

Modelling construction camps on the Otago Central Railway

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The development of strategic infrastructure such as road and railway networks in New Zealand during the latter part of the nineteenth century relied on a combination of government workers from the Public Works Department and private contractors. As these projects were often undertaken in remote areas the workforce would be housed in temporary camps, which could be occupied for a matter of months to some years. The following study puts forward a model to explain the location of railway construction camps on the Otago Central Railway in the South Island of New Zealand, which was constructed between 1880 and 1917. The model is tested against evidence drawn from archaeological field survey and historical research, which shows that there are distinctions between the locations of the Public Works Department camps and those of the private contractors.

INTRODUCTION

The development of overland transport infrastructure represents the second phase of European colonisation in Aotearoa New Zealand. By the 1860s coastal settlements had been established where possible and connecting these became of paramount importance. As well as linking the major urban areas, opening up the interior of the country for primary extraction activities such as mining, forestry and agriculture was high on the agenda. In the second half of the nineteenth century railways were the fastest and most economic means of moving large numbers of people and bulk freight overland (Watson 1996:87). The development of transport infrastructure required labour and heavy engineering, and while the basic work of rock breaking and digging could be effectively completed with unskilled labour, more specialised tasks such as bridge-building and tunnelling required an experienced workforce of stone masons, fitter welders and tunnel dressers. Using a regional railway constructed during this time as a test case, this study questions whether it is possible to develop a methodology to locate temporary settlements occupied by these groups of itinerant specialised and general labourers.

This study assesses which factors influenced the location and form of workers' camps associated with the construction of the Otago Central Railway. Otago is located in the east of the lower South Island of New Zealand. Having identified a set of influences, can we then use them to create a predictive

location model to apply to construction-related camps on other New Zealand railways, and the wider archaeology of strategic infrastructure such as track-ways, stock banks, roads and electricity networks?

Traditional industrial archaeologies have tended to focus on the monument and the machine to track the development of the industrial revolution (Shackel 2010:178). While this is obviously a valid approach, Shackel (2010) and Hill (1999) point out that this emphasis on the things people have made, impressive as they are, reduces the role of the people who made them. Like other industrial archaeologies railways archaeology has been for the most part concerned with the study of the physical features associated with the day to day operation of rail systems (McVarish 2008:68; Nock 1981:7). This includes locomotives and rolling stock as well as features such as bridges, culverts, signals, viaducts, embankments and the rails themselves (Baram 2011; Campbell *et al.* 2009; Coulls *et al.* 1999; Kiernan *et al.* 1989; McVarish 2008; Nock 1981).

In contrast to the study of monuments and machines, the archaeology of workers' camps could be described as 'social archaeology' which provides 'ethnographic snapshots of lifestyles, living conditions, cultures, social relations and ecologies' (Hardesty 2002:94). These range from comparative studies of living conditions and change over time (Briggs 1974; Cleveland 1983; Davies 2005; Franzen 1992; Gillespie and Farrell 2002; Morris 1994), to the study of camps as communities (Davies 2005; Morris 1994). Many of these investigations have focused on workers' camps associated with exploitative industries such as sealing and whaling, mining (particularly gold mining), and forestry. In the South Island previous studies have been concerned largely with Chinese groups associated with gold mining (Ritchie 1984, 1986; Ritchie and McGovern-Wilson 1986), and whalers and sealers who tended to be European or American, at least initially (Campbell 1992; Dudfield 2004). Only the work of Briggs (1974), Cleveland (1983), Morris (1994), Wegars and Sprague (1981), and Wessex Archaeology (2008) have been specific archaeologies of railway construction camps.

Because there has been limited previous investigation of railway construction related sites in New Zealand, there are few studies on which to base any form of modelling as to where such sites could be expected to be found. This study will draw heavily on William Buckles' (1983) *Models for Railroad Construction Related Sites in the West*, an American study based on locating railway construction related sites in the West Rockies, Colorado. Buckles proposed three basic categories of railway construction related camps: those relating to activities ahead of the tracks such as surveying, the formation of cuttings

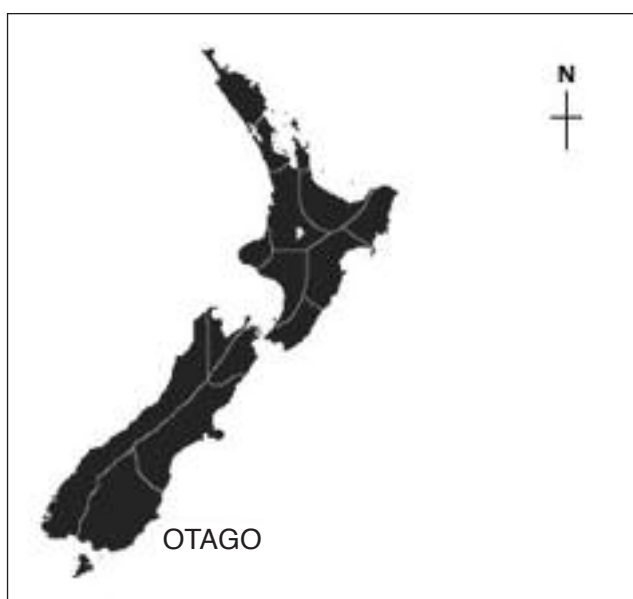


Figure 1: Map of New Zealand.

and tunnels, and bridge and culvert construction; those relating to track laying such as ballasting and rail laying; and those relating to activities conducted after track laying such as track maintenance (Buckles 1983:215). Other factors which Buckles states may dictate site location include: environmental variables, for example bridge builders being based near rivers; technological variables, such as whether a blacksmith was present, or which tools were in use; social structural variables, such as the ethnicity of the workforce, contractor or sub-contractor occupying the site; and economic variables such as working conditions and terms of contract (Buckles 1983:218-220).

HISTORY OF THE OTAGO CENTRAL RAILWAY

The Otago Central Railway, located in the lower South Island of New Zealand, was constructed between 1879 and 1918. Originally mooted as a means of linking the goldfields of Central Otago with the port of Dunedin, by the time work on the railway began the gold rush of the 1860s was long over. In the interim much land had been settled and turned over to farming and orcharding, and a means of quickly transporting produce from Central Otago to the city of Dunedin and its port was needed (Churchman and Hurst 1990:200). The railway was to be built using money made available from Sir Julius Vogel's 1870 policy to borrow heavily from Britain and invest in infrastructure. Vogel was a key figure in the development of the New Zealand colony. He served as New Zealand Colonial Treasurer under William Fox in 1869, and during this time advocated the borrowing of huge sums of overseas funds for the development of transport infrastructure (Mitchell 2012:5). He became Premier in the 1870s, and continued this policy of heavy borrowing.

The Public Works Department was the overseeing organisation for the construction of the Otago Central Railway and was mainly involved in forming the track bed. Private contracting firms saw to the more specialised tasks of tunnelling, bridge and viaduct construction, as well as some cuttings and embankments (Dangerfield and Emerson 1995:14).

The landscape through which the Otago Central Railway wound its way was, like most New Zealand landscapes, formed by a combination of volcanism, erosion, metamorphism and tectonic activity. The Taieri River has played a large part in the formation of the Otago landscape, continually wearing down what tectonic activity has thrown in front of it as it works its way to the sea. This explains its convoluted course, which the railway follows through the Taieri Gorge, a landscape of streams, gulches, steep drops and rocky outcrops (Dangerfield and Emerson 1995:7). These hills were formed by the uplifting and folding of the schist bedrock which underlies much of inland and central Otago, giving it its unique character. After leaving the Taieri Gorge the Otago Central Railway traversed the Strath Taieri Plain, an upland

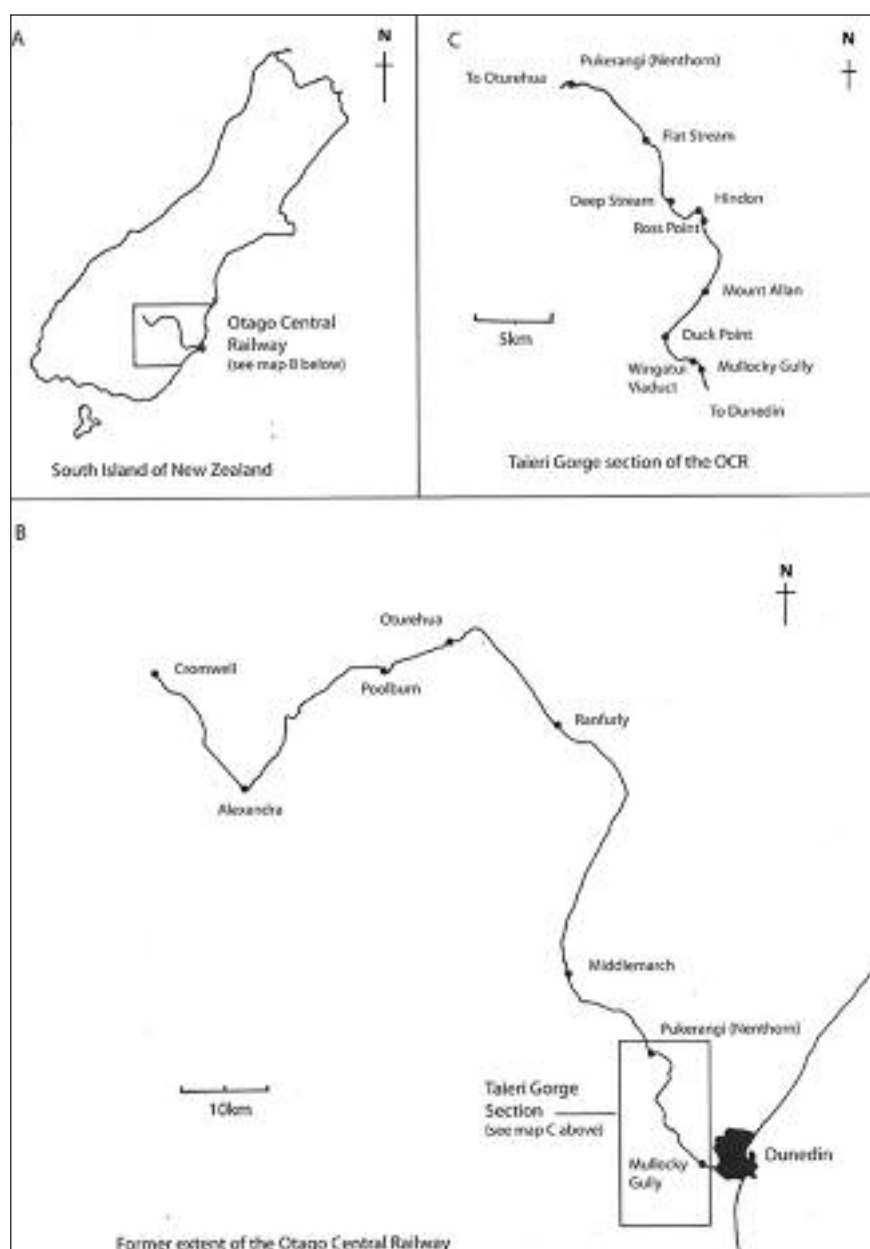


Figure 2: Map of the Otago Central Railway.

area some 550 metres above sea level. This is a dry landscape of schist rock outcrops (tors) and few trees, now favoured by sheep farmers. From here the railway struck out across the Maniototo Plain and skirted the northern end of North Rough Ridge before negotiating a series of valleys separated by ridges on its way to Alexandra. It then followed the upper Clutha River to Clyde, where it entered the now flooded Cromwell Gorge and followed this to its final stop, the town of Cromwell (Dangerfield and Emerson 1995:9).

On 7 June 1879 the first sod of the Otago Central Railway was turned at Wingatui (Cunningham 2005:70; Leitch and Scott 1998:92; McLintock 1949:662). Optimism was high, with the railway expected to reach Wanaka by 1884. By August 1880, 700 men were employed by the Public Works Department on the stretch of line from Mullocky Gully to Deep Stream, under government measures to deal with unemployment; however wage reductions and labour relation issues reduced the workforce to 115 in December of that year (Dangerfield and Emerson 1995:14). Several Public Works Department camps were set up along the proposed path of the railway through the Taieri Gorge, and contractors for tunnelling and viaduct and bridge construction had camps of

their own. In addition to the workers' tents and sod huts, the Public Works Department camps also boasted carpenters' and blacksmiths' workshops, an engineer's office, a powder magazine and stables. There were also stores and boarding houses at these camps. Similar facilities were provided at camps beyond the Gorge (Dangerfield and Emerson 1995:15).

The world-wide economic depression of the 1880s, combined with the rugged, inhospitable terrain of the Taieri Gorge conspired to dash any hope of the railway being completed quickly. After four years of very hard work the track bed was only prepared as far as Hindon, half way through the Taieri Gorge and barely a tenth of the distance to Wanaka (Churchman and Hurst 1990:200; Dangerfield and Emerson 1995:14). The workforce was now largely gleaned from the ranks of the local unemployed, alongside drifters from the goldfields, particularly the Chinese, who tended to keep to themselves (*Otago Witness* 26 Sept. 1885:12). In addition there were still many navvies who had immigrated to the fledgling colony from Britain under Vogel's 1870 labour and iron agreement with John Brogden and Sons of London. This agreement allowed for the importation of heavy engineering, such as railway iron and bridging girders, and a labour force skilled in railway construction (Olssen 1984:88; Watson 1996:105).

Another reason for the slow progress of the Otago Central Railway was the lack of a bridge over the Taioma Stream at Mullocky Gully, at the entrance to the Taieri Gorge. In January 1885 the contract for the Wingatui Viaduct (originally known as Taioma Viaduct) over Taioma Stream, was let and the viaduct was completed in 1887. This meant that the ironwork required for bridges and viaducts further up the line could now be delivered (Dangerfield and Emerson 1995:15). By 1890 the initial stages of the Otago Central Railway through the Taieri Gorge were completed. Although the terrain beyond the gorge was more conducive to railway construction, it was a further 17 years before the railway reached Clyde in 1907, and 10 more years passed before the line reached Cromwell in 1917. The line never reached Wanaka, instead terminating at the station at Cromwell. In January 1918 the Public Works Department ran the first passenger trains to Cromwell and on 11 July 1921 the Railways Department took over the running of the Otago Central Railway (Churchman and Hurst 1990:200; Dangerfield and Emerson 1995:34).

The Otago Central Railway operated until 1990, although it never returned a profit, despite early restrictions on how far goods could be moved by road in competition with railways (Leitch and Scott 1998:94). Freight carried included wool, livestock and stone-fruit, as well as heavy equipment for the dredges on the Clutha River (Churchman and Hurst 1990:200).

METHODS

Prior to 2012 the archaeology of construction related sites on the Otago Central Railway was limited to the recording of surface features and chimneys associated with the Flat Stream Public Works Department campsite by Jill Hamel in 1995. Hamel identified the probable location of the police camp (NZAA site number I43/118), a terrace, hut sites, hut floors, chimneys and a sod wall/fence (I43/119), and the main Public Works Department camp site, which consists of a cluster of hut sites and chimneys (I43/121). All features recorded were on the surface and no archaeological excavations were undertaken.

The present study, undertaken for an MA thesis (Mitchell 2012) combined an analysis of the historical record, remote sensing, and archaeological field survey; it did not include excavations. The historical record included written histories of the railway, contemporary newspaper reports, contemporary photographs of the construction camps, and Survey Office

maps from the time the Otago Central Railway was under construction.

Dangerfield and Emerson's (1995) *Over the Garden Wall: Story of the Otago Central Railway* was an invaluable resource, providing the bulk of the background information used in this study. This was consulted in conjunction with contemporary issues of the *Otago Daily Times* and the *Otago Witness*, which provided much useful information regarding the construction of the Otago Central Railway, especially the articles furnished by an *Otago Witness* correspondent who went by the pen name of 'Peripatetic Jotter'. The reports of the Peripatetic Jotter were published in the *Otago Witness* between May and September 1885. The reports of the meetings of the Otago Central Railway League were also very informative. Aside from these two sources, articles on the Otago Central Railway, such as Public Works reports, were more about politics and finances than the workers' camps and their conditions.

The primary source of photographs examined were by F.A. Coxhead, from a collection housed in the Hocken Library in Dunedin. These were taken in the Taieri Gorge in 1885 and several show railway construction camps, both Public Works Department and private contractor. The private contractors' camps tend to be small and located close to the bridges and tunnels the workers were constructing. These camps were predominantly composed of a cluster of tents, although the occasional larger building is visible. Images from the *Otago Witness* were also used, especially for the sites in use during the early twentieth century.

Google Earth images were used in conjunction with maps, photographs and the written record to locate sites and place them within the greater landscape. This proved a most useful technique, with at least one previously unidentified site being found in this fashion.

In all, 33 potential sites were identified, mainly from the written record. Of these, eight were selected for field survey: Mullocky Gully Public Works Department camp, Sparrow Bros workshop at the Wingatui (Taioma) Viaduct, Hindon Public Works Department camp, Deep Stream Viaduct workshop, Nenthorn contractors' camp, Otarehua Public Works Department camp, Poolburn Viaduct contractors' camp and the Poolburn Gorge Public Works Department camp. The sites were mapped and recorded for the New Zealand Archaeological Association Site Recording Database.

These sites were then compared according to the following criteria: aspect – was the site north facing; was there a source of fresh running water nearby; was there an alternative site available; and was the camp site close to the work site?

ARCHAEOLOGICAL SITES OF CONSTRUCTION CAMPS

As noted above, there were two different kinds of organisations that founded and maintained construction camps on the Otago Central Railway. The Public Works Department was responsible for the formation of the track bed and laying the tracks, and so worked along considerable lengths of the line from a succession of centrally located base camps. Private contractors were engaged for the specialist tasks of tunnel, viaduct and bridge construction, which they undertook from camps located close to each of the contracted work locations. The following discussion separates the study camp sites into these two groups.

Public Works Department camps

Mullocky Gully (I44/544) – This camp was first opened in August of 1880, when there were as many as 700 men working

on the section of track between here and Deep Stream (Dangerfield and Emerson 1995:14). In addition to the railway navvies and their families, there were also miners working gold claims in the area. Both navvies and miners lived in tents or mud huts, which typically measured 9 x 7 ft (3 m x 2.5 m) for a single man's quarters and 18 x 15 feet (6 m x 5 m) for a family. Mud huts had thatched roofs lined with calico and family abodes had a calico 'wall' dividing them into two rooms (Cowan 2009:144). Tents and mud huts had a chimney at one end, usually of sod or stone, topped with a biscuit tin or a tin of similar size.

Mullocky Gully is the nearest site to Dunedin and is also the one in which most surface evidence of occupation and activity has been destroyed. This has happened only recently, following construction of a logging road and felled timber storage area.

Mount Allan – The Mount Allan Public Works Department camp is completely overgrown and was subjected to severe flooding in 1980 which has potentially obliterated any surface evidence of the camps there. According to Lelia Graham, who has been a resident of the Ardachy Station at nearby Hindon for 80 years, there are still hut remains and chimneys which may be associated with the camp on the far side of the river at Mount Allan (Lelia Graham, pers. comm. 2012). These are at the terminus of an old track used to supply goods to the Mount Allan camp.

Hindon – This camp lies near the river about 7 km beyond the Mount Allan site. As at Mullocky Gully and Mount Allan, there were Public Works' offices, carpentry and blacksmith's workshops and a powder magazine. Gore Brothers held the contract for the construction of the tunnels at Hindon. Although Hindon was the site of a large Public Works Department camp during the construction of the Otago Central Railway, there is very little in the area to indicate this now. The school house is still there, though it is now a private residence. Several old tracks are still visible, but there are no obvious signs of the habitations of the railway construction workers, nor any associated buildings such as boarding houses or workshops.

The Public Works Department camp was most likely situated on the flat ground on which the present railway station at Hindon now stands. In addition to this camp, there were also private contractors' camps in the area (Dangerfield and Emerson 1995:15). Hindon is a palimpsest, as the site was used and reused for different purposes at different times. In the years before the Otago Central Railway, Hindon was an area of intensive mining; in the 1860s there were up to 10,000 men seeking gold in the area (*Otago Witness* 19 January 1884:10), and after the railway through the Taieri Gorge was completed this was again the chief activity in the area.

Flat Stream – Three camp sites associated with the Flat Stream viaduct were surveyed by Jill Hamel in 1995 and recorded in the New Zealand Archaeological Association site recording scheme in 2000 (sites I43/118, I43/119, and I43/121). The three sites Hamel recorded are on terraces above the railway line and consist mainly of chimneys, hearths and hut sites. In addition to the usual structures associated with Public Works Department camps, there was also a police camp, complete with lock-up, at Flat Stream (Cowan 2009:144). The jail was by the mouth of tunnel 9 and was still partly standing in 1976. The police camp was set up after a murder occurred at the Nenthorn camp in 1884. Whittaker & Co. held the contract for the construction of the viaduct at Flat Stream (*Otago Witness* 24 August 1888:17). The site is now much overgrown with scrub and is all but invisible from the train.

Oturehua (H41/232) – This Public Works Department camp, once the largest railway construction related site on the

Otago Central Railway, is now all but invisible. All that remains on the surface are three decaying huts under a stand of willow trees in a large field at the western end of the town. These huts have been repaired and remodelled over time, but the basic structure and construction technique are still visible. This camp is an example of what I call a flat land site, where the layout of the camp was not confined by its geography. Huts, rather than tents, were the preferred form of housing and these could be dismantled and packed on drays for moving to the next site up the line, as happened in early 1899 when the Ranfurly Public Works Department camp, 'all five dray loads', was shifted up the line to Wedderburn (Cowan 2009:149).

The three huts appear to have been left behind when the rest of the camp was packed up and moved at the turn of the twentieth century. According to Bill Cowan, a local railway historian who taught at the Oturehua School in the 1950s, at least one of the huts was lived in then (Bill Cowan pers. Comm. 2011). The huts are timber framed, and if typical of Public Works Department huts of the time, would be easily disassembled for transporting to the next flat land camp up the line. They are presently clad in planks and corrugated iron sheet, and roofed with corrugated iron, though they would originally been covered in heavy canvas. One is partially constructed using old railway sleepers, though whether this is original or a later repair is not clear. The corrugated iron cladding may also have been added post construction.

Poolburn Gorge (Blackstone, Blackstone Hills) (H41/234) – The Public Works Department camp was situated on 'a slight elevation just where the railway takes to the hills on the way down to the Poolburn Gorge' (*Otago Witness* 30 January 1901:12). In addition to the ubiquitous tents, there were wooden buildings, one of which was the Public Works Department headquarters. Other wooden buildings housed the engineers. The blacksmith shops were clad in corrugated iron and in addition to the workshops in the camps there was also a smithy at the entrance to the first of the tunnels at Poolburn (*Otago Witness* 30 January 1901:12). Visible remains of the camp include nine standing chimneys and their associated hut platforms, at least eight hut terraces without chimneys, and the remains of several stacked schist walls.

Private contractors' camps

Sparrow's Workshop (I44/545) – During construction of the Wingatui Viaduct from 1885–1887 Sparrow's Engineering Company, which held the contract for building the viaduct, maintained a workshop on high ground at the north side of Mullocky Creek. This large building is visible in many photographs of the construction of the Wingatui Viaduct, and was situated at its northern end immediately to the east of the second trestle. The platform on which Sparrow's workshop stood is still clearly visible, though much overgrown with long grass and scrub.

Duck Point Tunnel – The Gore brothers held the contract for the construction of the Duck Point Tunnel. They sub-contracted to a party of Italian navvies who made their camp on the slopes above the track bed.

Ross Point Tunnel – Gore Brothers held the contract for the construction of the Ross Point Tunnel, which they sub-contracted out. This was common practice for the brothers and their name appears in the court pages of the time with some regularity as they seem to have had difficulty meeting their financial responsibilities (*Otago Witness* 29 August 1885:13). While no surface evidence of any construction camp remains, there is a large flat area at the northern, or Hindon end, of the Ross Point Tunnel, which is a likely site for a contractors' camp associated with its construction.

Deep Stream Upper Camp (I44/546) and *Workshop*

(I44/547) – At least six contractors were involved in the construction of the viaduct at Deep Stream, with the contract being re-let to Collier and Clapham on 8 December 1883, Miller and Smellie on 22 August 1886, and Whittaker and Co. in 1888 (*Otago Daily Times* 19 February 1884:2; 29 August 1885:2; *Otago Witness* 24 August 1888:17). A Mr Rutherford ran a boarding house at or near this site, as did a Mr Phillips, though it is unclear whether these boarding houses operated at the same time (*Otago Witness* 25 July 1885:12).

Historical images of the Deep Stream section of the Otago Central Railway, taken during and just after its construction, show several buildings in a flat area immediately north of the Deep Stream Viaduct. These buildings were located in a large cutting just to the north of the Deep Stream Viaduct. Up to six different contractors were used to complete the work at Deep Stream, but the lack of firm dates for most of the photographs makes it impossible to determine which contractor is responsible for which buildings. The flat area where the buildings previously stood is now overgrown with long grasses and there is a raised area in its centre, which may be the remains of the demolition of these stone buildings. No artefacts or building rubble were visible on the surface. There are the remains of chimneys and at least one building on the slope above the track bed at the southern end of the viaduct.

Nenthorn (I43/153) – At Nenthorn there was a contractors' camp for workers employed by R. Meikle and Co, and, in the upper Nenthorn, a Chinese 'village' (*Otago Witness* 26 September 1885:12). This was located near the Pukerangi railway station. The Chinese site is described as a village, as opposed to a camp, though the forty or so men who lived there lived in tents. There were two stores, piggeries, and many chickens at this site. Gambling and opium smoking were the preferred leisure activities (*Otago Witness* 26 September 1885:12). Apparently there was an 'air of comfort surrounding the Chinese tents which was absent from the European settlements' (*Otago Witness* 26 September 1885:12). Perhaps it was the opium.

In contrast, the Nenthorn contractors' camp is described as a 'sort of sly grog, canvas township', to which great quantities of beer and spirits were transported by wagon and train (*Otago Witness* 13 December 1884:8).¹ There was at least one store associated with the camp at Nenthorn, which was run by the Mercer Brothers. A boarding house at Nenthorn, built by W. Mitchell and owned by John Wyatt, burnt down in 1885 (*Otago Witness* 26 September 1885:12). Nenthorn also housed a police camp and lock-up, set up in 1887 after a murder occurred in the main camp in 1884 (Cowan 2009:144).

Poolburn Viaduct (H41/233) – This site was a private contractor's camp relating to the construction of the Poolburn (Auripo) Viaduct and was located on flat ground below the viaduct itself. Aside from one possible hut platform no trace of the people living and working at the contractors' camp is visible on the surface. There are track ways at the site, which are most likely associated with bringing cut stone to the site for the construction of the viaduct piers. The only definite evidence of railway construction related activity is two large, square platforms constructed of cement bonded schist blocks on the south side of the stream directly beneath the viaduct, which appear to be the footings of the derricks required to lift the schist blocks for the piers and the iron super structure of the viaduct into place (Figure 3).



Figure 3: Workers and tents at the Poolburn Gorge Public Works Department camp (image courtesy of Hocken Collections, Uare Taoka o Hakena, University of Otago).

DISCUSSION

Of all the variables put forward by Buckles (1983), the most obviously applicable to the present study relate to the environment. The current research has shown that geology and geography were the two main factors in the location of railway construction related camps on the Otago Central Railway. Wherever possible camp sites were chosen to make best use of available sunlight and to be sheltered from the worst of the winds, especially the winter southerlies (Table 1). The campsites were all close to a source of clean fresh water. Exactly how influential were the other factors discussed by Buckles, such as technology, social structure, and economics, is difficult to establish without excavating the sites.

The present study highlighted an additional factor not considered in Buckles' model, relating to the organisational context of the activities for which the camps were constructed. Table 1 shows that there was an entirely consistent difference between the Public Works Department camps and those of the private contractors in relation to immediacy of location to the work site. The latter were always located immediately adjacent to the tunnel, viaduct or bridge for which the contractor was responsible, in all but one case using the only flat ground in the immediate vicinity, which was often the already formed track bed. This made for some very unpleasant living conditions, especially in the Taieri and Poolburn Gorges, where decent campsites near bridges and tunnels were few and far between. The exception is the Nenthorn contractors' camp, which is in

Table 1

	Aspect	Availability of water	Alternative site availability	Immediate proximity to work site
Public Works Department site				
Mullocky Gully	North	Yes	Yes	No
Mt Allan	North	Yes	Yes	No
Hindon	North	Yes	Yes	No
Flat Stream	North	Yes	Yes	No
Oturehua	North	Yes	Yes	No
Poolburn Gorge	North	Yes	Yes	No
Contractors site				
Wingatui Viaduct	North	Yes	No	Yes
Duck Point Tunnel	North	Yes	No	Yes
Ross Point Tunnel	North	Yes	No	Yes
Deep Stream Viaduct	North east	Yes	No	Yes
Nenthorn	North	Yes	Yes	Yes
Poolburn Viaduct	South east	Yes	No	Yes

1. The Nenthorn Camp was partially excavated by students from the University of Otago during the Archaeological Field School in February 2013. The material from this excavation is still being analysed, and further excavations at the site are planned for the 2014 Field School.

an almost ideal location, being on a relatively flat and north-facing piece of land between two streams.

In contrast, the Public Works Department camps served long sections of the track, and thus had a range of alternative potential locations. Hence they were situated on or near the line in places which made the best use of any favourable conditions, particularly north-facing sites sheltered from the worst of the winds. These were often long term occupation sites, especially in the Taieri Gorge where construction of the railway took a decade. Not being restricted by the need to occupy a specific locality, the Public Works Department could choose the optimum camp sites.

On this basis a two site type model is proposed for railway construction camps; one which distinguishes between those dedicated to the construction of location specific elements of infrastructure, and those for more generalised work over a broad area. In the case of the Otago Central Railway this coincided with the division between private contractors and the Public Works Department, but it is suggested that this was not really significant in determining the observed differences; rather it was the location-specific nature of the work being undertaken.

Although the present study did not involve excavation of any archaeological sites, and could therefore not delve into more detailed analysis of the living conditions and social organisation of the Otago Central Railway camps, there are several lines of evidence that indicate that there may have been further distinctions between the longer term Public Works Department camps and shorter term contractors' camps. The available photographic and documentary evidence suggests that the Public Works Department camps had a relatively consistent layout, with the engineers' or foremans' huts central, the workshops (blacksmith and carpentry) nearby and the boarding-houses, stores, workers' tents and huts scattered beyond. The powder magazine will always be at the furthest remove (Mitchell 2012).

These constituent components and their relative positions are very much 'standard' across all types of work camp over a certain size and level of enterprise, be it the lumber camps of Australia (Davies 2005), the navy settlements of Victorian Britain (Morris 1994; Wessex Archaeology 2008), or the late-nineteenth-century camps of those employed by the 'railway barons', who profited so greatly from the American methods of railway funding and construction (Buckles 1983; Cleveland 1983; Wegars and Sprague 1981).

The private contractors' camps appear to have had a more random layout, and often had associated sly grog shanties (Mitchell 2012:91). These sites fit Morris's early, eighteenth-century site types, as navvies in New Zealand in the late nineteenth century had far more of the 'traditional navy' lifestyle than their late Victorian British brethren. The inhabitants of navy camps were notorious for their unconventional lifestyle and hard drinking, and by the late nineteenth century the trend in Britain was toward a more ordered and supervised barrack type of settlement, meant to curb the more morally disturbing behavioural aspects of the itinerant workforce (Morris 1994:584). This policy was followed to some extent by the Public Works Department, especially in the more prefabricated camps on the flatland sections of the Otago Central Railway. The camps in the Taieri Gorge were occupied for up to six or seven years, and although considered temporary, most sites still contain extant features such as chimneys, platforms and walls. Flat land camps were more spread out than their counterparts in the gorges, and were of a much more portable and temporary nature.



Figure 4: The Poolburn Viaduct with contractors' camp in the background (image courtesy of Hocken Collections, Uare Taoka o Hakena, University of Otago).

CONCLUSIONS

The two site type model, adapted from Buckles (1983), was derived from detailed analysis of the historical and archaeological evidence of construction related camps on the Otago Central Railway. This showed that the Public Works Department campsites were usually in the better locations, while the contractors' camps were positioned as near to the worksite as possible. Using this model it should be possible to identify further potential construction related camps on the Otago Central Railway. It should also be possible to apply this model to locating such sites on other branches of the New Zealand rail network, especially those built or begun during the Public Works Department era, and it could potentially be applied to overseas examples.

The people who built the railway through Central Otago left their mark in more than just the camps. Evidence of them can be found all over Otago, perhaps all over the country. In addition to the Otago Central Railway these people built the culverts, bridges, road and rail cuttings, embankments and tunnels, which we take for granted as part of the human aspect of our local environment. Much of the infrastructure created at this time relied on the same pool of itinerant craftspeople and skilled labourers, augmented by any number of unskilled labourers, who came and went as the work required. Because the railway work was so intermittent, navvies went mining or worked on the roads when not employed on the railways. Likewise miners worked on infrastructure projects when the gold played out. Were we able to excavate all the camps associated with the construction of the Otago Central railway, chances are we would find traces of the same core group of workers and their families spread out over the length of the railway.

While this study has been essentially an attempt to locate where the people who constructed the Otago Central Railway lived, it opens the way to more detailed studies of who they were and how they interacted with their environment and each other. Through historical archaeology we can begin to bring the lives of these people to light. Our role as practical social historians is ideally suited to telling their tale, as we are able to follow them from site to site through time and the landscape.

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