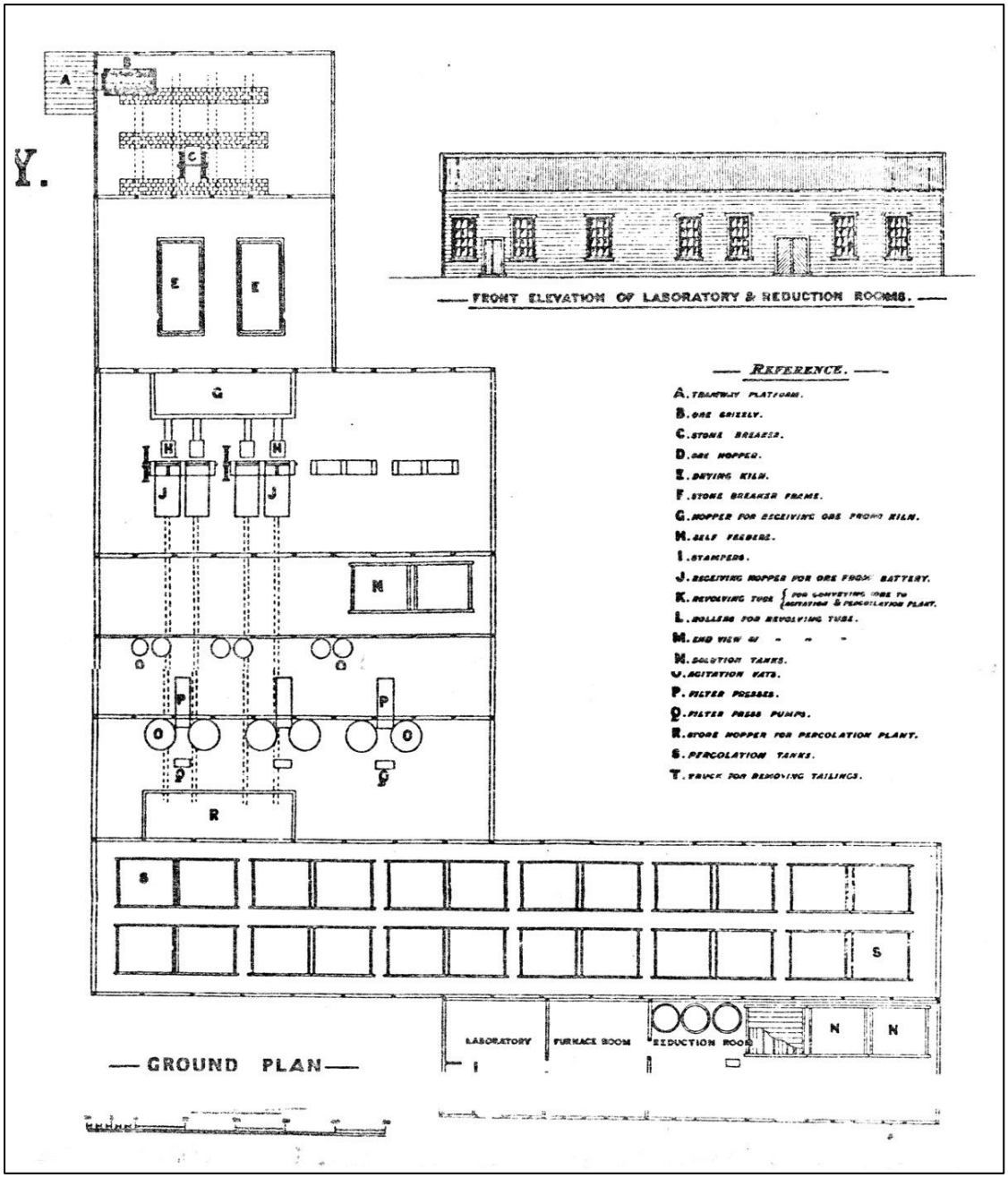
The plans mentioned above can be seen next page.

[45] https://paperspast.natlib.govt.nz/parliamentary/AJHR1893-I.2.1.4.5
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1893 Session I, C-03

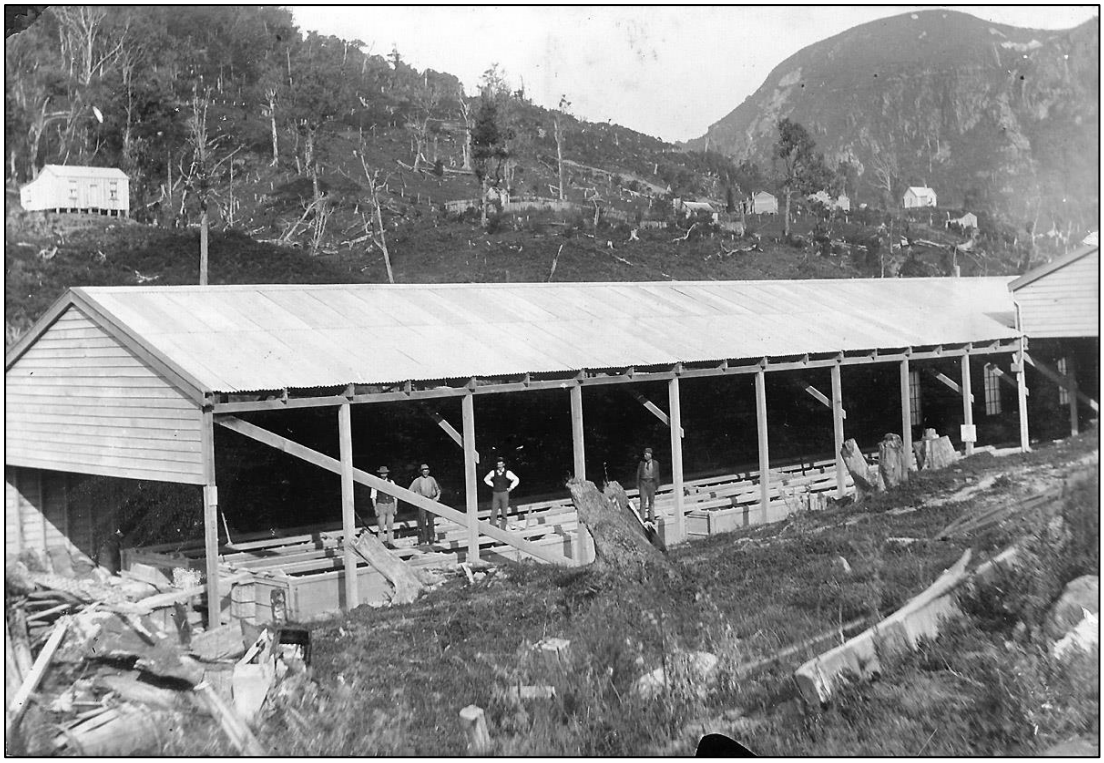


Plan of 40 Head Dry Stamper Battery. Erected By The New Zealand Crown Mines C°.
N.Z. Crown Mines Works Karangahake. [46]

[46] https://paperspast.natlib.govt.nz/parliamentary/AJHR1893-I.2.1.4.5
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1893 Session I, C-03



A crop from the previous plan, showing the ground layout of the battery.



This building holds the percolation tanks. The space on this side of the building suggests the image is of the smaller 20 stamp battery. This space gets filled with buildings when the battery is enlarged in 1896.

The vats are rectangular wooden tanks. “twenty-four wooden vats, each 11ft, long by 9ft. wide and 3ft. 9in. deep.”

Four men are at work. Is construction still underway, or are they operating the plant?

Note the tree stumps that remain in the ground.

MM White photograph B3569 Crown Battery, 1892. Staples Collection. Date from the Staples collection. If accurate then still being built, otherwise a year or two later.

1896

4 September

> One of the features of the past month has been the commencement of the new 20 head of stampers at the Crown Mines Gold Mining Company's reduction plant. This event took place about the 10th ult. The full complement has been running ever since, and the new machinery gives the utmost satisfaction. The plant now consists of 40 head of stampers, with 12 large percolation tanks, 9 solution tanks, and 11 vats for the treatment of tailings, with of course other concomitants. Altogether the mill is most complete, and one pleasing feature is the small amount of handling required. The crushed ore is now conveyed from the stamper-boxes to the large storage hoppers by means of eight revolving tubes, and these minimise to a considerable extent the dust evil, though the Crown employees have not been troubled much with dust, inasmuch as the mill is very high and well ventilated. [47]

[47] https://paperspast.natlib.govt.nz/newspapers/NZH18960904.2.58.4
New Zealand Herald, Volume XXXIII, Issue 10228, 4 September 1896, Page 1 (Supplement)

12 October

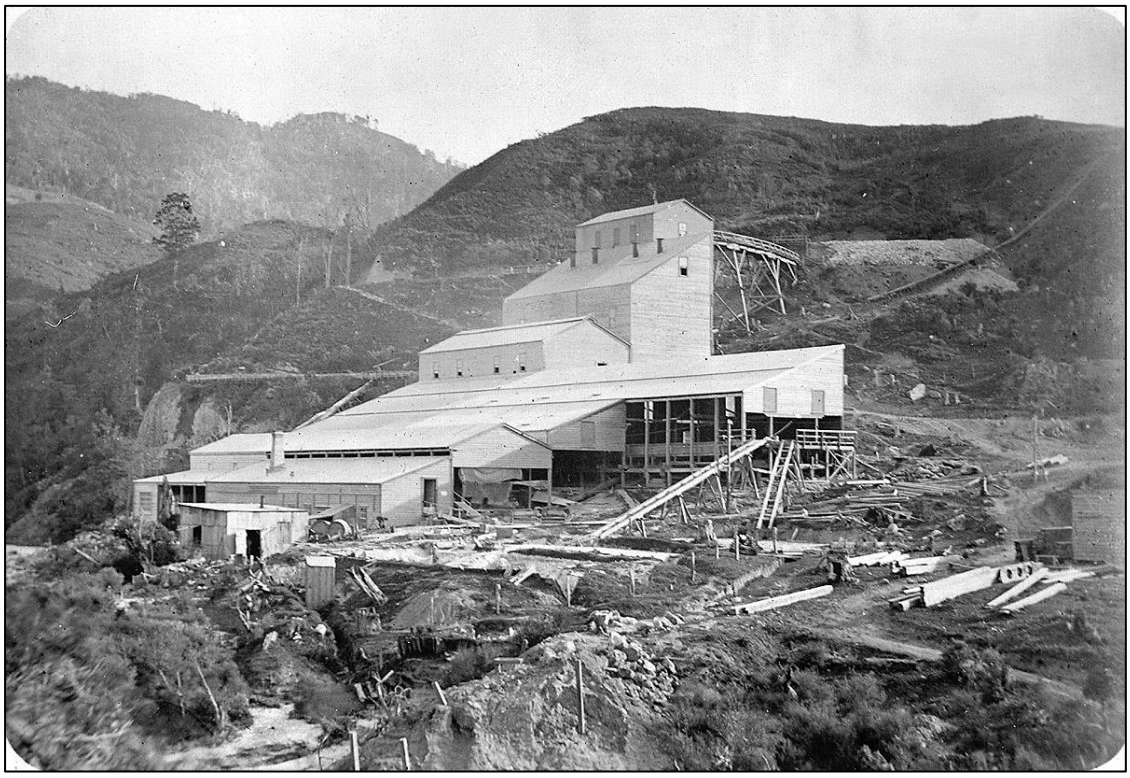
> Then proceeded to inspect the Crown Battery, which lies the furthest down the stream. Here the machinery was going at a great rate, and everything appeared in a flourishing condition. We noticed that here they have a different mode of drying their ore to that adopted in most batteries where cyanide is used. Huge furnaces are erected in the battery itself, and after being burnt the ore is taken out from the shoots and fed into the crusher. As far as we could see this is the only variation from the mode adopted at Waihi, which will be described later. The power is derived from water which is brought along the river side a distance of about half a mile. A horse tram brings the quartz from the mine, and the same line is also used by the Woodstock Company…[this is the "Crown tramway" beside the Waitawheta River]
> …we learned that the Crown mine was connected with the battery by telephone. [48]

16 November

> The Crown Company have just had a new electric lighting plant erected at their battery at Karangahake, the installation being successfully completed last week. The plant consists of a 200 light Electric Construction Company's dynamo, driven by a Pelton wheel. Beside the battery, the houses of the Company's manager, engineer, and mine manager are also lighted from the same dynamo, and sufficient power is still available for lighting the new 40 head battery which the Company are about to erect. [49]

The proposal is for 40 more stamps, but only 20 are erected, which will make 60.

[48] https://paperspast.natlib.govt.nz/newspapers/BOPT18961012.2.7
Bay of Plenty Times, Volume XXII, Issue 3461, 12 October 1896, Page 2
[49] https://paperspast.natlib.govt.nz/newspapers/AS18961116.2.8
Auckland Star, Volume XXVII, Issue 272, 16 November 1896, Page 2



Circa September 1896[50]: enlarged battery, 40 stamps, 4 drying kilns/chimneys. The battery is dry crushing until late 1897.

The tramway high on the hill delivers ore to the stone breakers via the prominent trestle. An ore paddock is to the right. Water race flume and bye wash to left (upstream) of battery buildings. An angled flume, maybe two, delivers tailings to pits where they are being saved?

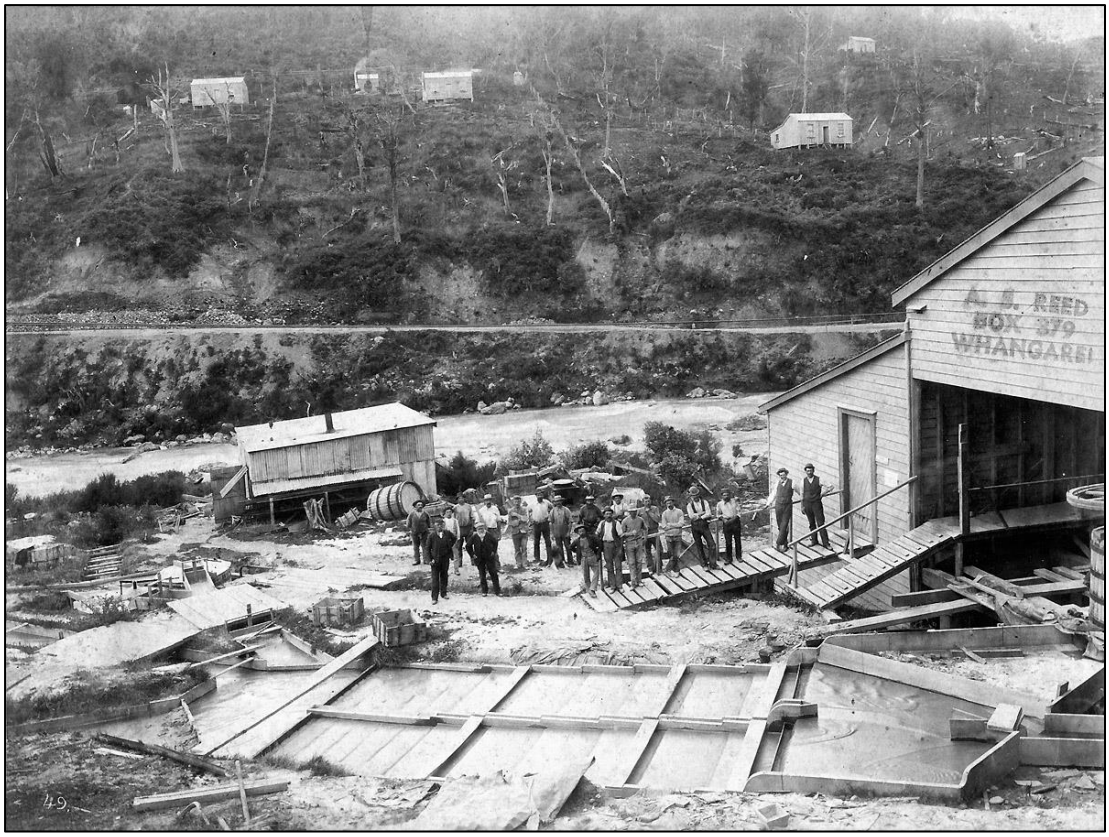
Lowest of the main buildings sports a brick furnace chimney; assay laboratory/smelt house.

Is there a water pipe coming down the hill at right of battery?

By end 1898 the battery is enlarged by 20 more stamps.

Staples Collection.

[50] https://paperspast.natlib.govt.nz/newspapers/THA18960904.2.24
Thames Advertiser, Volume XXVIII, Issue 8524, 4 September 1896, Page 3



A group photograph of the battery staff? 20 men assembled behind a tailings flume/sluice.

This may be a MM White photograph. AS Reed was her son. Date: not sure.

The wooden flume in the foreground appears to be designed to catch the coarser gold particles that have escaped the cyanide process.

Staples Collection.

1897

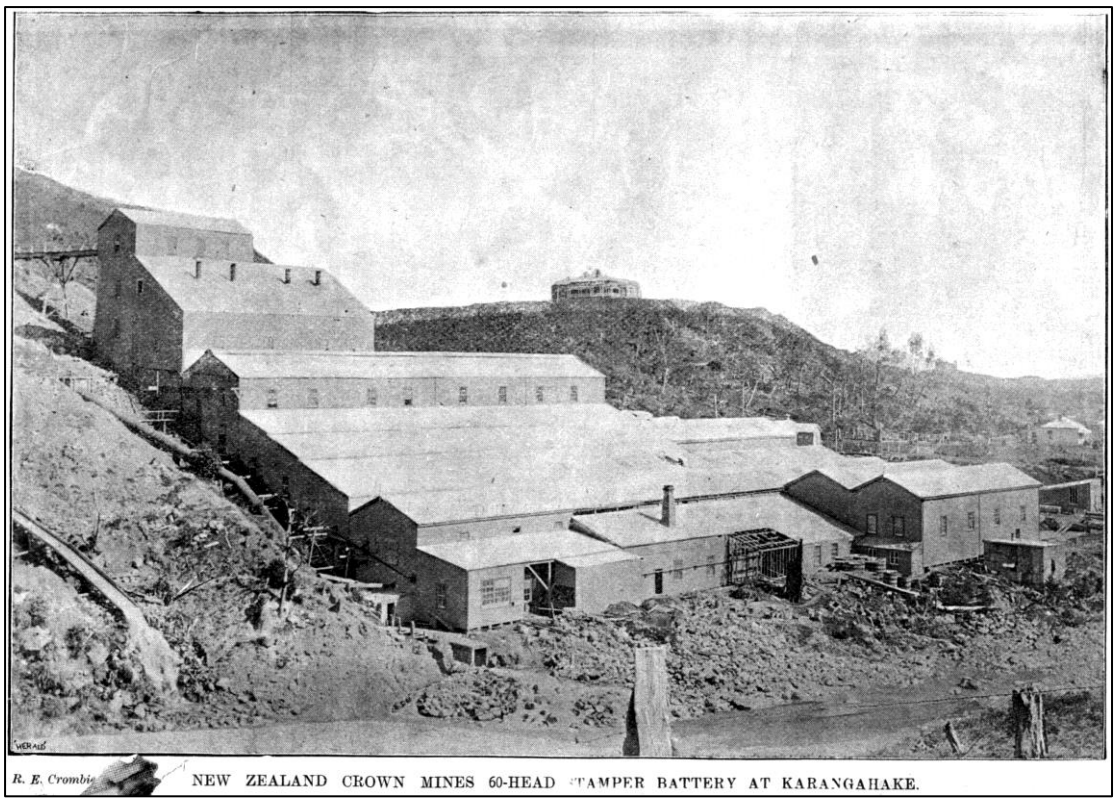
March. Crown works to be converted from dry to wet crushing plant.[51]
July. Crown battery has 20 stamps running wet. [52]
September. Crown battery 40 stamps wholly running wet. [53]
December…the whole plant was converted from dry to wet crushing. Additions were at once made to the battery in the shape of 13 new steel percolation tanks and five large steel sump tanks, at a cost of £2000. Now, with a view to still further increasing the battery power, foundations are being laid for another 40 head of stampers, thus making 80 head in all. [54]

[51] https://paperspast.natlib.govt.nz/newspapers/NZH18970319.2.78.4
New Zealand Herald, Volume XXXIV, Issue 10394, 19 March 1897, Page 1 (Supplement)
[52] https://paperspast.natlib.govt.nz/newspapers/NZH18970709.2.51
New Zealand Herald, Volume XXXIV, Issue 10490, 9 July 1897, Page 6
[53] https://paperspast.natlib.govt.nz/newspapers/NZH18970903.2.60.4
New Zealand Herald, Volume XXXIV, Issue 10538, 3 September 1897, Page 1 (Supplement)
[54] https://paperspast.natlib.govt.nz/newspapers/NZH18971223.2.68.3
New Zealand Herald, Volume XXXIV, Issue 10633, 23 December 1897, Page 1 (Supplement)

1898

5 August

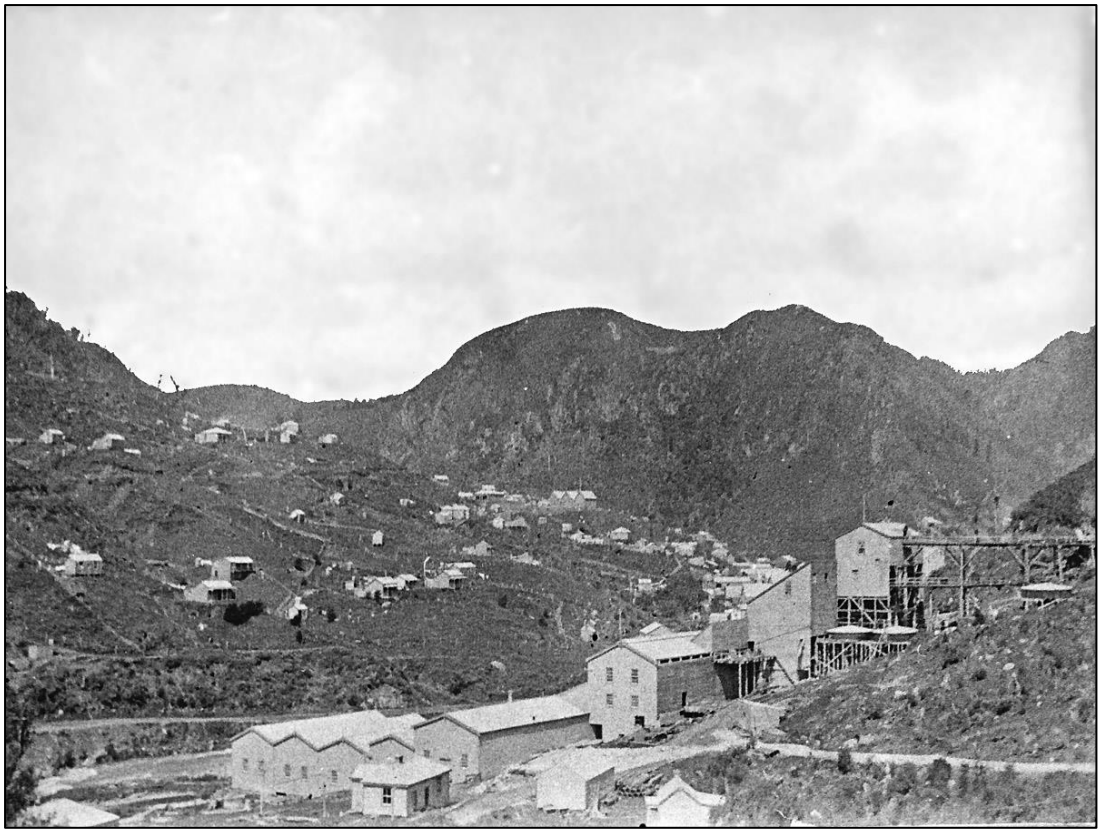
The New Zealand Crown Mines Company has considerably augmented its mining staff, whilst the company made another decided advance during the past month by starting another 20 head of stamps, thus making 60 head in all.[55]



An Auckland Weekly News image of 1898. Photograph taken from the highway, with Crown House on the hill in the background.

Considerable expansion of the battery has taken place, crushing wet, but the four kiln chimneys remain. 20 extra stamps were added in August 1898. They are in the long building below the roof with the four chimneys.

[55] https://paperspast.natlib.govt.nz/newspapers/NZH18980805.2.73.4
New Zealand Herald, Volume XXXV, Issue 10824, 5 August 1898, Page 1 (Supplement)



Photograph taken from, or near, Crown House. No sign of the first boiler house/engine, so pre 1900-01. DoC Thames.

1899

22 December

The New Zealand Crown Mines has made steady progress during the year, and at the present time shareholders can certainly be congratulated upon possessing one of the best equipped mines in the district. Mr. F. R. Daw, the company's superintendent, has instituted many changes since he came out from Home to manage the company's affairs at Karangahake, and it must be admitted that the alterations made have resulted beneficially. One of the matters that first engaged his attention was the mill, which, after a series of experiments and exhaustive trials, was converted into a wet-crushing process, thus abandoning the method of dry treatment. This alteration has been very successful, as not only is a better extraction secured. but low grade ore that previously would not be handled is now broken out and dispatched to the mill for treatment, where it can be crushed at a profit…

In the coming year the output bids fair to be very much larger, as the crushing power of the reduction works is to be supplemented by another 20 head of stamper making 80 heads in all [never happens]. The initial work connected with the increase is already under way, and at no distant date another 20 head of stamper's will be pounding away, in addition to the present power. In order to keep the big mill constantly running and well supplied with ore, Mr. Daw has been reorganising the tram system which connects the battery and mine. A new tramway about 85ft below the present tram-road is in course of construction, and as it is on an easy grade, and almost level, three horses will be able to work more effectively than the seven now employed, and, in

addition to keeping up a better supply of ore, the cost of working will, by the new road, be reduced by fully £1000 per annum. [56]

A considerable improvement has been made in the tramway between the mine and the battery. At a point opposite the Talisman cyanide plant [Battery Flat] a deviation has been made, and an easy grade made to the company's mill, a horse now being able to take eight trucks to the mill instead of one, and three horses doing as much as seven formerly. The tramway terminates on a level with the ground-floor of the battery, and the trucks of quartz are hoisted up an incline tramway on the outside of the crushing plant up to the rock-breaker with an engine erected near the bottom of the incline…

A new tram-line is being constructed, and when completed it is proposed to haul the ore from the mine to the reduction works with a locomotive instead of horses as at present. [57]

Locomotive never happens.

1900

8 June

The New Zealand Crown Mines Company are continuing to improve upon the old style of working, and Mr. F. R. Daw, their capable superintendent, is ever on the alert to reduce the cost of working expenses, without minimising the efficiency or productiveness of the operations. One of the latest improvements, which will contribute in a large measure towards a substantial reduction on the former cost of convening ore from the mine to the battery, is a new tramway. This line possesses a very easy grade, and is practically level from the back of the Talisman Company's offices to the branch at the terminus (the stamper floor of the battery). Three horses can now do the same work that until lately required seven, so that on this item alone there is a big saving. The line also is an improvement on the old one, and it has been so well ballasted that it will require very little repairing at any time, the trucks (containing one ton each), are now landed, as I previously stated, on the same floor as the mortar-boxes, and from here are hauled up an incline-tram to the top floor of the mill. The hauling engine is worked by two Pelton wheels, each turning in opposite directions, but attached to the same shafting. They are splendid wheels, and are capable of doing all the work required with three-quarter sluice heads of water per minute. A large hopper is now being erected at the head of the incline-tram, and when completed will enable the management to deal with a much larger quantity of ore than is now being sent up, whilst the tipping and emptying of the large ore waggons will be automatically managed, thus effecting a further material saving on the cost of handling the ore. A large new stonebreaker is also to be added to the crushing capacity of the mill, and it is anticipated that it will be ready for commencing operations in about a month's time…[58]

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[56] https://paperspast.natlib.govt.nz/newspapers/NZH18991222.2.55
New Zealand Herald, Volume XXXVI, Issue 11252, 22 December 1899, Page 1 (Supplement)

[57] https://paperspast.natlib.govt.nz/parliamentary/AJHR1900-I.2.1.4.3
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1900 Session I, C-03

[58] https://paperspast.natlib.govt.nz/newspapers/NZH19000608.2.73.3
New Zealand Herald, Volume XXXVII, Issue 11393, 8 June 1900, Page 1 (Supplement)

3 August

> New Zealand Crown Mines Company…
> The work of erecting another 20 head of stampers is proceeding, and as the greater portion of the necessary labour is done, it will only be the matter of a few months until the company will be crushing with 80 head of stampers…[59]

But they never install them.

AJHR 1901

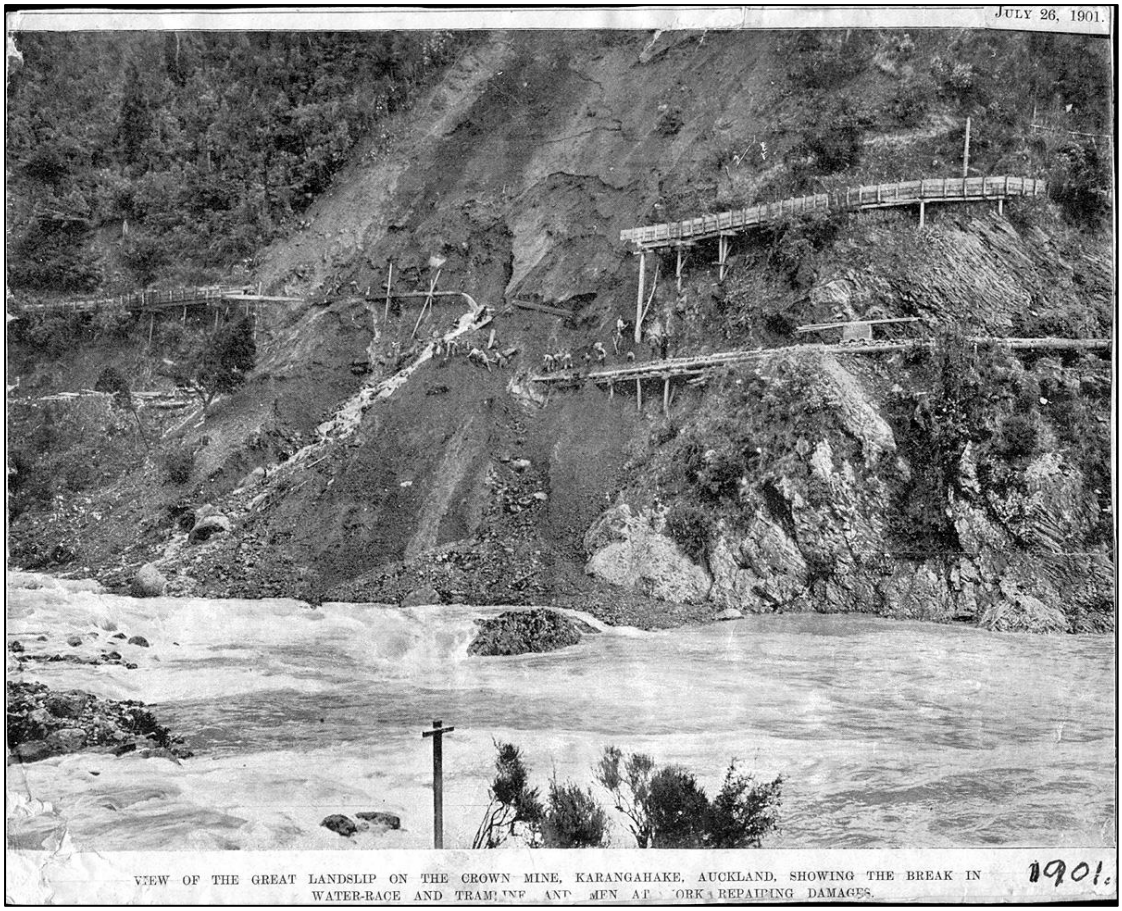
> This company is erecting an engine to supplement its water-power for battery purposes, as it finds it has not enough power from the water-races during the dry season to keep all the stampers at work [this is the boiler and engine at the back of the battery]. [60]

1901

26 July

> KARANGAHAKE. Since the publication of last Summary there has been an exceptionally heavy rainfall, and several large landslips have occurred. About the most serious, however, was that on the New Zealand Crown mines tramline and water-race at Karangahake, thousands of tons of earth having slipped away from the hillside. Though the tramline is uninjured, the line has been blocked with debris, and it has been found impossible to get quartz down to the mill, the consequence being that the reduction works have been stopped for close on a fortnight. The old water-race has also been carried away for a considerable distance by the heavy slip. A large staff of men have, however, been constantly at work clearing the debris, and though the task has been a difficult one, owing to the continual creeping away of the hillside, the men have about got through it, and it is confidently believed that crushing will be resumed without unnecessary delay. [61]

[59] https://paperspast.natlib.govt.nz/newspapers/NZH19000803.2.58.4
New Zealand Herald, Volume XXXVII, Issue 11441, 3 August 1900, Page 1 (Supplement)
[60] https://paperspast.natlib.govt.nz/parliamentary/AJHR1901-I.2.2.2.4
THE GOLDFIELDS OF NEW ZEALAND: REPORT ON ROADS, WATER-RACES, MINING MACHINERY, AND OTHER WORKS IN CONNECTION WITH MINING., Appendix to the Journals of the House of Representatives, 1901 Session I, C-03
[61] https://paperspast.natlib.govt.nz/newspapers/NZH19010726.2.78.3
New Zealand Herald, Volume XXXVIII, Issue 11716, 26 July 1901, Page 1 (Supplement)



View of the great landslip on the Crown mine, Karangahake, Auckland, showing the break in water-race and tramline and men at work repairing damages.

26.07.1901 Auckland Weekly News.[62]

The tramway and water race negotiate a rocky spur. The tramway is the current walkway, and this spur sports a large pine tree today.

6 September

> The New Zealand Crown Mines Company…
> As the summer weather is now advancing provision is being made for the continual operation of the battery during the dry season by the installation of a powerful steam plant. This will take the place of the water when there is not sufficient of the latter in the river to provide the requisite motive power for driving the mill. Two large Babcock boilers have already arrived, and excellent progress is being made with the foundations.[63]

This is at the back of the battery. 180 h.p. steam engine, supplied by Messrs. Davey, Paxman, and Co., Limited. [64]
Foundations remain.

[62] https://kura.aucklandlibraries.govt.nz/digital/collection/photos/id/174770
[63] https://paperspast.natlib.govt.nz/newspapers/NZH19010906.2.73.3
New Zealand Herald, Volume XXXVIII, Issue 11752, 6 September 1901, Page 2 (Supplement)
[64] https://paperspast.natlib.govt.nz/newspapers/NZH19020108.2.65
New Zealand Herald, Volume XXXIX, Issue 11857, 8 January 1902, Page 6

1902

25 April

The New Zealand Crown Mines…
At the battery the new engine has been fixed in position, and the sheds to cover it are now being built, so that the company will in future always have auxiliary power for driving the mill in the event of the river being too low during the dry season, or of an accident at any time to the water-races.[65]

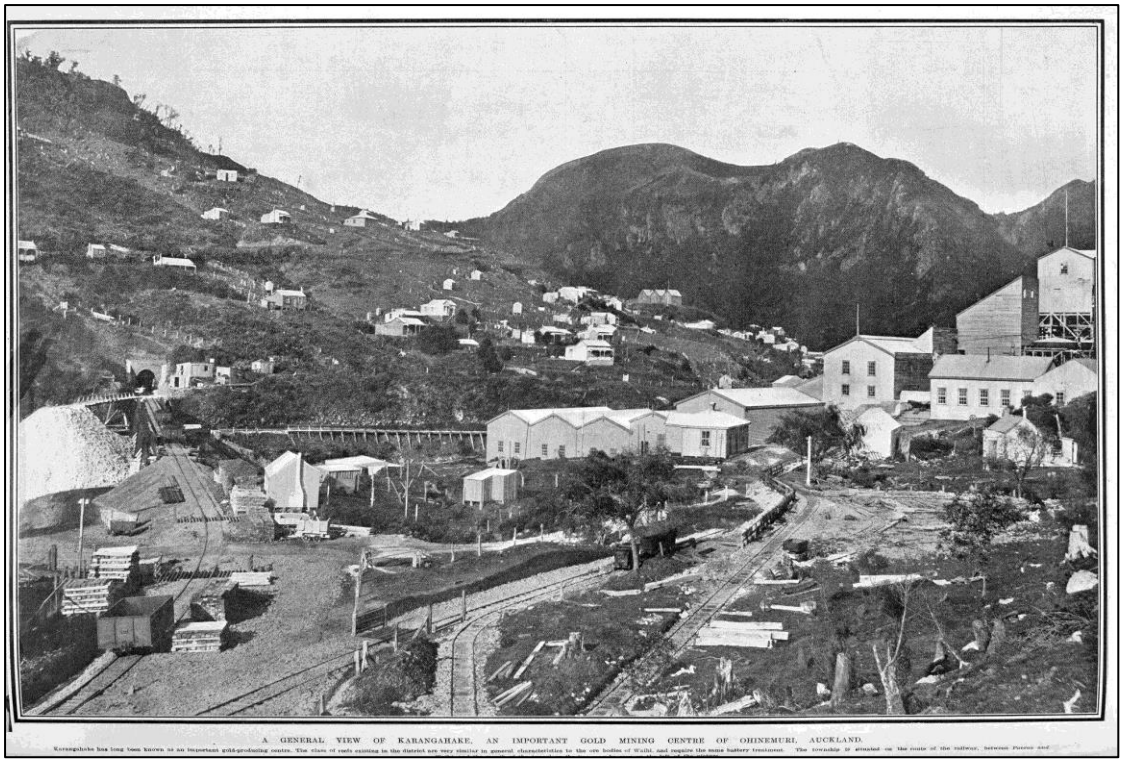
9 October

The New Zealand Crown Mines Company's operations are of a steadily progressive nature…
All the machinery is working well, and the battery during the dry season of this year will be worked by the new steam plant being erected contiguous to the reduction works.[66]

11 December

The Crown. The new steam plant at the battery is working well.[67]

[65] https://paperspast.natlib.govt.nz/newspapers/NZH19020425.2.79
New Zealand Herald, Volume XXXIX, Issue 11949, 25 April 1902, Page 1 (Supplement)
[66] https://paperspast.natlib.govt.nz/newspapers/NZH19021009.2.78.3
New Zealand Herald, Volume XXXIX, Issue 12091, 9 October 1902, Page 1 (Supplement)
[67] https://paperspast.natlib.govt.nz/newspapers/NZH19021211.2.77.3
New Zealand Herald, Volume XXXIX, Issue 12141, 11 December 1902, Page 1 (Supplement)



Published by the Auckland Weekly News 23 June 1904.

At left the huge heap of spoil from the railway tunnel, and the temporary bridge to deliver it over the road and into the river. Two coal wagons on the rail bridge, ready to discharge coal into horse carts beneath. This is the end of the line until the tunnel is complete.

Rail sidings to service the battery boilers at right foreground of battery. Between the boiler house and the stamper building is an elevated "tunnel" to accommodate the rope drive from the steam engine. Below this are concrete "steps", they remain today.

Taukani Ridge is an imposing lump.

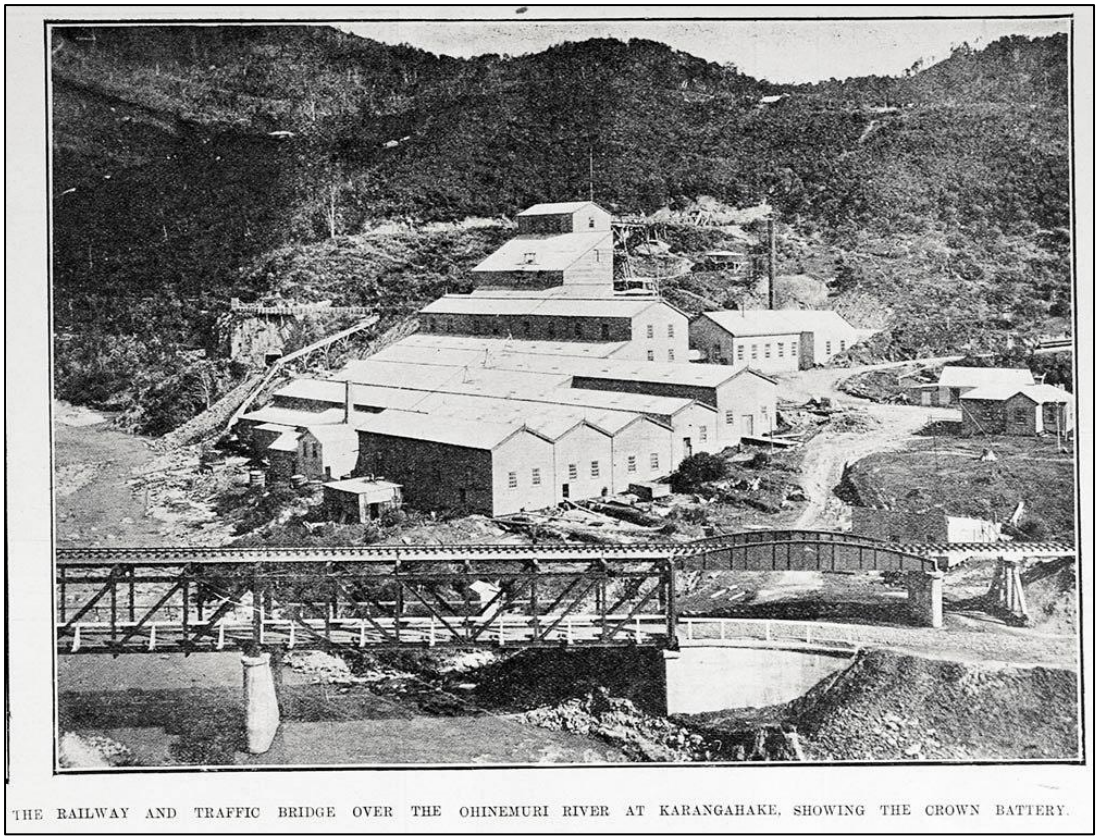
Auckland Libraries Heritage Collections AWNS-19040623-02-01

1905

29 March

> …The battery is at present only working one shift per day, but it is expected that it will be crushing full time about May. Great trouble is being experienced owing to the low state of the river.[68]

[68] https://paperspast.natlib.govt.nz/newspapers/NZH19050329.2.97.22
New Zealand Herald, Volume XLII, Issue 12827, 29 March 1905, Page 2 (Supplement)



THE RAILWAY AND TRAFFIC BRIDGE OVER THE OHINEMURI RIVER AT KARANGAHAKE, SHOWING THE CROWN BATTERY.

Auckland Weekly News image, dated 16.11.1905.

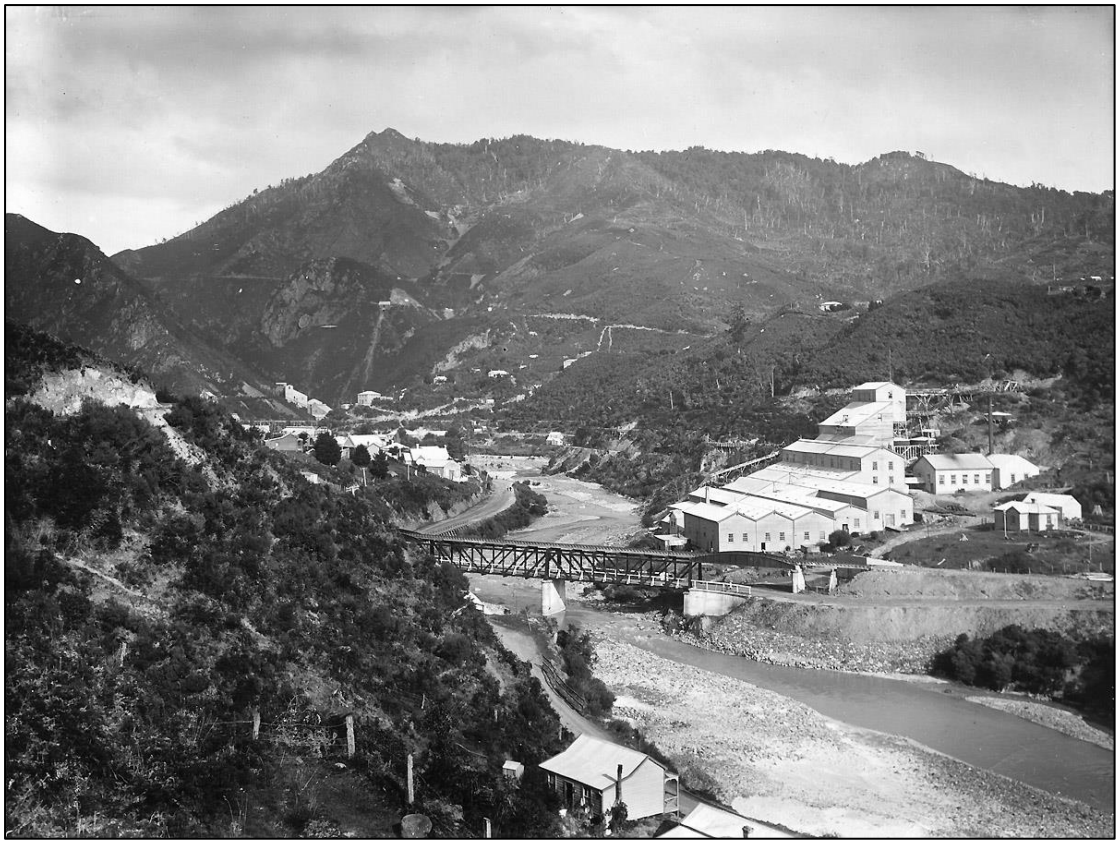
The ore dryer chimneys have been removed.

The two buildings at the back of the battery, right hand side, are the boiler and engine house added 1900. The large chimney pipe is prominent.

The water race and its bye wash are at left. Behind the angle in the bye wash can be seen the mouth of the tunnel through which the new level tramway arrives at the battery.

Photograph taken from high ground across the highway.

Auckland Libraries Heritage Collections AWNS-19051116-09-01



1906[69] Winkelmann photograph W979.

This image shows how extensive the battery complex is. Also how little space is available for the power house to be built beside the river in 1908/9. A heavy retaining wall will have to be built. The earlier 1901/2 boiler and engine houses are clearly visible behind the battery, to the right. Note the elevated connection between the engine house and the stamper building. This covers the drive ropes or belts.

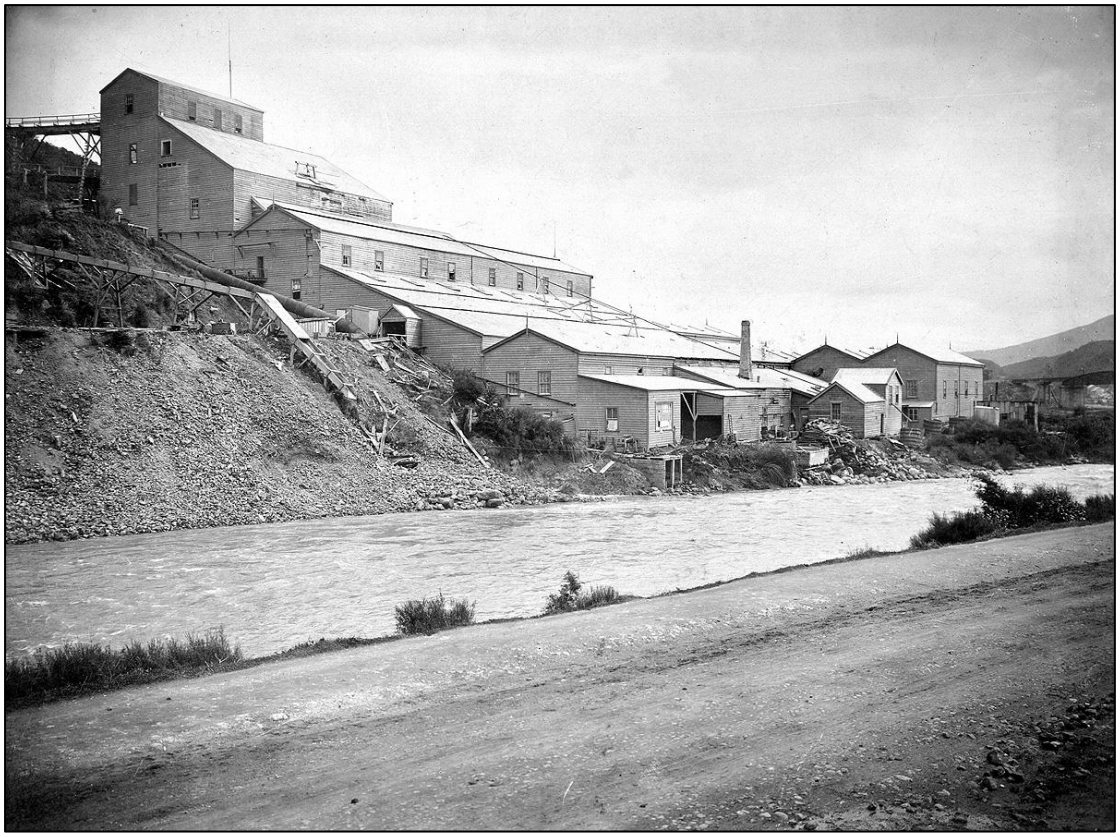
The trestle work at the top of the battery remains from the earlier sloping tramway system, though some will still be being used with the ore hoist out of sight behind the buildings. The trestle work extending in to the hillside, winding cables and sheaves are more clearly seen in later images (with comments). The water tank below this (behind the big chimney) is moved further up the hill later.

The level tramway and the water race flume approach the battery from the left; the sloping trestled flume is the bye wash for the water race. The tramway was tunnelled through the outcrop behind the lower end of the bye wash; we can see a dark hole. The water race flume went above the outcrop.

Mid to top right of the image may show Butler's Track, and the photographer may have been standing on this track. The rocky outcrop beside the highway and river that we see today can be seen in the image. People jump into a deep pool in the river from this outcrop, but no such pool shows in this image. The river is very congested with rail tunnel and mining debris. A hint of the tunnel rubble pile is visible beyond the rocky outcrop.

Staples Collection.

[69] Staples date



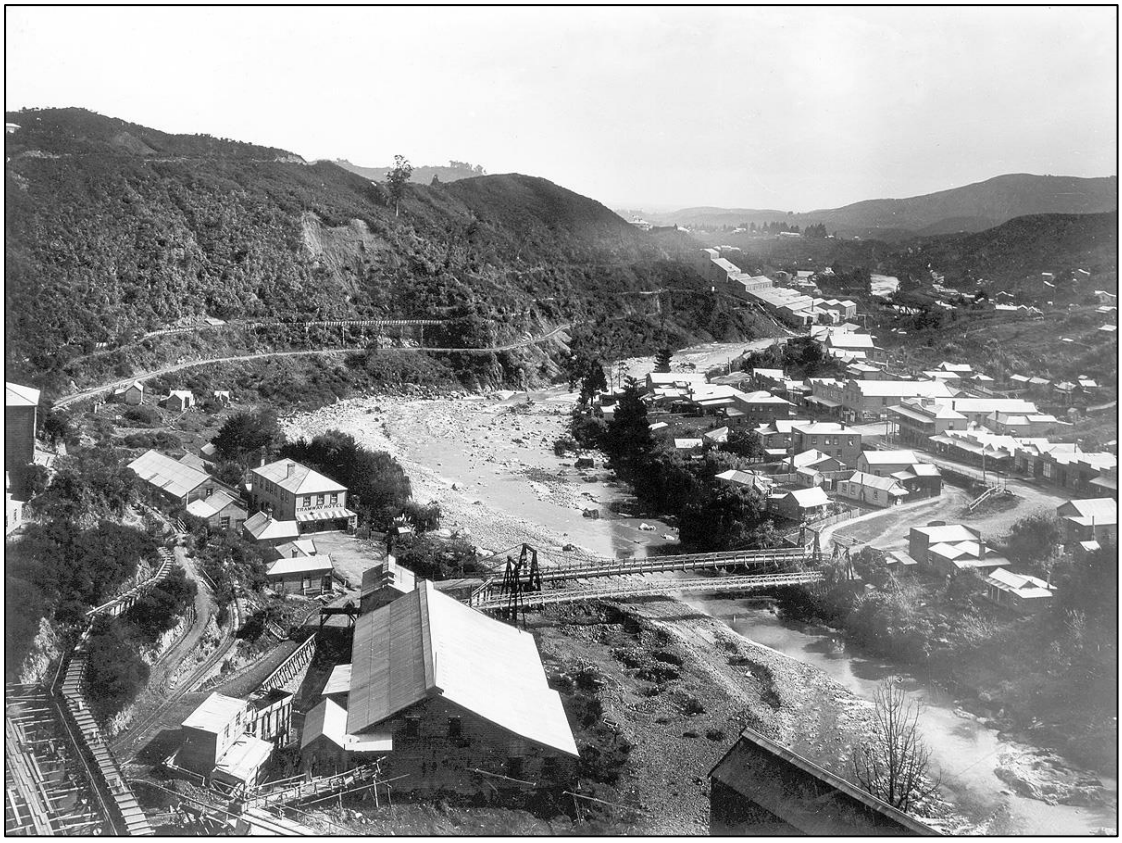
One of the few close-ups from this angle.

The flume in the foreground is the water race bye wash. The large pipe beyond it is delivering water from the race to the pelton wheels which must be low to the river, discharging at the wooden structure just in front of the buildings.

The apparatus that lifts the ore from the tramway to the top of the battery is either hidden from our view, or within the building. One poor image shows an incline close beside the building.

The rail bridge can be seen at the very right of the image. The river is high; there is not much freeboard.

Crown Battery, c. 1906. DoC Thames. The original is hand coloured; see first page of this document.



Winkelmann photograph, 1906[70], W1213.

The Crown battery in the distance. The lowest bench on the hillside is the new, level, tramway. Where it disappears near the battery is where it is tunnelled through the spur. Above this is the water race flume. The large slip scar is the 1901 slip? The company's response to that slip was obviously to support the flume on trestle legs. The flume is discharging water at the battery via the bye wash.

Above this again the remains of the high tramway, abandoned in 1899. At the very top of the hill is the County Road.

Karangahake has become a busy place. Talisman vat house large roof in foreground.

Staples Collection.

1907

22 January

CROWN MINES (KARANGAHAKE)

The recent flood carried away a considerable length of this company's old water race, and in consequence of this crushing operations have been somewhat delayed …[71]

24 July

NEW ZEALAND CROWN MINES. IMPORTANT DEVELOPMENTS AT LOW LEVELS. ELECTRIC POWER TO BE INSTALLED

The construction of a new water-race, in place of the one swept away by the floods in January last, is now beings proceeded with at a cost of about £5500. The requirements of the mine in the matter of power have been well thought out by the management, and the water is to be utilised to develop electrical

[70] Staples date

[71] https://paperspast.natlib.govt.nz/newspapers/WHDT19070122.2.29
Waihi Daily Telegraph, Volume VI, Issue 1845, 22 January 1907, Page 3

power, and generate it on to the mine to operate two or three throw pumps of the ram type, which will be installed in the main shaft. These pumps will be capable of lifting upwards of 1000 gallons of water per minute from a depth of 1000 ft. The water will be available for at least 200 days in the year, and will be delivered at a site near the mill, where powerful Pelton wheels will be installed [a turbine is installed], capable of developing 363 effective horse-power. In addition to the water power, the management intend erecting a steam engine to do the work in the dry season, when the water is not available. The steam power already at the mine will be devoted to the haulage of ore, etc. The electrical scheme referred to is at present under consideration by the London directors of the company, and, it is expected that a move will be made in the matter of construction at an early date.[72]

This is the powerhouse at the Crown battery, completed late 1909.

The company's water-race on the Ohinemuri River, which was destroyed in the early part of the year, is now being reconstructed, and the milling plant has been worked by steam. [73]

1908

27 May

The machinery will consist of a large electric three-phase generator of 550 kilowatts, 25 periods, working at 300 revolutions per minute. This generator will be worked by a Francis turbine [a water turbine, to use water from the Ohinemuri water race], manufactured by Eisher [Eicher?] Viess and Co., the turbine to be assisted by a triple expansion steam engine now being manufactured by Beiless [Belliss] and Morcam [74] The overhead transmission to the mine will consist of three stranded conductors, each conductor being about ½-inch diameter. At the mine it will be connected up to a panel, and a three-core insulated cable. This cable will be connected to suitable resistances, and to the motors driving the pumps…

It has been estimated that there is ample water supply in the Ohinemuri river for the driving of this plant, about 200 days of the year, and during the remaining 166 days the plant will be assisted by steam power, so that, from the above, it will be seen that every effort has been made to economise, consistent with efficiency. [75]

17 November

CROWN. MINING AND MILLING, SUSPENDED Waihi, Monday.

For the first time for over 25 years mining and milling operations in the New Zealand Crown mines at Karangahake have been suspended. At the earliest work is not likely to be resumed for several months, during which the new electrical pumping plant for unwatering the mine to a greater depth will be installed…

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[72] https://paperspast.natlib.govt.nz/newspapers/NZH19070724.2.21
New Zealand Herald, Volume XLIV, Issue 13498, 24 July 1907, Page 5

[73] https://paperspast.natlib.govt.nz/parliamentary/AJHR1908-I.2.2.2.5
THE GOLDFIELDS OF NEW ZEALAND. (REPORT ON), Appendix to the Journals of the House of Representatives, 1908 Session I, C-03

[74] Video: https://youtu.be/KOlhVVmb9pU

[75] https://paperspast.natlib.govt.nz/newspapers/AS19080527.2.94
Auckland Star, Volume XXXIX, Issue 126, 27 May 1908, Page 8

Part of the new plant, which in all cost from £12,000 to £13,000 in England, is on the ground, and the estimated cost of the water-race now in course of construction is £6000. [76]

18 December

F. R. W. Daw, general manager of the New Zealand Crown Mines Co. Ltd… The plant consisted of a large triple expansion steam engine, a 550 kilowatt generator, a 720 h.p. turbine, two Babcock boilers (250 h.p. each), two motors, two large duplex pumps, seven tons of copper stranded conductors, and insulated cables, together with the necessary fittings. It was proposed to instal this machinery in an electrical power station, which was now under construction. The steam power was for the purpose of supplementing the water power during the drought. The energy generated at the station was to be used for working the motors [pumps in the mine]. Witness was of opinion that the plant would enable him to carry out his scheme of operations. It was estimated there would be about 1100 gallons of water per minute to pump. About £8000 worth of machinery was now on the way out. In connection with the installation of this machinery they had commenced the power station, and excavated for the turbine site. One of the buildings was also partly constructed. They had also spent thousands of pounds in connection with the water race. They had erected a very large workshop, which was thoroughly equipped and finished. [77]

1909

19 February

The concrete foundations for a powerful electrical plant are now being prepared at the Crown mine. The site is on the banks of the Ohinemuri river.[78]

29 March

Great progress is being made with the erection of the Crown company's new plant. Two new boilers have been placed in position and the work of encasing them with brick has already commenced. The whole structure is assuming a definite shape, lending the impression of an imposing appearance when completed. [79]

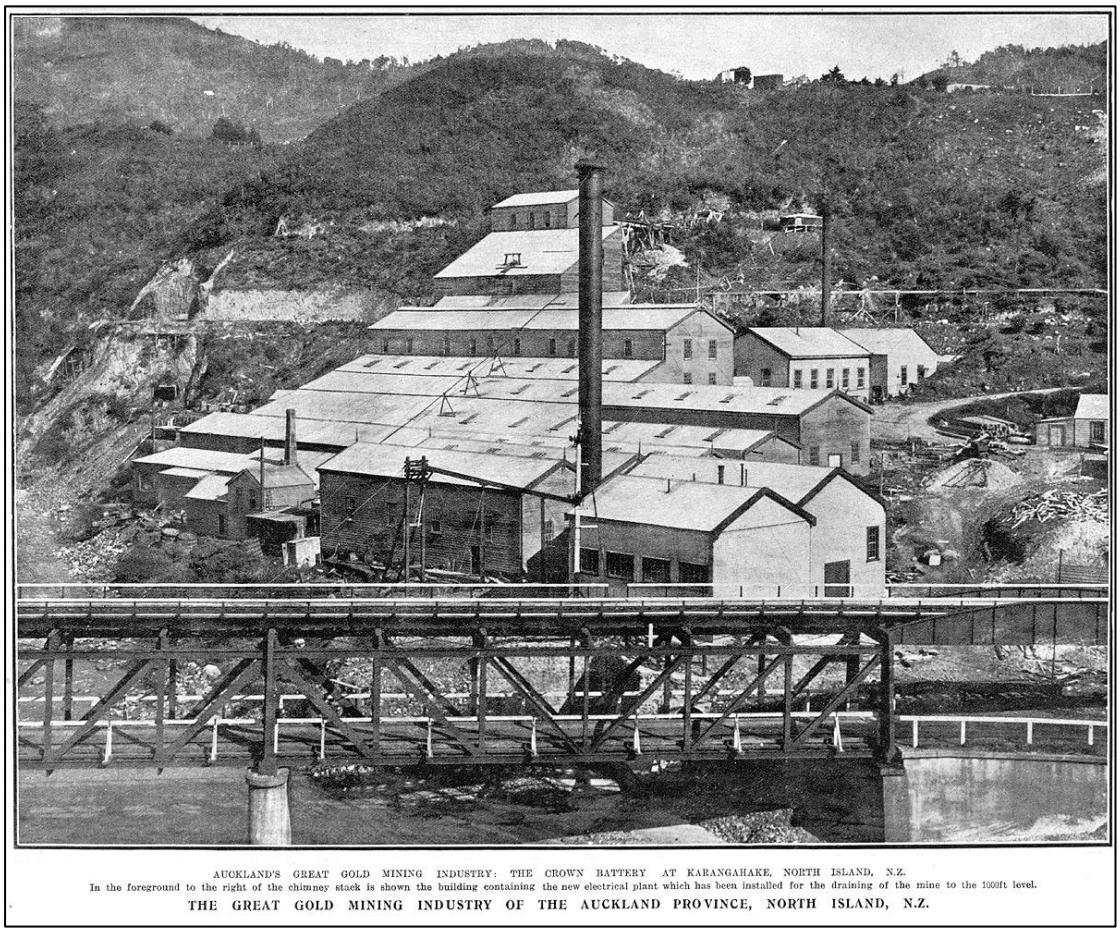
14 August

The power station near the company's reduction works is finished. Here a large triple expansion engine for driving a three phase 550 kilo. generator has been installed. There is also a large Francis turbine for driving the same generator when there is a sufficient supply of water in the Ohinemuri River for doing so. The plant is completely fitted up in all other respects. There are two Babcock boilers of 250 horse-power each, feed pumps, and every type of safety device to provide against accidents. The plant has been built on very

[76] https://paperspast.natlib.govt.nz/newspapers/NZH19081117.2.11
New Zealand Herald, Volume XLV, Issue 13909, 17 November 1908, Page 3
[77] https://paperspast.natlib.govt.nz/newspapers/OG19081218.2.12
Ohinemuri Gazette, Volume XVIV, Issue 2438, 18 December 1908, Page 2
[78] https://paperspast.natlib.govt.nz/newspapers/AS19090219.2.13
Auckland Star, Volume XL, Issue 43, 19 February 1909, Page 2
[79] https://paperspast.natlib.govt.nz/newspapers/THS19090329.2.22
Thames Star, Volume XLV, Issue 10682, 29 March 1909, Page 2

substantial foundations, a great deal of the concrete work being over 20ft deep…
The company have also erected a workshop for the carrying out of the whole of the repairs.[80]

Power station finished.



AUCKLAND'S GREAT GOLD MINING INDUSTRY: THE CROWN BATTERY AT KARANGAHAKE, NORTH ISLAND, N.Z.
In the foreground to the right of the chimney stack is shown the building containing the new electrical plant which has been installed for the draining of the mine to the 1000ft level.
THE GREAT GOLD MINING INDUSTRY OF THE AUCKLAND PROVINCE, NORTH ISLAND, N.Z.

Image published by the Auckland Weekly News 26 August 1909.

Shortly after the completion of the power house. Just above the road level of the bridge can be seen the arched top of the tailrace tunnel.

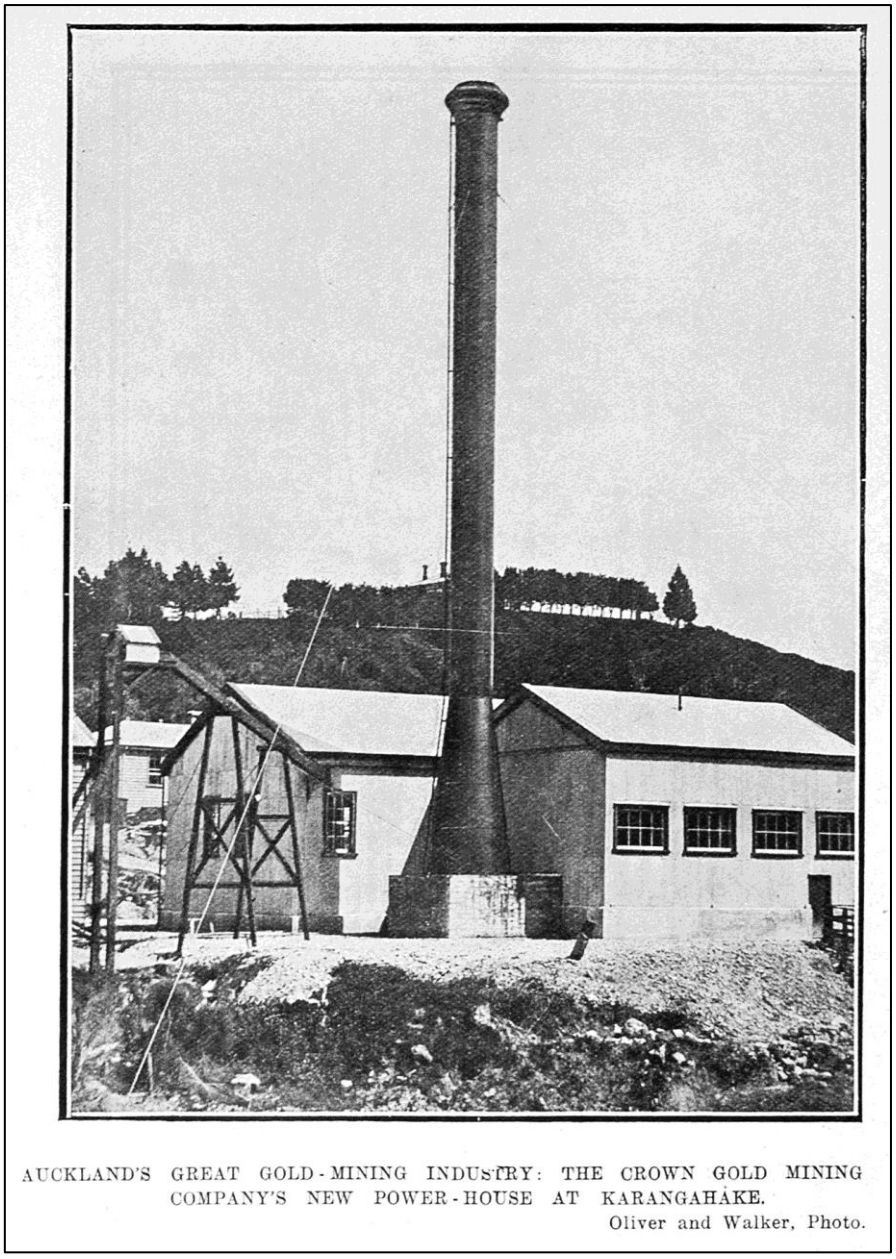
How did the water get from the water race to the turbine? How did the coal get to the boiler house?

The water tank at the back of the battery has been moved further up the hill. Also, what appears to be a light water race flume bringing water from out of frame to the right – from the stream in the gully behind the modern Karangahake hall?

The tramway tunnel through the rocky outcrop can be clearly seen. This outcrop is removed by the later quarrying operation.

Auckland Libraries Heritage Collections AWNS-1909 08 26-13-03

[80] https://paperspast.natlib.govt.nz/newspapers/NZH19090814.2.68
New Zealand Herald, Volume XLVI, Issue 14139, 14 August 1909, Page 6



AUCKLAND'S GREAT GOLD-MINING INDUSTRY: THE CROWN GOLD MINING COMPANY'S NEW POWER-HOUSE AT KARANGAHAKE.
Oliver and Walker, Photo.

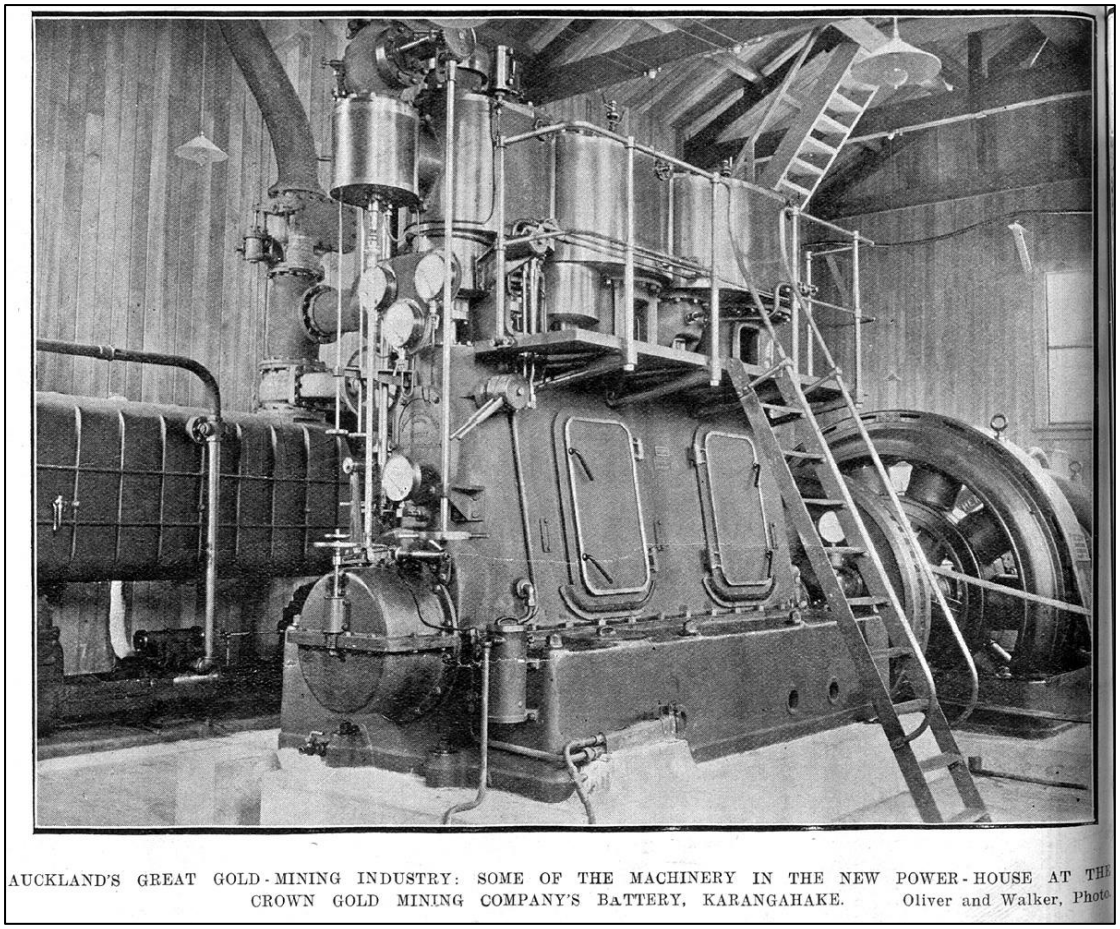
The New Crown Company Powerhouse. Image published by the Auckland Weekly News 4 November 1909.

The photograph was taken from across the river (ie roadside). The two buildings and chimney are the lowest set of foundations now seen at the Crown battery site. The concrete tunnel at almost river level is the tailrace for the water turbine, and also, says Bert Reed, for the ash and clinkers from the two boilers.

The trestle wooden conduit may have contained the electrical cables. The little "house" atop the trestle, at extreme left, has cables exiting to the left. The foot print of the large chimney can still be made out today. The chimney incorporates a ladder.

Auckland Libraries Heritage Collections AWNS-1909 11 04-06-01 Oliver and Walker. The larger image linked to is from the Staples Collection.

On the back of that image were notes by Bert Reed, stating that "when the mine closed the Power House was dismantled and sent to Wanganui".



AUCKLAND'S GREAT GOLD-MINING INDUSTRY: SOME OF THE MACHINERY IN THE NEW POWER-HOUSE AT THE CROWN GOLD MINING COMPANY'S BATTERY, KARANGAHAKE. Oliver and Walker, Photo.

Auckland Weekly News published 4 November 1909.

Central in this image is the large triple expansion steam engine (Belliss and Morcam), generator to right, turbine (?) obscured extreme right. Boiler house behind the wall at back, river beyond. The concrete foundations remain. The foundations and subsurface cavities of the turbine area remain a mystery. The concrete tunnel at almost river level is the tailrace for the water turbine, and also for battery tailings?

A modern video of a two cylinder version of this steam engine, with a generator, can be seen at: https://youtu.be/KOlhVVmb9pU

10 December

Crushing has been resumed at the New Zealand Crown Mines, Karangahake. At present the battery is only running one shift. [81]

AJHR 1910

The powerhouse and boilers are situated close to the Government railway, and consists of two Babcock boilers, designed to raise 6,000lb. of steam per hour at a pressure of 160lb. The boilers are connected to superheaters capable of imparting 500° Fahr. of supperheat to the steam produced from the boilers. The machinery in the power-house is as follows: One 550 BHP high-speed triple-expansion engine: one 550 K.W. generator, 25 periods, 2,200 volts. 300 revolutions per minute; one 25 K.W. exciter, 110 volts, 750 revolutions per minute; one two-panel switchboard; one Francis turbine; one condenser; one feed-water heater…

[81] https://paperspast.natlib.govt.nz/newspapers/NZH19091210.2.9
New Zealand Herald, Volume XLVI, Issue 14240, 10 December 1909, Page 3

> The machinery was started on the 10th July, and worked without the slightest hitch. [82]
>
> 27 December
>
> At the mill 55 stamps are now in commission for one shift of 10 hours per day, and are stamping from 40 to 45 tons of ore daily… Afterwards the mill, which meantime is being run with steam power, will be run by motor power from the power-house, thus effecting a saving in cost.[83]

The 1910 AJHR reports that the stampers, in fact the whole battery, are converted to be run by electric motors.

Was the turbine ever used? Was the existing engine at the back of the battery ever used again?

Close inspection of several photographs suggest that the water race was removed shortly after the completion of the power house, the turbine little, if ever, used. The AJHR for 1912: The machinery in connection with the treatment plant is now all electrically driven. [84]

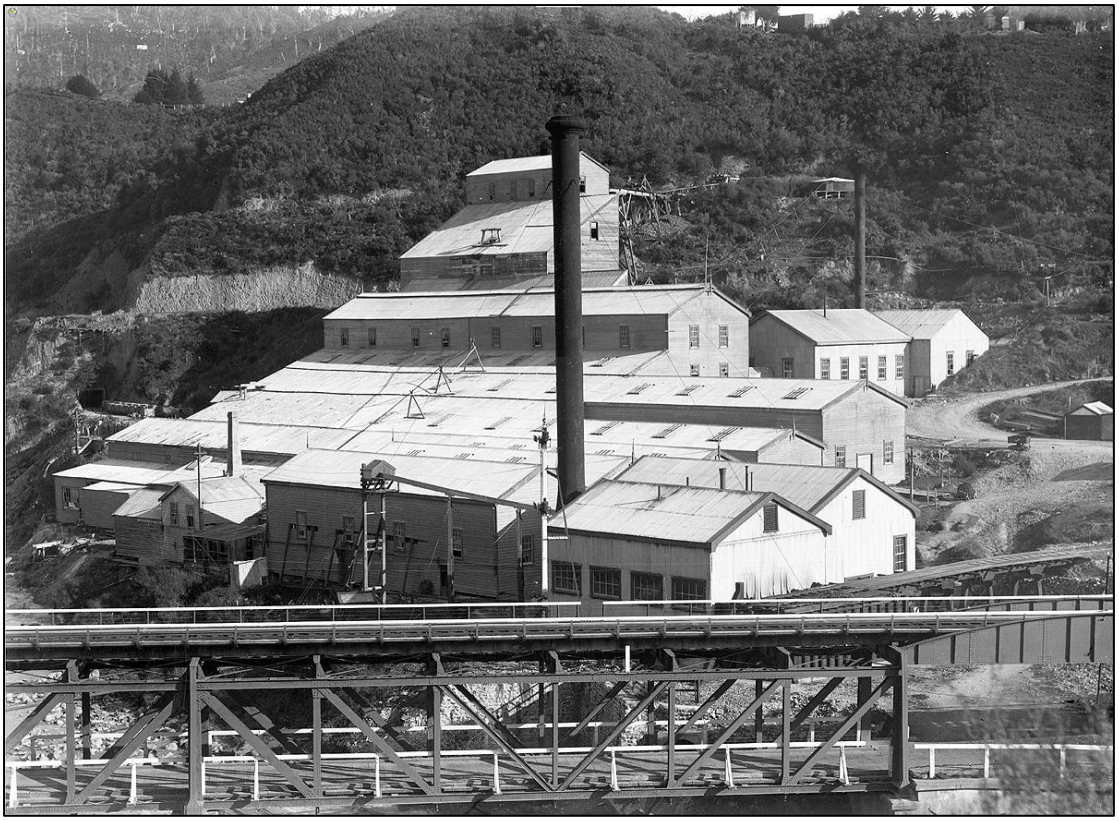
The foundations that remain show where the steam engine, dynamo and turbine were situated.

Three images from the Alexander Turnbull Library, via the Staples Collection, each show a man posing with the engine; Tom Henry, HE Herring and Bill McLean (not included here).

[82] https://paperspast.natlib.govt.nz/parliamentary/AJHR1910-I.2.1.4.9
THE GOLDFIELDS OF NEW ZEALAND (REPORT ON)., Appendix to the Journals of the House of Representatives, 1910 Session I, C-03

[83] https://paperspast.natlib.govt.nz/newspapers/NZH19101227.2.8
New Zealand Herald, Volume XLVII, Issue 14562, 27 December 1910, Page 3

[84] https://paperspast.natlib.govt.nz/parliamentary/AJHR1912-II.2.2.2.7
MINES STATEMENT, BY THE HON. JAMES COLVIN, MINISTER OF MINES., Appendix to the Journals of the House of Representatives, 1912 Session II, C-02. Page 21



George Chappell photograph.

Through the framework of the road/rail bridge can be seen the substantial retaining wall required to provide space for the boilers and engine shed. The top of the tailrace is just visible.

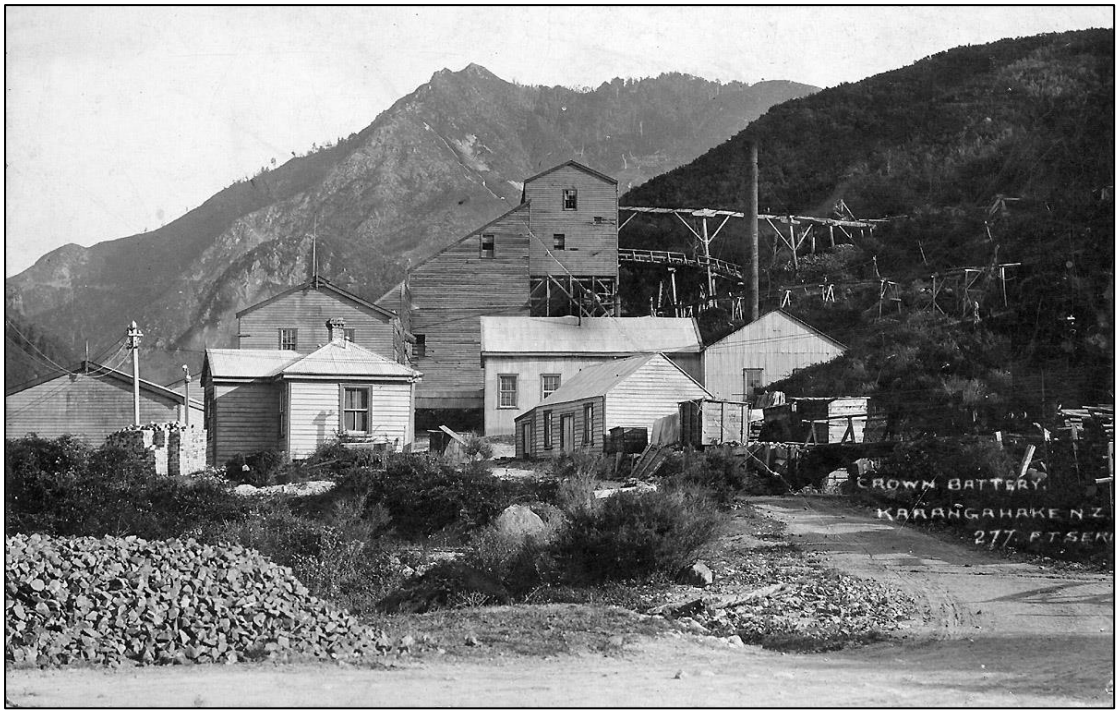
The pole just to the left of the large chimney mounts two railway signal devices. Just to the right of the boiler house is a newly constructed rail line, on trestles, which allows for delivery of coal. The coal is dropped through the rails to some sort of hopper in front of the building. This is not present in the 26 August 1909 AWN photograph.

Behind the very top of the battery, beyond the trestle, is a structure with two large wheels (like the top of a poppet head). Cables are visible. Is this winding gear for elevating the ore from the tramway to the top of the battery? Also on the hillside, a water tank and pipe. Process water supply?

At the left of photograph is the tunnel through which the ore carts arrive at the battery. This area is quarried after closure of the battery c.1915. Above that is the bench where the water race flume should be, but it appears to be gone. Are they no longer using water power?

Above that again are some cuttings from the early, sloped, ore tramway.

Crown Mine Battery, Karangahake. Chappell, George A, fl 1900-1928:Negatives, chiefly of gold mining at Waihi. Ref: 1/2-023609-G. Alexander Turnbull Library, Wellington, New Zealand. /records/22889894



A view from the railway line.

The lightweight flume traversing the hillside to the right of the battery buildings is prominent. Is this bringing in process water, now that the main water race no longer exists?

Staples Collection.

AJHR 1912

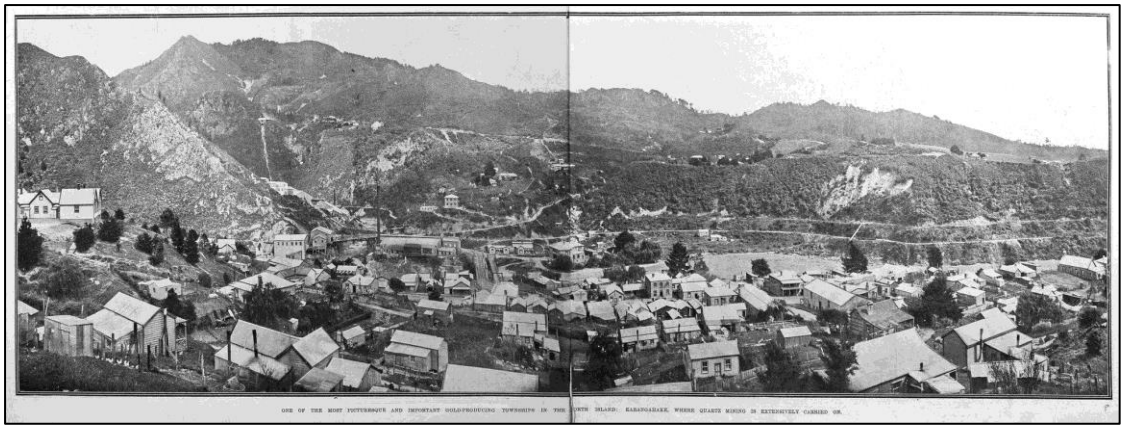
> The machinery in connection with the treatment plant is now all electrically driven, and the Waitawheta main adit is lighted by electricity for 1,700 ft. [85]

Now all electrically driven. No mention of the water turbine for some time now. Presumably the triple expansion steam engine is doing all the work.

> Mill. —All the machinery in the mill is now being driven by a 250-horse-power electric motor, which is working very satisfactorily. A transformer has been installed in the power-house, which enables the electric power to be used for working small motors, and a 9½-horse-power motor now drives all the fitting-shop machinery. Electric power is also used for hoisting ore from the tram-line to the top of the mill buildings. [86]

[85] https://paperspast.natlib.govt.nz/parliamentary/AJHR1912-II.2.2.2.7
MINES STATEMENT, BY THE HON. JAMES COLVIN, MINISTER OF MINES., Appendix to the Journals of the House of Representatives, 1912 Session II, C-02. Page 21

[86] https://paperspast.natlib.govt.nz/parliamentary/AJHR1912-II.2.2.2.7
MINES STATEMENT, BY THE HON. JAMES COLVIN, MINISTER OF MINES., Appendix to the Journals of the House of Representatives, 1912 Session II, C-02. Page 36



Published by the Auckland Weekly News 9 October 1913.

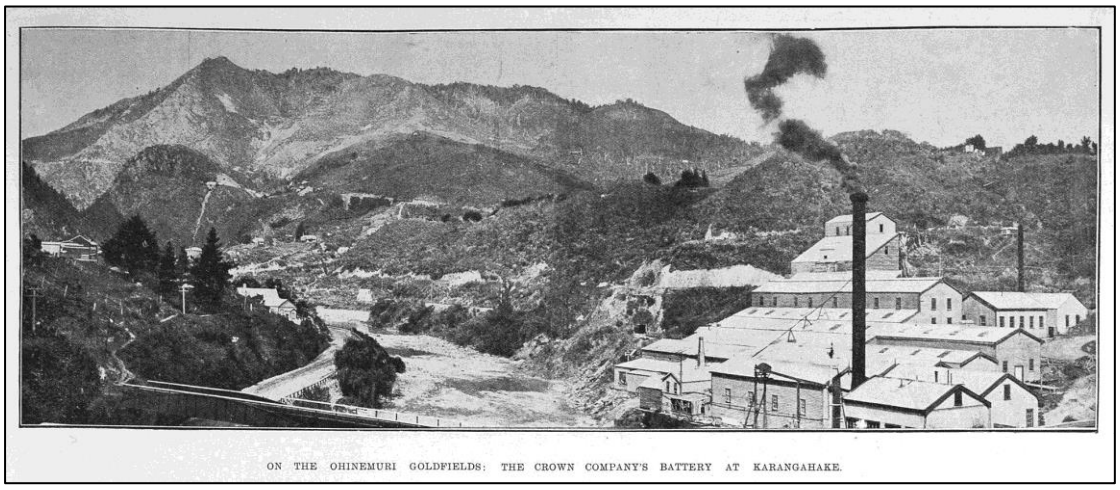
The new Traffic Bridge is in place (1912), the band rotunda and fire bell tower are faintly visible.

The Crown water race has been removed from its cut bench. What appears to be a bye wash flume has been added at the slip site. This is also shown on a map; Plan of Karangahake Mining Township 1893-98. A separate pipe brought water to the battery from the discharge of the pelton wheel/compressor at the mine entrance[87]. The map seems to show this pipe discharging at this point. Unclear.

Or, is this a leftover from the water race flume? Maybe drainage from the slip site and water race bench?

The slip site is slowly healing. The spur to the right of the bye wash is the sharp bend on our current walkway, with the very large pine tree.

Auckland Libraries Heritage Collections AWNS-1913 10 09-47-02



Published by the Auckland Weekly News 16 October 1913.

Boilers are being stoked.

Auckland Libraries Heritage Collections AWNS-1913 10 16-53-01

The Crown battery ceases operation in 1915.

1915

10 August

CLOSING OF CROWN MINE. DISAPPOINTING RESULTS.
The closing down of the New Zealand Crown mine, at Karangahake, under a term of six months' protection granted by the warden on July 22 last, is a matter for regret in view of the past history of this old and familiar property.

[87] Memory of the writer.

> For some time past it had not been paying, and owing to the war the prospects of obtaining fresh capital were so poor as to render the application for protection a necessity. [88]

1917

16 July

> POWER-HOUSE EXTENSION. STEAM PLANT UNDER TRIAL.
> … fortunately a plant was offered to the Council [Gisborne Borough Council] by the N.Z. Crown Mines, of just the capacity that was required, and on the advice of the Council's electrical consulting engineer. Mr .E. J. Fenn, negotiations for the purchase of the plant were entered into. The plant comprised two Babcock and Wilcox boilers…
> In addition to the boilers and engine, a condenser, steam pumps, and steel chimney were also purchased from the Crown mines, and on tenders being called a contract was let to the Gisborne Engineering Company to remove the plant and re-erect it in the Gisborne municipal power-house…
> The dismantling of the plant at Karangahake was carried out under the supervision of Mr F. deLautour and staff…
> As mentioned previously, the plant was specially designed in London for the Crown Mines Co., and in engineering circles the names of the respective makers are regarded as a sufficient guarantee of efficiency. An engineer who has a good practical knowledge of the machine states that he considers those representing the Council secured a splendid bargain in the purchase.[89]

1919

Crown Quarry granted by Warden

10 March

> The following mining applications were granted by the Warden at the Court on Wednesday:… New Zealand Crown Mines, Ltd., mineral license, Karangahake, royalty 1d per cubic yard plus rent 2s 6d per acre …[90]

14 June

> The local quarry adjacent to the Crown battery has been fully opened up, and good bell metal is to hand, which is in great demand by various councils, etc.[91]

A little upstream from the battery was a spur through which the ore tramway was tunnelled. The outcropping was made up of, or at least included, columnar jointed rock. This was presumably relatively easily broken down and crushed into road metal, and the Crown Company undertook quarrying from here. It is not clear what parts of the battery, if any, were used in this undertaking, though the stone breakers would have been useful. What powered the operation?

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[88] https://paperspast.natlib.govt.nz/newspapers/NZH19150810.2.29
New Zealand Herald, Volume LII, Issue 15992, 10 August 1915, Page 5
[89] https://paperspast.natlib.govt.nz/newspapers/PBH19170716.2.31
Poverty Bay Herald, Volume XLIV, Issue 14350, 16 July 1917, Page 4
[90] https://paperspast.natlib.govt.nz/newspapers/OG19190310.2.6
Ohinemuri Gazette, Volume XXX, Issue 4040, 10 March 1919, Page 2
[91] https://paperspast.natlib.govt.nz/newspapers/THS19190614.2.46
Thames Star, Volume LII, Issue 13910, 14 June 1919, Page 6

Some of the foundations by the walkway may be from the quarrying activity. The area quarried is beside the walkway; indeed, the walkway traverses the quarry floor, which, with the cliff formed, is largely obscured by vegetation. In the 1970s and maybe 80s the columnar jointed formation was still visible.

18 June

> NEW ZEALAND CROWN MINES. MEETING OF SHAREHOLDERS
> …In connection with the assets he [the chairman] mentioned that there was a quarry on the property which might prove valuable, and though he did not want to sound a too optimistic note regarding the same, it was believed that 500 tons of good road-making stone could be obtained from it. "There is evidently more money in the quarry than gold in the mine," interjected a shareholder.[92]

1920

2 March

> The Crown quarry at Karangahake notified that it was impossible to supply metal at present, as it was unable to get the railway trucks.[93]

Earlier mentions of this problem confirm that the Karangahake Quarry is the Crown Quarry.

6 December

> SEASONED KAURI.
> N.Z. CROWN MINES COMPANY Invites tenders for the purchase as one lot of 18,000 ft (more or less) Seasoned Kauri battery framing, as it lies in the Company's yard at Karangahake…
> Terms: Cash before removal. N.Z. CROWN MINES CO., LTD. 60. Shortland St., Auckland.[94]

1921

29 January

> The New Zealand Crown Mines Co., Ltd., invite tenders for the working of their road metal quarry at Karangahake on tribute for a term of two years from the fourteenth day of February, 1921. All plant and machinery other than tools will be provided by the Company, the tributers to provide all labour and stores and pay all expenses...
> Tenders, to be addressed to G. N. McGruer, Manager, Crown Co., Karangahake…[95]

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[92] https://paperspast.natlib.govt.nz/newspapers/AS19190618.2.100
Auckland Star, Volume L, Issue 144, 18 June 1919, Page 9
[93] https://paperspast.natlib.govt.nz/newspapers/WT19200302.2.64
Waikato Times, Volume 92, Issue 14302, 2 March 1920, Page 6
[94] https://paperspast.natlib.govt.nz/newspapers/NZH19201206.2.108.2
New Zealand Herald, Volume LVII, Issue 17646, 6 December 1920, Page 12
[95] https://paperspast.natlib.govt.nz/newspapers/WHDT19210129.2.45.1
Waihi Daily Telegraph, Volume XVIII, Issue 6130, 29 January 1921, Page 3

1926

20 December

> CROWN MINES COMPANY. LONDON, 16th November.
> The report of the directors of the New Zealand Crown Mines Company shows that expenditure in New Zealand amounted to £1214; development and prospecting, £642; total, £1856. Receipts from quarry £427, less Government royalties and charges £68, equalling £358; total, £1497…
> There was a heavy expenditure in New Zealand, mitigated to some extent by profits on the quarry, still totalling £1500…
> The quarry was still working satisfactorily with the assistance of the company's plant, which was necessary for its success…[96]

What sort of assistance? Machinery, power...?

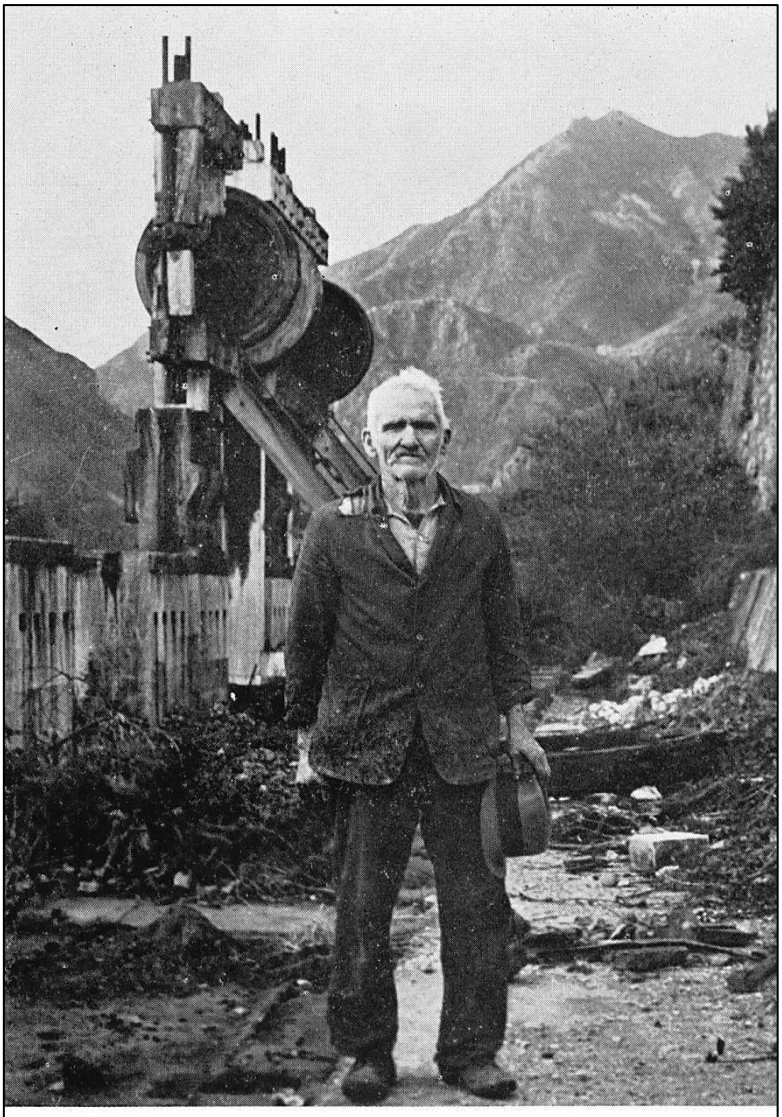
1927

3 August

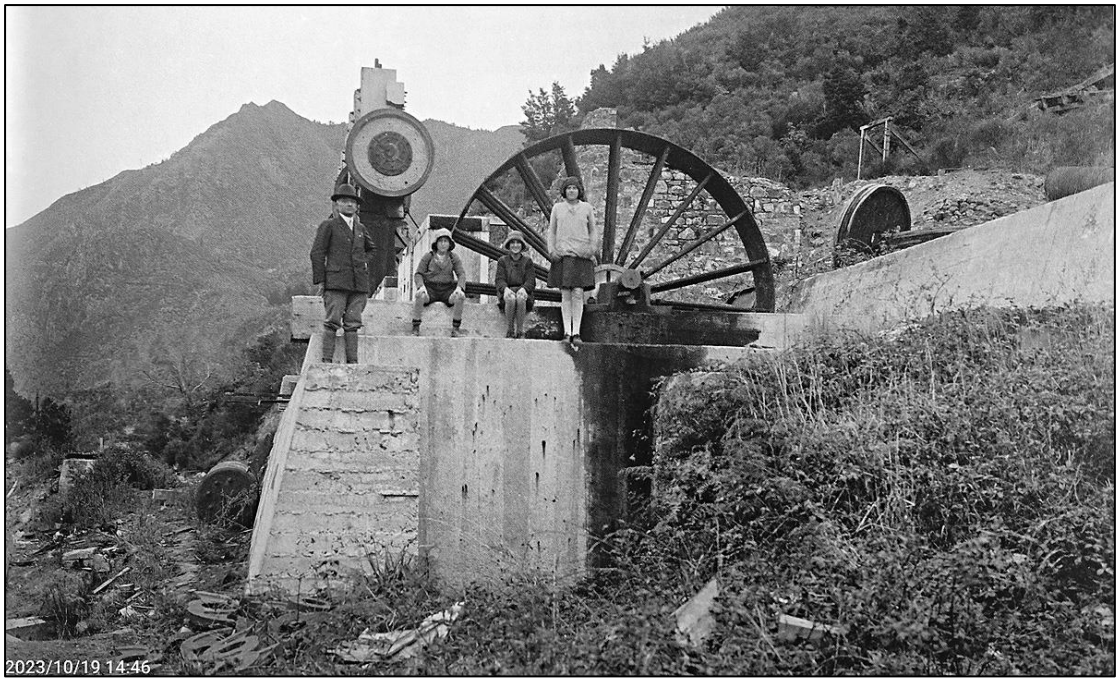
> George Norman McGruer, mine manager at Karangahake, for the company stated ... Men were regularly employed on the water-races, in his opinion the battery could be put into operation within 48 hours, and be capable of crushing small quantities.[97]

It seems the Crown battery has not yet been demolished. The water race still intact must be the Waitawheta race? With the pipe bringing water from the discharge from the pelton wheel/compressor at the mine entrance?

[96] https://paperspast.natlib.govt.nz/newspapers/EP19261220.2.103.3
Evening Post, Volume CXII, Issue 148, 20 December 1926, Page 13
[97] https://paperspast.natlib.govt.nz/newspapers/HPGAZ19270803.2.16
Hauraki Plains Gazette, Volume XXXVIII, Issue 5160, 3 August 1927, Page 3



Circa 1935. Three mortar boxes, two cams and bull wheels. Staples Collection.



A Jos Divis photograph. The large wheel (mounting bolts remain) was driven by belt from the steam engine behind the battery, out of image to right. To the left of the wall Divis is standing on is the current walkway. Top right shows the remains of the ore-cart hoist. Divis was briefly in Waihi 1930.

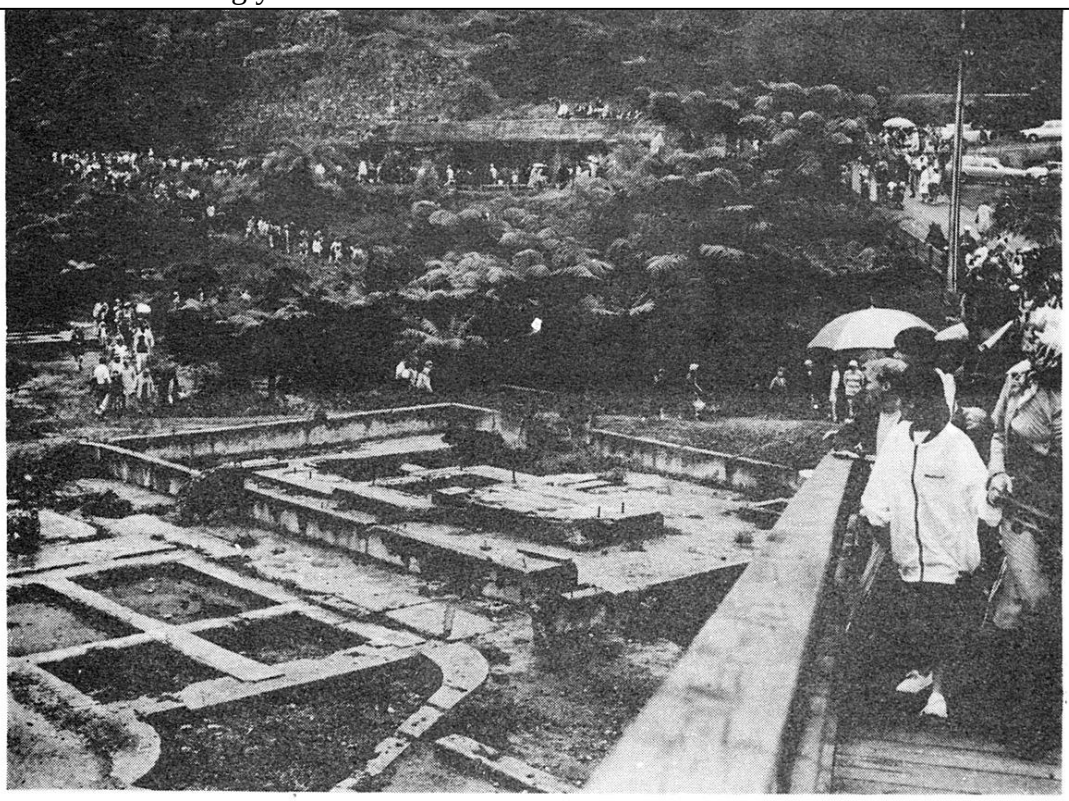
17.10.2023. Crown powerhouse foundations. Centre right front to back: steam engine mount, generator mount, turbine pit/mount. Middle left: heat exchanger mount. Top left, remains of chimney foundations, with boiler house to left.

Notes:

Battery closes 1915. But not dismantled till after 1927?
Quarrying after closure, but maybe earlier? How powered? What changes made at battery site? Was the battery used for the powering/crushing?
Columnar outcrop of stone quarried.

1985

On Saturday 2 March 1985 Stage 1 of the Karangahake Historic Walkway was officially opened.
One of the images reproduced in the ORHJ shows how much historic detail has been lost in the intervening years.



The large crowd follows a zigzag course through the Crown Battery foundations at the start of the Walkway. (photograph : John Greenwood)

John Greenwood. 2 March 1985.[98]

This image shows the Crown Powerhouse site, including especially the boiler room foundations. Much of the remains of the battery are now completely lost to us by privet and willow.

[98] Karangahake Gorge Historic Walkway. Ohinemuri Regional History Journal 29, October 1985 https://www.ohinemuri.org.nz/journals/journal-29-october-1985/karangahake-gorge-historic-walkway