

SOUTH WAIRARAPA DISTRICT COUNCIL

29 APRIL 2020

AGENDA ITEM B3

LISTING OF THE CARKEEK OBSERVATORY AS AN HISTORIC PLACE

Purpose of Report

To inform Council about the potential listing of the Carkeek Observatory as an historic place on the New Zealand Heritage List and to obtain approval to make a submission supporting that listing.

Recommendations

Officers recommend that the Council:

1. Receives the *Listing of the Carkeek Observatory as an Historic Place* report.
2. Council supports, in principle, the listing of the Carkeek Observatory by Heritage New Zealand through Heritage New Zealand's public consultation process.
3. Council delegates to the Chief Executive the authority to make the submission to Heritage New Zealand.
4. Council informs the public about the Heritage New Zealand process and Council's support for the listing.
5. Council undertakes further investigation, including costings, to conserve Carkeek Observatory as recommended by Heritage New Zealand.

1. Background/Context

Heritage New Zealand (HNZ) proposes to add the Carkeek Observatory in Featherston to the New Zealand Heritage List/Rārangi Kōrero (the 'List') as a Category 1 historic place. HNZ have been in conversation with officers about this matter and have sent correspondences to Council, including an historic place report that provides a historical narrative and robust heritage assessment for the observatory, and a heritage list brochure. The said documents are attached as Appendix 1 and 2 of this report.

HNZ has since publicly notified the proposal under the Heritage New Zealand Pouhere Taonga Act 2014 and is seeking submissions from the public and interested parties. HNZ has extended the consultation period by 20 working days to 21 May 2020 in order to give Council an opportunity to make a submission, should it choose to do so.



Carkeek Observatory

2. Legislative Framework

Any heritage artefact to be listed on the New Zealand Heritage List is assessed under the appropriate section of the Heritage New Zealand Pouhere Taonga Act 2014. Section 66 deals with the main assessment criteria and requirements and HNZ's assessment is summarised as follows.

2.1 Section 66(1) Assessment

The Carkeek Observatory possesses archaeological, historical, social and technological significance and qualifies to be part of New Zealand's historic and cultural heritage. It is historically significant as the oldest surviving astronomical observatory in New Zealand. As an amateur observatory built by an individual, Stephen Carkeek. It is an early representation of the dominance of amateur practitioners in the history of New Zealand astronomy, and the importance of non-professionals in the early period of New Zealand scientific research.

The place is connected to colony-building through the association of its creator with the development of accurate timekeeping and the creation of a national standard time service, and by the employment of astronomical methods in land surveying and mapping. It predates the burgeoning popular interest in astronomy that followed the transit of Venus in 1874, and other astronomical events of the late nineteenth century, such as the transits of Mercury in 1878 and 1881, of all which were major events in the astronomical calendar and attracted significant scientific and public interest.

In terms of social value, Carkeek Observatory in the late 1980s provided the New Zealand astronomical community with a tangible connection to its past. It has become a meeting place

for historians of local astronomers, who have recorded the site and its physical changes. The observatory has gained additional public recognition as a key site close to the proposed South Wairarapa International Dark Sky Reserve.

Its technological significance is enshrined in the use of inexpensive timber as the building material.

2.2 Section 66(3) Assessment

It is considered that this place qualifies as a Category 1 historic place due to:

- (a) The extent to which the place reflects important or representative aspects of New Zealand history Heritage New Zealand Pouhere Taonga;
- (b) The association of the place with events, persons, or ideas of importance in New Zealand history;
- (c) The potential of the place to provide knowledge of New Zealand history;
- (d) The community association with, or public esteem for, the place;
- (e) The potential of the place for public education; and
- (f) The importance of identifying rare types of historic places.

2.3 Summary of Significance or Values

The Carkeek Observatory occupies an outstanding position in the history of Aotearoa/New Zealand as the earliest surviving astronomical observatory in the country and a building directly associated with amateurism, a major theme in the history of New Zealand astronomy and science in general. Its builder Stephen Carkeek played a critical role in local timekeeping by utilising his astronomical skills in the creation of New Zealand's first timeball in Wellington, in addition to carrying out a range of observations that were typical activities for serious amateur astronomers of his era. Details of its significance are contained in the attached report.

3. Implications of listing Carkeek Observatory

The following implications arise from the listing of Carkeek Observatory.

3.1 Statutory Property Information

Once Carkeek Observatory is listed as an historic place, the list entry will be noted on future Project Information Memorandum, building consents and Land Information Memorandum. The heritage values identified may be taken into account by the Overseas Investment Office when determining whether the property is "sensitive land" under the Overseas Investment Act 2005.

The observatory may also be scheduled as a Heritage Item in the Wairarapa Combined District Plan and any changes to the building would require a resource consent. It should be noted that changes to such buildings are generally infrequent.

3.2 Conservation Plan

HNZ recommend that a conservation plan be prepared as the observatory is in a dilapidated state. This is a guiding document for the conservation, care and management of the observatory. The conservation plan will describe the observatory, its history and identify its significance and heritage values. It establishes conservation policies to safeguard those values and makes recommendations through which the policies can be put into action. Conservation plans are made by conservation architects and other experts in consultation with Heritage New Zealand.

3.3 Rehabilitation of the Observatory

HNZ recommend that the observatory be stabilised as a ruin and archaeological site. HNZ does not consider the reconstruction of the observatory to be an appropriate heritage conservation measure at this time as there is potential for a replica observatory to be built elsewhere and/or for the use of augmented reality technology to illustrate the original form and function.

The rehabilitation work may need specialist builders and material. Consultation will be required with archaeology and conservation architects on the level of rehabilitation and the type of materials to be recycled and replaced.

3.4 Public Access

If listed, the public should be provided with access to the site to view the observatory in order to maximise its heritage value. The location of the site is such that it could be included as part of a walking/cycle trail. Public access will require maintenance, security, and general upkeep of the surrounding area.

It is possible that one or more community groups may be interested to take responsibility of the day to day maintenance and running of the observatory site. Once the use and access requirements are established, there may be a need for some complementary structures and facilities that will be associated with the chosen access.

3.5 Financial Implications

There would be costs associated with resource consent applications, preparing a conservation plan, rehabilitation and providing public access. There is potential for cooperation with interested parties like the Dark Skies Association, Heritage New Zealand through their National Heritage Preservation Incentive Fund, and the Walking Trail group. The funds can be raised through a variety of fund-raising activities by these individual groups or in collaboration with Council. Council will have to decide the modalities of such co-funding arrangements.

3.6 Strategic Implications

As noted in paragraph 2 above, Carkeek Observatory has outstanding historical significance as Aotearoa/New Zealand's earliest surviving astronomical observatory and its importance is recognized through meeting Category 1 requirements. Listing and conserving the observatory contributes to Council's community outcomes to create educated and knowledgeable people and vibrant and strong communities. It is consistent with Council's strategic plan to take best care and use of natural resources and assets by telling unique local stories of valuable places and spaces and sharing high value experiences for visitors and the community. It also fits with Council's "shaping move" to nurture and create the District's special character and qualities, as provided in Council's Spatial Plan discussion document. In particular, it positions well with being a tourism hub and with the dark sky reserve initiative.

4. Options and Analysis

Section 77 of the Local Government act sets the following requirements in relation to decisions

- (a) A local authority must, in the course of the decision-making process,
- (b) seek to identify all reasonably practicable options for the achievement of the objective of a decision; and assess the options in terms of their advantages and disadvantages

It is in this context that the following options are being assessed by way of the table below.

Options	Risk	Cost	Benefit
1-Do nothing	<ul style="list-style-type: none"> • There is risk to Council as the observatory will fall apart like any other old structure in the district. • Loss of a heritage building with historic value 	<ul style="list-style-type: none"> • No cost to council as no conservation plan, no consenting. • No reconstruction and no operation and maintenance costs will be expected of Council. 	<ul style="list-style-type: none"> • No current cost to Council.
2-Support the HNZ listing and conservation	<p>HNZ listing</p> <ul style="list-style-type: none"> • The process will be undertaken by Heritage New Zealand and will be outside of the scope of the usual Council consultation processes and cannot be pre-determined. • If the public is not supportive, there will be potential loss of a heritage building and place with historic value. • Potential public opposition and appeals <p>Observatory conservation</p> <ul style="list-style-type: none"> • Costs are unknown at this stage and could be significant 	<ul style="list-style-type: none"> • No cost to council • Costs for consenting, conservation and access 	<ul style="list-style-type: none"> • Preservation of unique heritage building and place • Consistency with Council's strategic direction and initiatives

In light of this analysis, officers recommend that:

1. Council supports, in principle, the listing of the Carkeek Observatory by Heritage New Zealand through Heritage New Zealand's public consultation process.
2. Council delegates to the Chief Executive the authority to make the submission to Heritage New Zealand.
3. Council informs the public about the Heritage New Zealand process and indicates Council's support for the listing.

4. Council undertakes further investigation, including costings, to conserve Carkeek Observatory as recommended by Heritage New Zealand.

Appendix1: Carkeek Observatory Heritage NZ Report

Appendix 2: Heritage NZ List Brochure

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Appendix 1 – Carkeek Observatory Heritage NZ Report



HERITAGE NEW ZEALAND
POUHERE TAONGA

New Zealand Heritage List/Rārangi Kōrero – Report for a Historic Place **Carkeek Observatory, FEATHERSTON (List No. 9808, Category 1)**



Carkeek Observatory, 20 November 2019
Photograph by Christine Barnett, Heritage New Zealand Pouhere Taonga

Kerryn Pollock
DRAFT: Last amended 28 November 2019
Heritage New Zealand Pouhere Taonga

TABLE OF CONTENTS

EXECUTIVE SUMMARY	3
1. IDENTIFICATION	4
1.1. Name of Place	4
1.2. Location Information	4
1.3. Legal Description	4
1.4. Extent of List Entry	4
1.5. Eligibility	5
1.6. Existing Heritage Recognition	5
2. SUPPORTING INFORMATION	5
2.1. Historical Information	5
2.2. Physical Information	19
2.3. Chattels	28
2.4. Sources	28
3. SIGNIFICANCE ASSESSMENT	30
3.1. Section 66 (1) Assessment	30
3.2. Section 66 (3) Assessment	31
APPENDICES	35
3.3. Appendix 1: Visual Identification Aids	35
3.4. Appendix 2: Visual Aids to Historical Information	39
3.5. Appendix 3: Visual Aids to Physical Information	40
3.6. Appendix 4: Significance Assessment Information	44

Disclaimer

Please note that entry on the New Zealand Heritage List/Rārangī Kōrero identifies only the heritage values of the property concerned, and should not be construed as advice on the state of the property, or as a comment of its soundness or safety, including in regard to earthquake risk, safety in the event of fire, or insanitary conditions.

Archaeological sites are protected by the Heritage New Zealand Pouhere Taonga Act 2014, regardless of whether they are entered on the New Zealand Heritage List/Rārangī Kōrero or not. Archaeological sites include 'places associated with pre-1900 human activity, where there may be evidence relating to the history of New Zealand'. This List entry report should not be read as a statement on whether or not the archaeological provisions of the Act apply to the property (s) concerned. Please contact your local Heritage New Zealand office for archaeological advice.

EXECUTIVE SUMMARY

Purpose of this report

The purpose of this report is to provide evidence to support the inclusion of Carkeek Observatory in the New Zealand Heritage List/Rārangi Kōrero as a Category 1 historic place.

Summary

Built in *circa* 1867 on a farm south of the Wairarapa town of Featherston, the Carkeek Observatory possesses outstanding historical significance as Aotearoa/New Zealand's earliest surviving astronomical observatory. Built by civil servant, timeball instigator and amateur astronomer Stephen Carkeek, the place reflects the crucial role of amateur practitioners in the foundation and development of science in this country. As a local version of the popular Romsey-style of observatory used in Britain, it represents the transfer of a British tradition of amateur astronomy to colonial settings. The place has technological significance through the use of construction methods and materials similar to the Romsey model, and it possesses enough original elements to demonstrate how these observatories worked. As the only surviving nineteenth century stand-alone astronomical observatory in the country, it is a rare historic place. Due to their light-weight construction, Romsey-style observatories are rare internationally, making the Carkeek Observatory a remarkable survivor in a global context. Rediscovered by historians of astronomy in the 1980s, the observatory has provided this community and local astronomers with a connection to their past, which affords the place social significance, a quality heightened by its location next to the proposed South Wairarapa International Dark Sky Reserve.

Stephen Carkeek built the timber observatory on the farm he bought following his retirement from the civil service in 1866. Carkeek was a dedicated astronomer, establishing latitude and longitude points by astronomical means and tracking planetary satellites, eclipses and culminations. His expertise was recognised in the lead-up to the 1874 transit of Venus, which attracted many international astronomical expeditions to New Zealand. Carkeek was also an active member of the Featherston community, providing meteorological observations to a local newspaper and serving on committees.

Likely made from locally-sourced tōtara, the structure was typical of modest, low-cost observatories built by western amateur astronomers in the nineteenth and early twentieth centuries. It was comprised of two main parts, an octagonal equatorial room with a revolving canvas dome and a rectangular transit annex. The equatorial room housed a refracting telescope used to monitor astronomical objects while the north-south path of stars across the meridian was tracked with the transit telescope.

Stephen Carkeek died suddenly in 1878 and the farm was leased and subsequently sold. The observatory was no longer used for its original purpose, instead housing farming equipment, and gradually fell into a ruinous state. By the twenty-first century it was a partial yet authentic ruin, with enough original fabric surviving in-situ for the structure's function to be discernible.

1. IDENTIFICATION¹

1.1. Name of Place

Name

Carkeek Observatory

Other Names

Stephen Carkeek's Astronomical Observatory

1.2. Location Information

Address

270 Murphys Line

FEATHERSTON

Additional Location Information

NZTM E 1794984; NZTM N 5442525

Local Authority

South Wairarapa District Council

1.3. Legal Description

Lot 5 DP 482853 (RT 679923), Wellington Land District

1.4. Extent of List Entry

Extent includes part of the land described as Lot 5 DP 482853 (RT 679923), Wellington Land District and the building known as Carkeek Observatory thereon. (Refer to map in Appendix 1 of the List entry report for further information).

¹ This section is supplemented by visual aids in Appendix 1 of the report.

1.5. Eligibility

There is sufficient information included in this report to identify this place. This place is physically eligible for consideration as a historic place. It consists of an archaeological site and part of a building fixed to land which lies within the territorial limits of New Zealand.

1.6. Existing Heritage Recognition

Local Authority and Regional Authority Plan Scheduling

Not scheduled in Wairarapa Combined District Plan, Operative 25 May 2011.

Other Protection Mechanism

Land covenant in easement instrument no. 10091293.2. This requires the land owner to take all reasonable steps to ensure the preservation of the site where the Carkeek Observatory lies.

New Zealand Archaeological Association Site Recording Scheme

This place has been recorded by the New Zealand Archaeological Association. The reference is S27/52 (Observatory with dome room and transit annex, built c. 1867 by Stephen Carkeek).

2. SUPPORTING INFORMATION

2.1. Historical Information

The Wairarapa region has a long history of Māori occupation, with the first arrivals settling in Palliser Bay in the late 1300s.² Small communities were established on the east side of the bay and were supported by fishing, hunting and kūmara cultivation. By 1600 these communities had disappeared, most likely in response to resource depletion related to population growth.³ Two major earthquakes the previous century may also have been contributing factors. Early iwi groups were Waitaha and Ngāti Māmoē, both of whom subsequently left Wairarapa for Te Waipounamu/South Island.⁴ Some of these people may

² Ben Schrader, 'Wairarapa region - Māori settlement', *Te Ara - the Encyclopedia of New Zealand*, 2007a, <http://www.TeAra.govt.nz/en/wairarapa-region/page-5> (accessed 12 August 2019).

³ Roberta McIntyre, *The Canoes of Kupe: A History of Martinborough District*, Wellington, Victoria University Press, 2002, p.19.

⁴ *ibid.*, p.21.

also have moved inland to the central Ruamāhanga valley area, where permanent settlements were located after the coast was abandoned. Later arrivals were Ngāti Ira, Rangitāne and Ngāti Kahungunu. Ngāti Ira later relocated to Te Whanganui-a-Tara /Wellington, while Rangitāne and Ngāti Kahungunu forged a largely peaceable co-existence in Wairarapa, with conflict tempered by intermarriage.⁵

During the so-called musket wars period, the region was invaded on a number of occasions, in the early 1820s by Ngāti Whātua and Ngāti Maniapoto, and from the mid-1820s through the following decade by Taranaki tribes, in particular Te Āti Awa.⁶ Rangitāne people found a temporary safe haven in the Puketoi and Tararua mountain ranges, while Ngāti Kahungunu made a series of migrations north to Nukutaurua on the Māhia Peninsula. However, Ngāti Kahungunu leaders kept an eye on their Wairarapa rohe and sent taua or war parties back to fight the invaders. They returned for good in the early 1840s when peace was made with Te Āti Awa.⁷ The western boundary between the two iwi was the Remutaka and Tararua ranges, of which the Ngāti Kahungunu rangatira Tūtepākihirangi said: 'I will call those mountains our shoulders; the streams that fall down on this side are for you to drink; on the other side for us'.⁸

By then Pākehā explorers were assessing the settlement potential of Wairarapa and in 1844 Wellington settlers leased grazing land off Ngāti Kahungunu and brought the first sheep and cattle into the region.⁹ The first land sales occurred in 1853, including the Ōwhanga block, on which the future town of Featherston would be founded.¹⁰ The town was surveyed in 1856 and named after Isaac Featherston, the superintendent of the Wellington province.¹¹ It had previously been the site of Henry Burling's accommodation house and known as Burlings; Kawaewae and Paeotumokai were the Māori names for the area.¹² Featherston was divided into town and suburban sections. It was on the 200-acre suburban section 258 that a timber

⁵ *ibid.*, p.22; Schrader, 2007a; Waitangi Tribunal, *The Wairarapa Ki Tararua Report. Volume I: The People and the Land*, Wellington, Legislation Direct, 2010, pp.3-4.

⁶ McIntyre, 2002, pp.25-27.

⁷ *ibid.*, p.33; Schrader,2007a; Waitangi Tribunal, 2010, p.14.

⁸ Quoted in McIntyre, 2002, p.33.

⁹ *ibid.*, pp.39-42.

¹⁰ *ibid.*, p.66; H. Hanson Turton, 'Deeds – No. 115 Owhanga Block (Featherston), Wairarapa District', *Maori Deeds of Land Purchases in the North Island of New Zealand: Volume Two*, Wellington, George Didsbury, 1878, pp.295-96.

¹¹ Ben Schrader, 'Wairarapa places - Featherston', *Te Ara - the Encyclopedia of New Zealand*, 2007b, <http://www.TeAra.govt.nz/en/wairarapa-places/page-8> (accessed 13 August 2019)

¹² *ibid.*; Waitangi Tribunal, 2010, p.6; David Yerex, *Featherston: The First 150 Years: 1857-2007*, Featherston, Featherston Community Board, 2007, p.33.

astronomical observatory would be built by retired public servant Stephen Carkeek just over a decade later.

Stephen Carkeek

Stephen Carkeek was born in Swansea, Wales, in 1815.¹³ His father Morgan Carkeek was a sea captain and Stephen followed in his footsteps, spending his youth and early adulthood at sea. He and Martha Piotti were married in Sydney, Australia in 1838 and settled with their first child Frances in Aotearoa/New Zealand in 1841.¹⁴ Carkeek worked for the Customs Service in Russell before moving to Nelson where he was Collector of Customs from 1842 to 1849. That year the family transferred to Wellington following Carkeek's appointment as the Collector of Customs there. In addition to his customs work he was briefly a member of the Legislative Council (1851-52). He purchased Wellington Town Acre 479 on Boulcott Street in 1853 and built a house on the corner where the street curved west to meet The Terrace.¹⁵

Just when Carkeek developed an interest in astronomy is unclear. He is likely to have been exposed to it during his time at sea, due to the use of astronomy in nautical navigation, but there is no known evidence of any direct engagement during his time in Nelson.¹⁶ He had clearly developed considerable expertise by the early 1860s, when he instigated and supervised the construction of New Zealand's first timeball station at the customs building on Wellington's waterfront.

¹³ Wayne Orchiston, *Exploring the History of New Zealand Astronomy*, Switzerland, Springer International Publishing, 2016, p.230; Stephen Carkeek death registration 1878/3243, Births, Deaths & Marriages, Department of Internal Affairs.

¹⁴ Orchiston, 2016, p.230; 'Stephen Carkeek', Australia, Marriage Index, 1788-1950, Ancestry Library; <https://www.geni.com/people/Stephen-Carkeek/6000000007471104325> (accessed 30 July 2017) (copies on Heritage New Zealand Central Region file 12025-005). The Carkeeks had seven children in total, three of whom died in childhood.

¹⁵ Deed 312, 10 May 1853. Deeds Register 2, AFIH w5691 22395 101, Archives New Zealand; Edward Villiers Briscoe, 'Wellington Street Levels Lambton Ward' (map), 1867, MapColl-r832.4799gmbd/1867/Acc.24572, Alexander Turnbull Library. Briscoe's survey map shows surveying benchmarks, one of which was on the 'cill of door of Mr Carkeek's House Boulcott St'. On this map, the house was precisely located on the corner of Boulcott Street as it curves west towards The Terrace (then known as 'Wellington Terrace') and may be the house shown in this photograph taken in 1951, which is on the present-day site of 79 Boulcott Street, next to the Central Region Office of Heritage New Zealand <https://natlib.govt.nz/records/23042202>. Carkeek was recorded as owing and occupying a house on town acre 479 in the Wellington City Council rate book of 1863, the first year in which rating information was recorded (Rate books 1863-70 transcription spreadsheet, supplied by Wellington City Archives, copy on Heritage New Zealand Central Region file 12025-005). He took out a house and contents insurance policy for a house on town acre 479 in 1860 ('Liverpool and London Fire and Life Insurance Company, Wellington Agents – Fire Insurance Policies – Ashdown-Cox', MS-Papers-1345-6/21, Levin & Company Papers, Alexander Turnbull Library).

¹⁶ Orchiston, 2016, p.231. In 1843 he requested the provision of a telescope so he could see ships from land, suggesting that he did not own one at this time. See David McGill, *The Guardians at the Gate: The History of the New Zealand Customs Department*, Wellington, Silver Owl Press for the New Zealand Customs Department, 1991, p.27.

Astronomy in New Zealand

New Zealand has a centuries-old indigenous tradition of tātai arorangi or Māori astronomy, in which astronomical knowledge was applied to practices such as food production, house building and sea navigation.¹⁷ Communities had a good working understanding of tātai arorangi through its application to regular tasks like gardening and hunting, while deeper knowledge resided with tohunga kōkōrangi and tohunga tātai arorangi, the ‘teachers and specialists’.¹⁸

Between 1769 and 1777 British navigator and explorer James Cook and expedition astronomers made numerous astronomical observations to calculate the latitude and longitude of New Zealand places for navigation and mapping purposes.¹⁹ After 1840 British settlers brought their own tradition of amateur astronomy to New Zealand.²⁰ Until the late nineteenth century British astronomical research was an almost wholly amateur endeavour with private individuals funding their own work, while many enthusiasts simply enjoyed looking at celestial objects with whatever equipment their means allowed.²¹

In New Zealand astronomy largely remained the province of amateurs until the second half of the twentieth century and there was little scope for dedicated professional astronomical work.²² Carkeek’s contemporary Archdeacon Arthur Stock became New Zealand’s first dedicated professional astronomer in 1869 when he was appointed official observer at the Colonial Observatory in Wellington, but this was a part-time post and the only one of its kind.²³ Joseph Ward and John Grigg, both renowned New Zealand astronomers active in the late nineteenth and early twentieth centuries, pursued their work on a strictly amateur basis. It was not until 1965, when the Mt John Observatory was established at Lake Tekapo by the

¹⁷ Pauline Harris, Rangi Matamua, Takirangi Smith, Hoturoa Kerr and Toa Waaka, ‘A Review of Māori Astronomy in Aotearoa-New Zealand’, *Journal of Astronomical History and Heritage*, vol. 16, no.3, 2013, pp.325, 327.

¹⁸ *ibid.*, p.325.

¹⁹ *Orchiston*, 2016, pp.107, 110; Maggy Wassilieff, ‘Astronomy – overview - The first astronomers’, *Te Ara - the Encyclopedia of New Zealand*, 2006a, <http://www.TeAra.govt.nz/en/astronomy-overview/page-1> (accessed 9 August 2019).

²⁰ Wassilieff, 2006a.

²¹ Allan Chapman, *The Victorian Amateur Astronomer: Independent Astronomical Research in Britain 1820-1920*, Chichester, John Wiley & Sons in association with Praxis Publishing, 1998, p.xi.

²² Wassilieff, ‘Astronomy – overview - An enthusiast’s pursuit’, *Te Ara - the Encyclopedia of New Zealand*, 2006b, <http://www.TeAra.govt.nz/en/astronomy-overview/page-2> (accessed 12 August 2019).

²³ Wassilieff, 2006a.

universities of Canterbury and Pennsylvania that New Zealand had the capacity to host significant, professional astronomical research.²⁴

The importance of amateurs in New Zealand astronomy is consistent with the hegemony of 'gentlemen scientists' and the concomitant lack of professionalism and government-funded scientific research in the nineteenth and early twentieth centuries.²⁵ The formation of the New Zealand Geological Survey in 1865 followed by the New Zealand Institute two years later heralded the beginnings of institutional and centralised science, but dominated by well-resourced amateurs, they 'did not professionalise science...to any large degree'.²⁶ This only occurred with the formation of the Department of Scientific and Industrial Research (DSIR) in 1926.²⁷

It must be noted that local astronomy was not mere stargazing; 'amateur' is not intended to connote dilettante. Amateurs in the generation following Carkeek (Ward and Griggs for instance) made important contributions to astronomical knowledge. Additionally, astronomy was bound up with the establishment of the new colony. The execution of land surveys and maps by surveyors who used astronomical methods and instruments were 'part of the wider process of colonisation' in which Māori land was transferred to the Crown and Pākehā settlers.²⁸ Over time amateur astronomy became very popular – in 1954 the director of the Carter Observatory suggested that New Zealand of all countries had the most astronomical society members per head of population.²⁹

Wellington Timeball

Timeballs provided accurate time once a day and were used by visiting sea captains to reset the ship chronometer (a portable timekeeping device) to local time. The Wellington timeball,

²⁴ Wassilieff, 'Astronomy – overview - Mt John Observatory', *Te Ara - the Encyclopedia of New Zealand*, 2006c, <http://www.TeAra.govt.nz/en/astronomy-overview/page-4> (accessed 31 October 2019)

²⁵ Wendy McGuinness, Joe McCarter, Mark Newtown and Chris Aitken, *A History of Government-funded Science from 1865-2009*, Wellington, The Sustainable Future Institute, 2009, pp.12-14.

²⁶ *Ibid.*, p.14.

²⁷ *Ibid.*, pp.16-17.

²⁸ Giselle Byrnes, *Boundary Markers: Land Surveying and the Colonisation of New Zealand*, Wellington, Bridget Williams Books, 2001, p.16; J.T. Thomson and Henry Jackson, 'Report Relative to Measurement of Longitude Between Wellington and Otago by Means of Electrical Telegraph', *Appendix to the Journals of the House of Representatives*, 1871, G-23, p.3; C.A. Lawn, *The Pioneer Land Surveyors of New Zealand*, Wellington: New Zealand Institute of Surveyors, 1977, digital transcription pp.8, 205, 391 https://www.surveyspatialnz.org/Attachment?Action=Download&Attachment_id=2653 and https://www.surveyspatialnz.org/Attachment?Action=Download&Attachment_id=2674 (accessed 14 August 2019).

²⁹ Orchiston, 2016, p.20.

which became operational in 1864, dropped at noon each day apart from Sunday.³⁰ The drop time was determined by an astronomical clock and transit instrument (a small telescope).³¹ Carkeek, whose 'scientific attainments', according to a local newspaper, were 'well known', instigated the timeball, spent the first four months of its operation modifying and refining its mechanisms and subsequently established the site's latitude and longitude by astronomical means.³² His work on the timeball was an early instance of professional astronomy and he was one of the few astronomers of his era to work in both the amateur and professional realms.³³ The timeball was part of a wider move to institute an accurate timekeeping service in colonial New Zealand, which culminated in the establishment of a nationwide standard time in 1868.³⁴ Standard time had a major impact on everyday life, influencing for example work hours and schedules and leisure time.³⁵ In 1869 the Colonial Observatory, from which official time in New Zealand was set by measuring the transit of stars, was built in the Wellington Botanic Garden.³⁶

Construction of Carkeek's Observatory

It is not known whether Carkeek had an astronomical observatory at his Boulcott Street home in Wellington; he at least owned instruments, including a telescope which was stolen when his house was burgled in early 1866.³⁷ In April that year Carkeek took early retirement from the government service, likely due to long-standing ill health, and was granted a pension.³⁸

³⁰ *ibid.*, pp.232-33.

³¹ Jock Phillips, 'Timekeeping - New Zealand mean time', *Te Ara - the Encyclopedia of New Zealand*, 2006a, <http://www.TeAra.govt.nz/en/timekeeping/page-2> (accessed 30 July 2019).

³² *Orchiston*, 2016, pp.232-33; Thomson and Jackson, 1871, p.4.

³³ *Orchiston*, 2016, p.228. Note that there is no evidence that Carkeek undertook any other professional astronomical work in addition to the timeball. He is best understood as an amateur astronomer who had an unusual opportunity to apply his expertise professionally.

³⁴ Phillips, 2006a.

³⁵ Phillips, 'Timekeeping - Time and society, 1870s–1930s', *Te Ara - the Encyclopedia of New Zealand*, 2006b, <http://www.TeAra.govt.nz/en/timekeeping/page-3> (accessed 5 November 2019).

³⁶ James Hector to the Colonial Secretary, 5 July 1870, 'Correspondence Relative to the Establishment of an Observatory for the Purpose of Affording a Correct Mean Time throughout Every Part of the Colony', *Appendix to the Journals of the House of Representatives*, 1870, D-39, p.4. This observatory was demolished in 1906 to make way for the Richard Seddon Memorial.

³⁷ *Orchiston*, 2016, p.230; 'Local and General News', *Wellington Independent*, 23 January 1866, p.5.

³⁸ 'Return of Officers who have Ceased to be in the Service of the New Zealand Government since the 30th of June, 1865', *Appendix to the Journals of the House of Representatives*, 1867, D3, p.5; 'H.M. Customs', *Wellington Independent*, 24 April 1866, p.5.

The Boulcott Street house was put up for sale in May 1866 and Carkeek, Martha and their youngest child Ellen moved to the South Wairarapa district, where they leased suburban section 258, now a sheep farm called Torohanga, approximately five kilometres south of Featherston.³⁹ They had taken up residence by late October 1866, when the couple wrote letters from the farm to their eldest daughter Frances Stewart.⁴⁰ In May 1870 Torohanga was advertised for sale and the Carkeeks purchased it the following month.⁴¹ Carkeek immersed himself in the Featherston community, becoming the chair of the school committee, a member of the Agricultural and Pastoral Association and a local magistrate.⁴²

Ill health and sheep farming notwithstanding, the move to Featherston must have allowed Carkeek more time for astronomy because he built a small timber astronomical observatory between the edges of the farmhouse garden and the road to Featherston.⁴³ The precise year of construction is unknown. *Circa* 1867 is typically given in secondary sources and is fair conjecture based on Carkeek's removal to Featherston the previous year.⁴⁴ In the first half of 1869 the *Wairarapa Standard* published monthly meteorological observations made by Carkeek from his farm and described 'the instruments being sheltered from the wind and sun', which may suggest the existence of a shelter-giving observatory.⁴⁵ The first known recorded mention of Carkeek's observatory occurs in March 1871 and it appears to have been well-established by then. The *Wellington Independent* reported on flooding that encroached on his property, noting that 'Mr Carkeek had just had his observatory refitted, and shelves with valuable books raised from the floor, the outsides of which became covered

³⁹ 'For Sale by Private Contact – Town Acre No. 479', *Wellington Independent*, 15 May 1866, p.3.

⁴⁰ Stephen Carkeek to Frances Stewart, 28 October 1866 and Martha Carkeek to Frances Stewart, 28 October 1866, MS-Papers-10864-1, Stewart Family Papers, Alexander Turnbull Library. Stephen Carkeek's letter was labelled 'Wairarapa' and Martha Carkeek's 'Taurahanga', almost certainly an alternative spelling for Torohanga. Carkeek wrote: 'I am delighted to be informed of the birth of my little Grandson, I hope he will live to be as great a blessing to you and John [Stewart, Frances' husband] as you have always been to me. It is a long time since I wrote you last, but, I have really nothing to write about and to be always sending "kind love" appears nonsense. I hope John will be here before you get this letter, if not give him my love and congratulations, kiss baby for me'. Martha referred to her daughter Ellen in her letter, which indicates that the 15 year-old had moved to Torohanga with her parents.

⁴¹ 'Public Auction', *Wairarapa Standard*, 28 May 1870, p.2. The auction advertisement noted the property was 'at present in the occupation of Stephen Carkeek, esquire; Conveyance 11933, 15 June 1870, Deeds Register 21, AFIH w5691 22395 120, Archives New Zealand.

⁴² 'Public Notice', *Wairarapa Standard*, 3 October 1868, p.2; 'Agricultural and Pastoral Association', *Wairarapa Standard*, 20 April 1867, p.3, 'Open Column', *Wairarapa Standard*, 25 March 1871, p.3; 'Police Court', *Wairarapa Standard*, 28 September 1876, p.2.

⁴³ 'Torohanga in the Township of Featherston', 1878, collection of Graham Hodder (copy Heritage New Zealand Central Region file 12025-005).

⁴⁴ See *Orchiston*, 2016 and Gordon Hudson and Wayne Orchiston, 'A Report on the Status of Stephen Carkeek's Observatory at Featherston: the Oldest Surviving Astronomical Observatory in New Zealand', *Southern Stars*, vol. 56, no. 3, 2017, p.7.

⁴⁵ 'Meteorological Observations', *Wairarapa Standard*, 5 February 1869, p.4. Similar notices were published in March, April, and July.

with mud, but fortunately the insides are very little damaged.⁴⁶ Based on the surviving evidence, a construction date of *circa* 1867 is feasible.

The layout of the timber building was typical of modest nineteenth century observatories built by amateur astronomers in the western world. It was comprised of an octagonal equatorial room with a revolving canvas dome, a rectangular transit annex, and timber floor without footings, and is believed to have housed a 10.2cm refracting telescope in the equatorial room and transit telescope of between 4.5 to 6.4cms in the transit annex.⁴⁷ The refracting telescope was used for monitoring astronomical objects (planets, comets, stars), while the transit telescope was used to determine geographical locations and time by tracking the north-south path of stars across the meridian.⁴⁸

Carkeek would likely have been aware of the simple observatory built by Admiral William Smyth in Bedford, England in the late 1820s which became a much-emulated model.⁴⁹ Like Carkeek's building, the Bedford Observatory was an equatorial room with attached rectangular transit annex. Though the Bedford equatorial room was spherical rather than octagonal, the dome metal-clad and the building resting on a concrete or brick foundation, Carkeek's observatory owed much to its basic design despite not sharing these particular features.⁵⁰

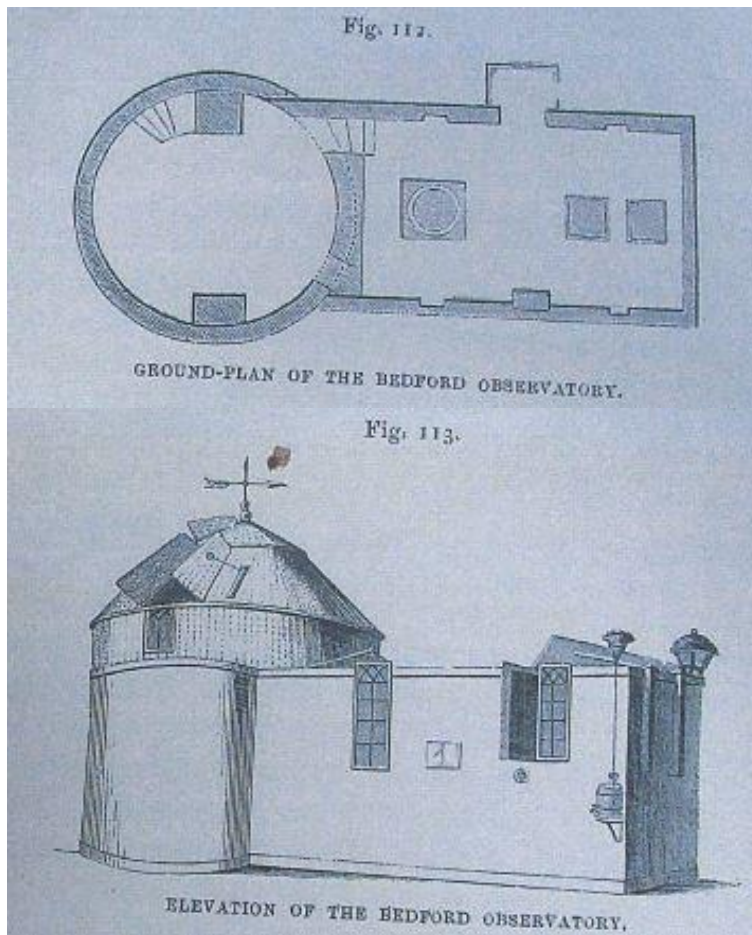
⁴⁶ 'Wairarapa', *Wellington Independent*, 15 March 1871, p.3.

⁴⁷ *Orchiston*, 2016, p.234-36.

⁴⁸ The meridian is a circle passing through the north and south celestial poles and the zenith of any place on the earth's surface. Tony Deverson and Graeme Kennedy, *The New Zealand Oxford Dictionary*, Melbourne, Oxford University Press, 2005, p.705.

⁴⁹ *ibid*; George F. Chambers, *A Handbook of Descriptive and Practical Astronomy. Part Two: Instruments and Practical Astronomy*, Oxford, Clarendon Press, 1890, pp.194, 196-97.

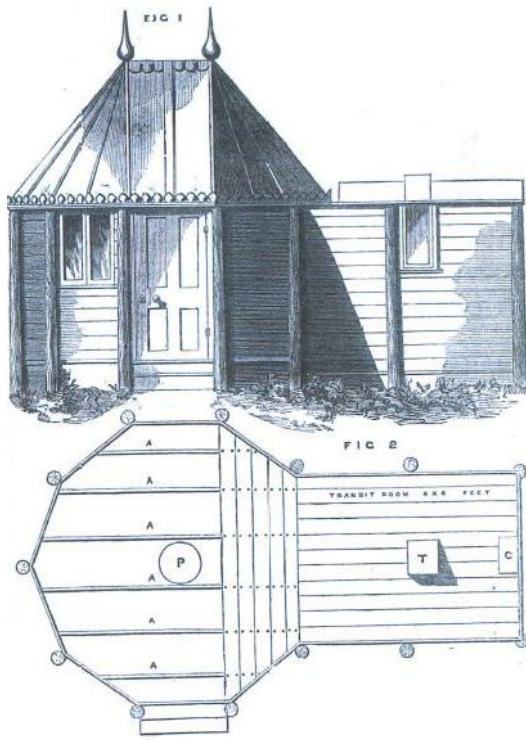
⁵⁰ Chambers, 1890, p.197. There is no evidence of a solid foundation in the floorless Carkeek Observatory.



The Bedford Observatory reproduced in George F. Chambers, *A Handbook of Descriptive and Practical Astronomy. Part Two: Instruments and Practical Astronomy*, Oxford, Clarendon Press, 1890, p.197.

It was also very similar to English astronomer and inventor Edward Berthon's well-known Romsey Observatory (designed *circa* 1863), a timber building with a nonagonal equatorial room, revolving canvas dome, rectangular transit annex and timber floor that allowed for air circulation.⁵¹ Berthon claimed his design afforded the observatory 'freedom from damp' and high temperatures, critical in a building housing sensitive instruments. He argued that brick or stone observatories were unnecessarily expensive and furthermore, that light-weight timber structures produced better astronomical results.

⁵¹ *Orchiston*, 2016, pp.235-36; *Chapman*, 1998, p.229; E.L. Berthon, 'On Observatories', *English Mechanic and World of Science*, no. 342, 13 October 1871, pp.83-84.



The Romsey Observatory reproduced in E.L. Berthon, 'On Observatories', *English Mechanic and World of Science*, no. 342, 13 October 1871, pp.83.

The Romsey was specifically designed as a low-cost model for amateur astronomers, able to be built 'by any village carpenter... in less than a fortnight' and is believed to be the first such model explicitly aimed at amateurs.⁵² Berthon published basic architectural drawings and instructions for this model in 1871, following 'a great many [that were built] in the last seven or eight years with uniform results' and it proved very popular with amateurs.⁵³ This was a development upon his even simpler twelve-sided 'inexpensive garden' observatory published in 1864.⁵⁴ Whether Carkeek knew about Berthon's designs is unknown but regardless of any direct connection, the shared characteristics and materials places his observatory within the Romsey mould.

Other contemporary New Zealand astronomers recorded as having their own personal observatories include surveyors Henry Jackson in the Hutt Valley and John Turnbull Thomson in Dunedin, Arthur Stock in Wellington and meteorologist Henry Skey in Dunedin, while

⁵² Berthon, 1871, p.84; Chapman, 1998, p.229.

⁵³ Berthon, 1871, p.83; Chambers, 1998, pp.229-30. Chambers published detailed drawings of a version of the Romsey observatory in his 1890 edition, see pp.230-234, plates XVII and XVIII.

⁵⁴ E.L. Berthon, 'The Romsey Observatory', *The Intellectual Observer*, July 1864, pp.444-48. Acknowledgements to Trudy E. Bell for drawing my attention to this source.

Thames-based John Grigg built two timber observatories similar to Carkeek's in the 1880s and 1890s.⁵⁵ None of these have survived, leaving Carkeek's observatory as the single extant example of this type of structure in New Zealand.

Carkeek's Astronomical Work

In 1871 Jackson and Thomson wrote that '...Carkeek had for many years pursued observations for longitude by lunars, Jupiter's satellites, lunar eclipses, and moon culminations'.⁵⁶ Longitude calculations were critical to the work of surveyors, geographers and mariners and the observations pursued by Carkeek were typical activities for serious astronomers of the period.⁵⁷ He is not known to have published, but fellow astronomers like Jackson and Thomson were clearly aware of his work.

Carkeek was well-placed to observe the much-anticipated transit of Venus on 9 December 1874. By tracking the passage of Venus across the sun, astronomers could work out 'one of astronomy's fundamental yardsticks', the distance between the sun and the earth known as the 'astronomical unit'.⁵⁸ The entire transit would be visible from New Zealand and its offshore islands and this attracted official transit parties from England, France, Germany and the United States of America, drawing New Zealand into an internationally-significant exercise.⁵⁹

Prior to the transit, Astronomer Royal George Biddell Airy, of the Royal Observatory Greenwich in England, had corresponded with the New Zealand government regarding an appropriate location and the loan of astronomical instruments for the English observation station.⁶⁰ James Hector, director of the Geological Survey and Colonial Museum, suggested

⁵⁵ *Orchiston*, 2016, pp.243-45, 277-279, 287; 'An Initial Meridian of Longitude for New Zealand', *Taranaki Herald*, 9 December 1871, p.3; Thomas King, 'On New Zealand Mean Time, and on the Longitude of the Colonial Observatory, Wellington; with a Note on the Universal Time Question', *Transactions and Proceedings of the Royal Society of New Zealand*, vol. 35, 1 January 1902, p.443. Note that Henry Skey's extant house Leithendel started life as a meteorological observatory in 1862 (see physical description below) and he built himself a stand-alone observatory in the grounds of the house in 1874 which has not survived.

⁵⁶ Thomson and Jackson, 1871, p.4 Thomson and Jackson noted that Carkeek's calculations would have been incorporated into their longitude work had they not been destroyed in a fire.

⁵⁷ *Ibid.*, p.3; *Orchiston*, 2016, pp.237-38.

⁵⁸ *ibid.*, p.371; Simon Nathan, 'The Transit of Venus in 1882', Signposts Te Ara Blog, 2012 <https://blog.teara.govt.nz/2012/05/29/the-transit-of-venus-in-1882/> (accessed 5 August 2019).

⁵⁹ *Orchiston*, 2016, pp.372-73.

⁶⁰ 'Papers Relative to the Observation of the Transit of Venus', *Appendix to the Journals of the House of Representatives*, 1874, H-16, pp.1-9.

Carkeek as one of the few locals who might ‘furnish such instruments’.⁶¹ In the event, the English brought their own instruments and portable observation huts and Carkeek declined an invitation to participate in their observation at Burnham in Christchurch.⁶²

There is no record of Carkeek following the transit at his own observatory but he is highly likely to have done so or at least have attempted to – like most of New Zealand, Wairarapa was clouded over on the day of the transit, wholly obscuring the sun.⁶³ The 1874 transit and the next one in 1882, along with transits of Mercury in 1878 and 1881 and the appearance of a number of bright comets in those decades, popularised astronomy and spurred local astronomers to ‘systematically observe their patch of southern sky’.⁶⁴

Carkeek’s Death and Legacy

Carkeek died suddenly on 27 November 1878 aged 63.⁶⁵ He had just returned to Torohanga from a visit to Tauranga, where his daughter Ellen Sheath lived.⁶⁶ Reportedly ‘so pleased with the voyage and district that he resolved to spend the remainder of his life at the seaside’, he bought a property there during his visit.⁶⁷ He had already planned to sell Torohanga, having ‘become tired of sheep-farming’.⁶⁸ At the time of his death Carkeek was recognised for his public service and contribution to astronomy. One obituary referred to him as ‘the first astronomer in the Colony’, and another described him as ‘widely-known as an astronomer [who] always took a deep interest in astronomical matters’, noting his establishment of the Wellington timeball.⁶⁹

While Carkeek’s precise contribution to astronomical research and its practical application beyond the timeball is unclear due to the loss of his papers and apparent lack of publication,

⁶¹ Ibid., p.4. Hector misspelled his name as ‘Karkeek’. The other individuals named were Archdeacon Arthur Stock and surveyors John Thomson and Theophilus Heale.

⁶² ‘The 1874 Transit of Venus Expeditions’, <http://www.royalobservatorygreenwich.org/articles.php?article=1190> (accessed 5 August 2019); R.S (Syd) Cretney to Greenwich Observatory, 12 January 1989, MS-Papers-7132-1, Robert Sydney Cretney papers, Alexander Turnbull Library.

⁶³ *Orchiston*, 2016, p.238.

⁶⁴ Wassilieff, 2006a; J.B. Seymour, ‘A History of the Thomas King Observatory, Wellington’, Wellington, Carter Observatory, 1997, p.1.

⁶⁵ Stephen Carkeek death registration, 1878/3243. Causes of death given were chronic alcoholism, bronchitis and epileptic fit. These illnesses may go some way to explaining Carkeek’s lack of recorded activity following his retirement.

⁶⁶ Untitled, *Wairarapa Standard*, 30 November 1878, p.2.

⁶⁷ *ibid.*

⁶⁸ ‘The Late Mr. Stephen Carkeek’, *Evening Post*, 30 November 1878, p.3.

⁶⁹ Untitled, *Wairarapa Standard*, 30 November 1878, p.2; Untitled, *Evening Post*, 30 November 1878, p.3.

his work was recognised and valued by peers such as Jackson, Thomson and Hector. Carkeek was acknowledged in New Zealand as an observatory expert and advised the Philosophical Institute of Canterbury on the costs associated with establishing a small observatory in 1872.⁷⁰ Contemporary reference to his ‘accumulated astronomical observations’ suggests Carkeek engaged in serious astronomical activity and produced a body of work known of in his life time and recognised at his death.⁷¹

Later History

Within two weeks of Carkeek’s death, Torohanga, the livestock and household furniture were put up for sale, but the property was bought in at auction.⁷² Martha Carkeek returned to Tauranga and Torohanga passed to the couple’s children.⁷³ Carkeek’s ‘numerous valuable notes and observations’ were apparently promised to the *Wairarapa Standard* before he died, but there is no record of this happening.⁷⁴ At least one telescope ended up with the Carkeek’s daughter Frances Stewart and her husband John Tiffen Stewart. In 1882 this telescope was offered on loan to chief surveyor John Marchant for his observation of the second transit of Venus but he instead borrowed a 4-inch Browning refractor from a David Grey of Wellington.⁷⁵

In 1880 Torohanga was leased to Charles Welby Jackson and from 1885 to William Hodder, who bought it in 1896, ushering in over 100 years of Hodder family ownership.⁷⁶ The farmhouse was destroyed by fire at an unknown date and the garden was turned over to

⁷⁰ ‘Astronomical Society’, *Lyttleton Times*, 11 January 1872, p.2. An observatory does not appear to have been built by the institute.

⁷¹ *Orchiston*, 2016, p.237.

⁷² ‘Auctions’, *New Zealand Times*, 10 December 1878, p.4; Untitled, *Evening Post*, 19 December 1878, p.2.

⁷³ RT WN3/97, Wellington Land District. Son Morgan Carkeek is the only name on the record of title, however, letters held by Graham Hodder suggest that his surviving siblings were part owners. See Arthur Carkeek to William Hodder, 8 October 1892, collection of Graham Hodder. For Martha’s return to Tauranga, see Martha Carkeek to Francis Stewart, 11 May 1879, MS-Papers-10864-1, Stewart Family Papers. This letter was written from Tauranga. Martha writes ‘I received a letter from Morgan yesterday he says this property here must be sold. I cannot think how he can write such a thing of the kind as he knows that dear pa [Carkeek] bought it for me to live here....I will not go back to the farm [Torohanga] now. I did not think that I should have had so much worry about what was left to me it makes me quite unhappy when I think about it’.

⁷⁴ Untitled, *Wairarapa Standard*, 30 November 1878, p.2. Carkeek researcher Syd Cretney (1919-2013) discussed the absence of Carkeek’s papers in his 1989 letter to the Greenwich Observatory, suggesting they may have been destroyed in one of a number of house fires experienced by his descendants (op. cit).

⁷⁵ John T. Stewart to J. Marchant, 25 September 1882, and J. Marchant to Morgan Carkeek, 27 September 1882, ‘Correspondence Regarding Transit of Venus, Erection of Pyramid and Observatory Studies’, LS-W1 30 1279, Archives New Zealand; ‘Surveys of New Zealand. Report for 1882-83’, *Appendix to the Journals of the House of Representatives*, 1883, C-2, p.4. Marchant observed the transit from the Bidwell Station near Featherston.

⁷⁶ RT WN21/2, Wellington Land District.

livestock. The observatory became a store for farm equipment with the dome, floor and two walls of the equatorial room removed to facilitate access.⁷⁷

In the late 1980s Syd Cretney of the Wellington Astronomical Society (WSA), ‘rediscovered’ the observatory after researching Carkeek’s history. Members of the WSA, the Royal Astronomical Society of New Zealand, the Martinborough Dark Sky Society and historians of astronomy have made periodic visits to the observatory since then, monitoring its physical condition and conducting research into its history.⁷⁸ In 2015 the original Carkeek farmland, including the observatory site, was purchased by the South Wairarapa District Council and a land covenant was placed over the observatory by the Hodder family, compelling the new owner to ‘take all reasonable steps to ensure the preservation’ of the site.⁷⁹

In the twenty-first century the Wairarapa region is recognised for its dark skies and stargazing activities. Stonehenge Aotearoa, inspired by the English Stonehenge, opened in Carterton in 2005 and observation tours were offered at Star Field near Martinborough from late 2019.⁸⁰ The Carkeek Observatory is near the proposed South Wairarapa International Dark Sky Reserve applied for by the Martinborough Dark Sky Society in 2017.⁸¹ In support of this proposal the three Wairarapa local authorities and the New Zealand Transport Agency adopted softer street and highway lighting and businesses were encouraged to become ‘dark sky friendly’.⁸² If the reserve application is successful the Carkeek Observatory ‘will likely become a significant stop-over for astronomy buffs and any night sky enthusiasts’.⁸³

⁷⁷ Syd Cretney, ‘A Journey 110 Years into the Past’, *Royal Astronomical Society of New Zealand (Inc.) Newsletter*, December 1988, p.6; ‘Remains are Historic Observatory’, *Dominion*, 1 October 1998, p.15 It is not known when the observatory was first used for storage.

⁷⁸ Cretney, 1988; Cretney to Greenwich Observatory, 12 January 1989, MS-Papers-7132-1, Robert Sydney Cretney papers; *Orchiston*, 2016, pp.239-243; ‘Historic Night Sky Observatory on Agenda’, *Martinborough Star*, August 2018, p.1.

⁷⁹ Easement Instrument 10091293.2, RT 679923, Wellington Land District.

⁸⁰ <https://www.stonehenge-aotearoa.co.nz/about-stonehenge.html> (accessed 31 October 2019); Piers Fuller, ‘Stars Align in Wairarapa for Astro-Tourism Business’, 22 October 2019 <https://www.stuff.co.nz/national/116766496/stars-align-in-wairarapa-for-astro-tourism-business> (accessed 31 October 2019).

⁸¹ <https://martinboroughdarksky.org/index.php/information/dark-sky-reserve/> (accessed 31 October 2019); ‘Martinborough Dark Sky Reserve’, *Martinborough Star*, 19 December 2017 <https://www.martinboroughstar.co.nz/martinborough-dark-sky-reserve/> (accessed 31 October 2019); Piers Fuller, ‘A Wairarapa Dark Sky Reserve Would be the World’s Largest’, 13 November 2018 <https://www.stuff.co.nz/environment/108557307/a-wairarapa-dark-sky-reserve-would-be-worlds-largest> (accessed 8 August 2019).

⁸² Piers Fuller, ‘Softer Lighting Sees Martinborough Shine the Way for Dark Sky Designation’, 23 January 2018 <https://www.stuff.co.nz/environment/100811610/softer-lighting-sees-martinborough-shine-the-way-for-dark-sky-designation> (accessed 31 October 2019); <https://martinboroughdarksky.org/index.php/darkskyfriendly/> (accessed 31 October 2019).

⁸³ ‘Historic Night Sky Observatory on the Agenda’, *Martinborough Star*, August 2018, p.1.

Associated List Entries

n/a

2.2. Physical Information

Current Description

The Carkeek Observatory is located within a rural property approximately five kilometres south of Featherston. It sits near the eastern boundary of a flat field known to the Hodder family as the 'Garden Paddock', which largely follows the boundaries of Stephen Carkeek's substantial garden.⁸⁴ Numerous old trees, including poplars, Australian gums, fruit, tōtara and tī kōuka, grow throughout the paddock and were likely planted in Carkeek's time. Some of the poplars once lined the driveway between the Otairira Stream and the farmhouse, and uniform spacing of the surviving trees hints at their avenue function. The house (not extant), was a two-storey ten room dwelling located in the north-west quarter of the paddock.⁸⁵ There are remnants of nineteenth century post-and-rail tōtara fences constructed with hand-made nails incorporated into more recent fencing.



The Garden Paddock from the north. The Carkeek Observatory is at left in the middle distance as indicated by a yellow arrow. The farmhouse site is behind the nearest stand of poplar trees at right, while the poplar trees lining the driveway are in the middle. Kerryn Pollock, Heritage New Zealand Pouhere Taonga, 12 September 2019.

The observatory, comprised of an octagonal equatorial room and an adjoining rectangular transit annex, is a light-weight structure made of rough-sawn timber (most likely locally-

⁸⁴ The following description is based on a site visit made on 12 September 2019 and information shared by Graham Hodder, the previous land owner who lives near the observatory. These have been supplemented by comparisons with the 1878 map 'Torohanga in the Township of Featherston'.

⁸⁵ A drawing of the house and the ground floorplan is included in the 1878 map. The size of the house is indicated by an 1896 loan application form completed by William Hodder (collection of Graham Hodder).

sourced tōtara) and has been constructed with hand-made iron nails and mortice and tenon joints. Sections of lead flashing remain in situ. The building is in a ruinous state and is to some extent supported by a mature walnut tree growing through the transit annex. The floor is missing from both sections and grass and weeds grow inside. It is surrounded by a modern fence intended to keep stock out.

The equatorial room is missing approximately four of its original eight sides but the surviving panels show it was made up of a double layer of vertical boards with thin vertical battens on the outside. The canvas dome roof of the equatorial room is long gone; whether there are any remnants on or in the ground is unknown. Broken pieces of the iron channels and four of the iron wheels (which together allowed the canvas dome to revolve on top of the vertical boards) survive; the channels both in situ and on the ground, where all the surviving wheels have ended up.

The rectangular transit annex is slightly less ruinous than the equatorial room. It retains key structural and design elements, including the front, west-facing elevation, a double layer of horizontal boards on the north and south elevations and vertical boards on the west elevation, and the partially-intact gable roof with evidence of an observation slit running from north to south (through which stars were observed with a transit instrument as they crossed the meridian). There is an apex-shaped internal door opening between the building's two parts that is embellished with simple mouldings. The equatorial room has a higher floor than the transit annex, as was typical of Romsey-style observatories, but the small flight of stairs that connected them are not evident.⁸⁶ What may be a seat or shelf survives in the north-east internal corner of the transit annex.

Despite the general dilapidation of the building, enough fabric survives for its purpose and layout to be readily discernible by an informed viewer. The octagonal shape of the equatorial room is still clearly evident and it is possible to visualise how the revolving dome and transit annex slit would have worked when in use. There is no evidence of any astronomical instruments or related paraphernalia remaining on-site and though it is highly likely that all equipment was removed following Carkeek's death, the possibility of finding items under the ground cannot be discounted.

⁸⁶ These steps were present when Wayne Orchiston visited in 1994. See *Orchiston*, 2016, p.240.

Comparisons

The Carkeek Observatory has been identified by scholars as New Zealand's 'oldest surviving observatory' and it predates the astronomical observatories entered onto the New Zealand Heritage List/Rārangī Kōrero, all of which date from the twentieth century: Ward Observatory (Including Telescope and Mounting), Category 1, List No. 170 (1903), Dominion Observatory, Category 1, List No. 4700 (1907), Thomas King Observatory in the Dominion Observatory Historic Area, List No. 7033 (1912) and Carter Observatory, Category 2, List No. 3596 (1940).⁸⁷

The Dunedin house Leithendel, List No. 4697, built in 1862 (with extensions made in 1878 and 1886), was in its earliest form used as a meteorological observatory.⁸⁸ In 1874 a stand-alone astronomical observatory was built near the house by owner Henry Skey in anticipation of that year's transit of Venus; this is no longer extant.⁸⁹ Another Dunedin dwelling, Transit House (Former), List No. 367, was built in 1882 and commemorates the second transit of Venus.⁹⁰ It includes an astronomical observatory on the roof but only parts of the dome, which is now used as a skylight, survive.⁹¹

An observatory tower was added to Nelson's Fairfield House, List No. 256, in the early 1880s; this was later demolished and then rebuilt during restoration work in the late 1990s.⁹² Arts Centre of Christchurch, List No. 7301, includes an astronomical observatory tower built in 1895-96; this was badly damaged during the Canterbury earthquake in 2011.⁹³ Christ's College School House, List No. 3280, has a rooftop observatory built in 1936.⁹⁴

⁸⁷ *Orchiston*, 2016. Note that Dominion Observatory and Carter Observatory are within the Dominion Observatory Historic Area and have separate historic place listings, while Thomas King Observatory does is not individually listed. See Helen McCracken, 'Ward Observatory (Including Telescope and Mounting)', Heritage New Zealand, 25 September 2001, <https://www.heritage.org.nz/the-list/details/170>; 'Dominion Observatory', <https://www.heritage.org.nz/the-list/details/4700> (accessed 5 November 2019; Historyworks, 'Information Upgrade Report: Thomas King Observatory', Heritage New Zealand, 23 November 2005, p.12; 'Information Upgrade Report: Carter Observatory, 3596', Heritage New Zealand, 2011, pp.2-3, 6.

⁸⁸ Susan Irvine, 'Summary Report: Leithendel, Dunedin (List No.4697)', Heritage New Zealand, 15 March 2019, pp.3, 10.

⁸⁹ *ibid.*, p.10.

⁹⁰ Sarah Gallagher, 'Summary Report: Transit House (Former), Dunedin (List No. 367)', Heritage New Zealand, 17 June 2019, p.1.

⁹¹ *ibid.*, p.10.

⁹² 'Fairfield House and Garden', *The Prow* <http://www.theprow.org.nz/places/fairfield-house-and-garden> (accessed 6 September 2019).

⁹³ Melanie Lovell-Smith, 'Arts Centre of Christchurch', List No. 7301, Heritage New Zealand, 20 August 2001.

⁹⁴ Robyn Burgess, 'Summary Report: Christ's College School House, Christchurch, List No. 3280', Heritage New Zealand, 10 March 2017, p.2.

Not entered onto the New Zealand Heritage List but scheduled in the Selwyn District Plan and part of the Transit of Venus Historic Reserve are brick instrument piers built by the British transit of Venus expedition in 1874.⁹⁵ The portable observation huts brought to New Zealand by the international parties were very similar in form and materials to the Carkeek Observatory; however they were disassembled after the transit and none are known to have remained in New Zealand.⁹⁶



Portable observation huts constructed by the Royal Observatory Greenwich for the 1874 Transit of Venus. The huts in the middle and at right were brought to New Zealand. University of Cambridge Digital Library, RGO 6/276. Creative Commons Attribution-Non Commercial 3.0 Unported License (CC BY-NC 3.0).

One of the significant aspects of the Campbell Island/Motu Ihupuku Historic Area, List No. 9700, is its status as the southernmost transit of Venus station, but only archaeological remnants (terraces, an instrument base, hut stone floor, and glass and ceramic fragments for instance) and a grave of an expedition member survive.⁹⁷ The 1876 Timeball Station in

⁹⁵ William Tobin, 'Transit of Venus Primer', *Southern Stars: The Journal of the Royal Astronomical Society of New Zealand*, vol. 51, no. 1, 2012, pp.10-11; Selwyn District Plan – Rural Volume – Part E – Appendix 3 Schedule of Heritage Items: H206 (operative 3 May 2016); <https://www.doc.govt.nz/news/media-releases/2012/poised-to-mark-transit-of-venus-history/> (accessed 6 September 2019). The piers that the telescopes were mounted on are solid, squat columns.

⁹⁶ Graham Dolan, 'Stables, Workshops, Sheds and other Miscellaneous Buildings', The Royal Observatory Greenwich <http://www.royalobservatorygreenwich.org/articles.php?article=922>; For the American huts in Queenstown see <https://teara.govt.nz/en/photograph/7990/transit-of-venus-observation-station>; For the American huts on the Chathams see <https://digital.librarycompany.org/islandora/object/digitool%3A99613> (accessed 1 November 2019). A hut brought to Campbell Town in Tasmania, Australia by one of the US parties was given to amateur astronomer William Valentine in 1874. It was later converted to a summerhouse and is believed to survive in this form on the grounds of The Grange in Campbell Town (Heritage Tasmania place no.4943. See Wayne Orchiston and Alex Buchanan, 'The Grange', Tasmania: Survival of a Unique Suite of 1874 Transit of Venus Relics', *Journal of Astronomical History and Heritage*, vol.1, no.1, 2004, pp.40-41.

⁹⁷ Heather Bauchop and Huia Pacey, 'New Zealand Heritage List/Rārangī Kōrero – Report for a Historic Area: Campbell

Lyttelton, the only extant timeball, was removed from the New Zealand Heritage List in 2013 after it was severely damaged in the 2010-11 Canterbury earthquakes.⁹⁸

No buildings or structures related to other scientific disciplines and of comparable age to the Carkeek Observatory have been located on the New Zealand Heritage List. There are places on the New Zealand Heritage List that represent early government involvement in science. Te Kauwhata Winery, List No. 4174, was established by the government as one of the country's first experimental farms in 1893 and became a site of viticultural research in the early 1900s, when its earliest buildings date from.⁹⁹ Weraroa State Farm, List No. 9494, has similar origins and chronology.¹⁰⁰ Wallaceville Animal Research Centre, List No. 3573, was built in 1905 and reflects government involvement in agricultural science research.¹⁰¹

The Carkeek Observatory is distinguished from the surviving New Zealand astronomical observatories by its date of construction, design and to a lesser extent materials. None of these bear a close affinity to the Romsey style of observatory, though the timber Ward Observatory built in 1903 by the Wanganui Astronomical Society is comparable, reflecting the growth of amateur astronomy in New Zealand.¹⁰² It is also very intact and as the full name hints, includes the original telescope. Additionally, research suggests that the Carkeek Observatory is an internationally-rare surviving Romsey style amateur observatory – no other directly equivalent examples have been located on the heritage lists of institutions in Australia, the United Kingdom or Canada.¹⁰³

Island/Motu Ihupuku Historic Area, Campbell Island/Motu Ihupuku (List No. 9700), Heritage New Zealand, 10 September 2019, pp.3, 42-43, <https://www.heritage.org.nz/the-list/details/9700> (accessed 6 December 2019).

⁹⁸ It is now List Considered No. 43. The timeball was subsequently reconstructed.

⁹⁹ Martin Jones, 'Te Kauwhata Winery', Heritage New Zealand, 20 November 2001, <https://www.heritage.org.nz/the-list/details/4174> (accessed 5 November 2019).

¹⁰⁰ Natasha Naus, 'Registration Report for a Historic Place: Weraroa State Farm, Levin', Heritage New Zealand, 17 May 2011, pp.3-4.

¹⁰¹ 'Heritage Assessment for Crown Land Disposal Ag-Research Centre, Wallaceville, Upper Hutt', August 2008, unpaginated.

¹⁰² Historyworks, 'Information Upgrade Report: Thomas King Observatory', Heritage New Zealand, p.3.

¹⁰³ The lists of the following overseas heritage institutions were consulted: New South Wales Office of Environment & Heritage, Australian Capital Territory Environment, Planning and Sustainable Development Directorate, Heritage Tasmania, Northern Territory Government Parks, Wildlife and Heritage Division, Government of Western Australia Department of Planning, Lands and Heritage, Queensland Heritage Register, Government of South Australia Department for Environment and Water, Heritage Victoria (Australia); Historic England, Historic Environment Scotland, Cadw Wales (United Kingdom); Canadian Register of Historic Places. The UK-based Society for the History of Astronomy (SHA) was also contacted. Kevin Johnson, convenor of the SHA's Astronomy's Survey of Astronomical History stated his belief that no 'Romsey style observatories from the 19th century in Britain have survived due to their wooden and lightweight construction', while American historian Trudy E. Bell was not aware of any surviving Romsey-type observatories in the US. (pers. comm Kevin Johnson, Society for the History of Astronomy, to Kerryn Pollock, 13 September 2019, and Trudy E. Bell to Kerryn Pollock, 11 September 2019 (copies on Heritage New Zealand Central Region Office file 12025-005. All

A surviving working timber amateur observatory is the Fernley Observatory in Southport, England.¹⁰⁴ In 1877 this building was moved from Gloucestershire to Southport, Merseyside (the date of construction is unknown), and again relocated to Hesketh Park in Southport in 1901, where it was placed on top of a substantial brick base. Unlike the Romsey model, the original building is comprised of one room only, has a metal-clad dome and is far more decorative than the budget-conscious Berthon provided for.



Fernley Observatory, www.fernleyobservatory.org/media

Another extant timber observatory of the period is that of John Capron in Guildford, England.¹⁰⁵ Built between 1867 and 1870, this too is a single room and has a metal-clad dome. Its construction is more substantial than the Romsey model required.¹⁰⁶

correspondence with institutions is held on this file).

¹⁰⁴ Also known as Astronomical Observatory, Historic England List No. 1379686 <https://historicengland.org.uk/listing/the-list/list-entry/1379586>; <https://southportastro.org/joseph-baxendell-and-his-observatory/> and <http://www.fernleyobservatory.org/history/> (accessed 17 September 2019).

¹⁰⁵ Kevin Johnson to Kerryn Pollock, 13 September 2019; <https://shasurvey.wordpress.com/astromers-surrey/> and <https://www.exploringsurreypast.org.uk/themes/people/scientists/capron/> (accessed 17 September 2019). This building is not heritage listed. Acknowledgements to Kevin Johnson for drawing it to my attention.

¹⁰⁶ Johnson, 13 September 2019.



John Capron observatory, photograph supplied by Kevin Johnson.



Other surviving small observatories built by western amateur astronomers in the nineteenth and early twentieth centuries include¹⁰⁷:

Name	Location	Date	Description	Image
Peninsula House and Observatory ¹⁰⁸	Australia	1864 and 1879	Two brick observatories built by John Tebbutt	<p>1879 at left; 1864 at right.</p>
Former James Oddie Observatory ¹⁰⁹	Australia	1886	Brick observatory built by James Oddie	

¹⁰⁷ Note that amateur observatories that are additions to existing buildings, such as houses, have not been considered – the focus is on stand-alone structures.

¹⁰⁸ <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1741567> (accessed 11 September 2019).

¹⁰⁹ <https://vhd.heritagecouncil.vic.gov.au/places/67539> (accessed 11 September 2019).

Shearer House and Observatory ¹¹⁰	Australia	Early c20th	Limestone and cement-rendered observatory built by David Shearer	
Euarra Homestead and Observatory ¹¹¹	Australia	1930s	Timber observatory with sliding roof built by George Herbert Hoskins	
Linden Observatory Complex ¹¹²	Australia	1938-48	Observatory complex (including brick observatory) built Ken Beames	
Observatory at South Wing ¹¹³	England	1801	Brick observatory built by William Lax	
Whitbread Observatory ¹¹⁴	England	1851	Brick observatory built by Samuel Whitbread	





¹¹⁰ http://maps.sa.gov.au/heritagesearch/HeritageItem.aspx?p_heritageno=16311 (accessed 11 September 2019).

¹¹¹ <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1080600> (accessed 11 September 2019).

¹¹² <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5061010> (accessed 11 September 2019).

¹¹³ <https://historicengland.org.uk/listing/the-list/list-entry/1295431> (accessed 11 September 2019).

¹¹⁴ <https://shasurvey.wordpress.com/observatories-bedfordshire/> (accessed 17 September 2019). This building is not heritage listed. Acknowledgements to Kevin Johnson for drawing it to my attention and supplying the photograph.

Observatory south of Tarn Bank ¹¹⁵	England	1860s	Sandstone ashlar observatory built by Isaac Fletcher	
Brisbane Observatory ¹¹⁶	Scotland	1805-09	Ashlar and rubble neoclassical observatory built by Sir Thomas Brisbane	
The Observatory ¹¹⁷	Wales	ca.1805	Rubble stone observatory built by Charles Greville	
The Equatorial Observatory, Penllergare ¹¹⁸	Wales	1846	Tolled square stone observatory built by John Dillwyn Llewelyn	

Peninsula House and Observatory is a 'rare early private observatory', while the Linden Observatory Complex is as 'a rare example of a privately held historic observatory in Australia'.¹¹⁹ The Former James Oddie Observatory is similarly reported as 'perhaps the only surviving nineteenth century private observatory in Victoria'.¹²⁰ The Brisbane Observatory is a 'highly important and rare example of an observatory building and is among the earliest of its type in Scotland' and the Equatorial Observatory, Penllergare is 'an extremely rare example of a mid c19 private observatory; the only other example in Wales is the partly ruinous observatory at Hakin, Milford Haven', (Charles Greville's observatory above). The

¹¹⁵ <https://historicengland.org.uk/listing/the-list/list-entry/1144510> (accessed 11 September 2019).

¹¹⁶ <http://portal.historicenvironment.scot/designation/LB52478> (accessed 11 September 2019).

¹¹⁷ <https://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=&id=12922> (accessed 11 September 2019).

¹¹⁸ <https://cadwpublic-api.azurewebsites.net/reports/listedbuilding/FullReport?lang=&id=26500> (accessed 11 September 2019).

¹¹⁹ <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=1741567> (accessed 11 September 2019).

¹²⁰ <https://vhd.heritagecouncil.vic.gov.au/places/67539> (accessed 11 September 2019).

preponderance of stone materials indicates the scarcity of surviving timber observatories within an already limited pool of amateur observatories.

Construction Professionals

Unknown

Construction Materials

Timber; lead; iron

Key Physical Dates

ca.1867 Original construction

Uses

Research Observatory (Former)

Agriculture Shed (Former)

Ruin Misc Archaeological

2.3. Chattels

There are no chattels included in this List entry.

2.4. Sources

Sources Available and Accessed

The Carkeek Observatory has been the subject of research by astronomical historian Wayne Orchiston and his 2016 book *Exploring the History of New Zealand Astronomy* was an invaluable source of specific and contextual information. Syd Cretney's earlier work was similarly useful and also provided good evidence on the efforts of the New Zealand astronomical community to find and research the observatory. These sources were supplemented by other secondary works, including local histories, a report on the history of government science, a Waitangi Tribunal report and entries in Te Ara, the Encyclopedia of New Zealand. Contact with overseas heritage institutions and the UK-based Society for the History of Astronomy yielded vital comparative information on surviving amateur observatories in other countries.

Stephen Carkeek's personal papers have been lost and there are no known primary records that detail the construction of his observatory. Letters written by Carkeek and his wife

Martha from Featherston were located in the papers of their daughter Frances Stewart at the Alexander Turnbull Library; unfortunately none mention the observatory. Carkeek is an elusive figure and the loss of his personal papers and records of his astronomical activities along with his lack of publication hinders an assessment of his contribution to New Zealand astronomy. However, information sufficient to construct a reliable narrative of his life and the observatory was gleaned from other primary sources including newspaper articles, reports published in the *Appendices to the Journals of the House of Representatives* and land deeds and records of titles. Digitised nineteenth century astronomy manuals and articles provided crucial evidence and details of the kind of amateur observatories that were built by Carkeek's peers in Britain. Special thanks must go to Graham Hodder, last the owner of the observatory before the South Wairarapa District Council, for generously allowing access to his collection of primary documents.

The site visit by the author and archaeology and conservation architect colleagues was critical to gaining an informed appreciation of the Carkeek Observatory's material authenticity, particularly in light of its ruinous state. It is considered that there is sufficient original material and enough of that material in its original configuration or nearby (principally the iron wheels) for this place to sufficiently reflect the heritage values outlined in the significance assessment below.¹²¹

Further Reading

Orchiston, Wayne, *Exploring the History of New Zealand Astronomy*, Switzerland, Springer International Publishing, 2016.

Phillips, Jock, 'Timekeeping - New Zealand mean time', *Te Ara - the Encyclopedia of New Zealand*, 2006a, <http://www.TeAra.govt.nz/en/timekeeping>.

Wassilieff, Maggy, 'Astronomy – overview', *Te Ara - the Encyclopedia of New Zealand*, 2006a, <http://www.TeAra.govt.nz/en/astronomy-overview>.

¹²¹ Note that the ruinous state of the place made it challenging to photograph. It is hoped that the photographs included in this report adequately support the authenticity statement above.

3. SIGNIFICANCE ASSESSMENT¹²²

3.1. Section 66 (1) Assessment

This place has been assessed for, and found to possess archaeological, historical, social and technological significance or value. It is considered that this place qualifies as part of New Zealand's historic and cultural heritage.

Archaeological Significance or Value

There is great potential for a buildings archaeology approach to yield valuable information about this place, particularly in the absence of written records about its construction. Scientific analysis of the observatory timber could confirm the origin tree species. Measured drawings would likely contribute similarly vital extra detail on its construction methods and structural elements. Subsurface investigation could produce evidence of astronomical instruments and other equipment, furniture and materials related to the observatory. Additionally, investigation of the wider site known as the 'Garden Paddock' may produce archaeological material dating from the Carkeek family period. All these research avenues provide a rare opportunity to shed light on the practice of nineteenth century amateur astronomy.

Historical Significance or Value

The Carkeek Observatory is historically significant as the oldest surviving astronomical observatory in New Zealand. As an amateur observatory built by an individual, Stephen Carkeek, it is an excellent, early representation of the dominance of amateur practitioners in the history of New Zealand astronomy, and the importance of non-professionals in the early period of New Zealand scientific research. The place is connected to colony-building through the association of its creator with the development of accurate timekeeping and the creation of a national standard time service, and by the employment of astronomical methods in land surveying and mapping. It predates the burgeoning popular interest in astronomy that followed the transit of Venus in 1874, and other astronomical events of the late nineteenth century, such as the transits of Mercury in 1878 and 1881, of all which were major events in the astronomical calendar and attracted significant scientific and public interest.

¹²² For the relevant sections of the Heritage New Zealand Pouhere Taonga Act 2014 see Appendix 4: Significance Assessment Information.

The Carkeek Observatory represents the transmission of the British tradition of amateur astronomy to colonial locales. Furthermore, it is a nationally and internationally-rare surviving example of nineteenth century vernacular astronomical architecture realised in timber. Though ruinous, sufficient material survives for the building to act as a New Zealand version of the stand-alone Romsey style of observatory, which was designed in Britain as a model for amateur astronomers to emulate. It reflects a local translation of a vernacular architectural response to the growing popularity of astronomy in this period through the employment of low-cost materials and simple layout, culminating in a fit-for-purpose observatory achieved without major financial outlay.

Social Significance or Value

The rediscovery of the Carkeek Observatory in the late 1980s provided the New Zealand astronomical community with a tangible connection to its past. It has become a meeting place for historians of local astronomy, who have recorded the site and its physical changes. The observatory has gained additional public recognition as a key site close to the proposed South Wairarapa International Dark Sky Reserve.

Technological significance

The Carkeek Observatory has technological significance through the use of Romsey-style observatory construction elements, such as timber rather than permanent materials and an inexpensive, light-weight canvas-clad revolving dome. Though the canvas dome is not extant, sufficient amount of the iron channels and wheels survive to demonstrate how the dome would have operated. The Romsey model was widely adopted by amateur astronomers in the United Kingdom but no nineteenth century examples are known to survive, making the surviving elements of the Carkeek Observatory a good example of this type of astronomical technology.

3.2. Section 66 (3) Assessment

It is considered that this place qualifies as a Category 1 historic place. It was assessed against, and found to qualify under the following criteria: a, b and j.

(a) The extent to which the place reflects important or representative aspects of New Zealand history

The role of the amateur in astronomy and other scientific disciplines is an important theme in New Zealand history. The foundation and development of science in this country rested on the contribution made by individual practitioners and organisations dominated by amateurs for many decades, and in the case of astronomy, until the second half of the twentieth century. As a rare nineteenth century astronomical observatory, with a construction date that places it in the vanguard of Pākehā astronomy, the Carkeek Observatory is an outstanding representation of the early expression of the amateur theme. As the observatory of one person, Stephen Carkeek, it strongly represents the important contribution individuals made to scientific endeavour at a time when research institutions and government-sponsored science were in their infancy.

(b) The association of the place with events, persons, or ideas of importance in New Zealand history

Stephen Carkeek's association with Pākehā concepts of time through his establishment of the New Zealand's first timeball in Wellington and his related role in the implementation of standard time based on astronomy links the Carkeek Observatory to these ideas and practices. The advent of standard time was of major importance in the daily life of New Zealanders and contributed to the regularisation of work hours and schedules and leisure time. Carkeek instigated the timeball, supervised its construction and refined its workings and is thus an outstanding figure in the history of New Zealand timekeeping. Though his precise contribution to astronomy remains unclear, his astronomical activities and expertise were recognised by his peers and he is nevertheless understood as an important individual in the early history of amateur astronomy.

(c) The potential of the place to provide knowledge of New Zealand history

As the earliest surviving astronomical observatory in the country, this place possesses the ability to provide meaningful insights into early Pākehā astronomical practices. The surviving fabric is a physical demonstration of the way amateur astronomers carried out their work in the nineteenth century, and further knowledge would likely be gained through archaeological investigations, measured drawings and scientific analysis of the building, the sub-surface surroundings and the wider site.

(e) The community association with, or public esteem for, the place

The importance of this place to the New Zealand astronomical community is demonstrated by successful efforts of members to find the observatory in the late 1980s and subsequent

site visits and research. It is appreciated by the Martinborough Dark Sky Society as a valuable historic element near the proposed South Wairarapa International Dark Sky Reserve.

(f) The potential of the place for public education

The Carkeek Observatory has the potential to demonstrate to the public that astronomy and astronomical history is not confined to grander structures constructed in more permanent materials. As an authentic, albeit ruinous building, it shows how amateur astronomers could pursue their work as their means permitted. The present-day identification of the Wairarapa region with dark skies and astronomy, and the proposed Dark Sky Reserve, provides a very appropriate context for wider public knowledge and appreciation of this place.

(j) The importance of identifying rare types of historic places

The Carkeek Observatory is only nineteenth century timber astronomical observatory known to survive in New Zealand and the only extant, stand-alone observatory built in that century – no other personal observatories built by Stephen Carkeek’s astronomical peers are known to survive, while the Colonial Observatory of 1869 was demolished in 1906. Similarly, none of the 1874 transit of Venus portable observation huts, which had similarities in form and materials to the Carkeek Observatory, stayed in New Zealand, and few physical remnants of this major international scientific exercise remain. Furthermore, it is an internationally-rare New Zealand version of a popular form of astronomical observatory typified by the English Romsey model, favoured by amateur practitioners in the nineteenth and early twentieth centuries.

Amateur practitioners are critical not only in astronomy, but to the history of New Zealand science in general and there are few surviving places from the nineteenth century which tell that story. This local and international exceptionalism affords the Carkeek Observatory outstanding importance as a rare historic place.

Summary of Significance or Values

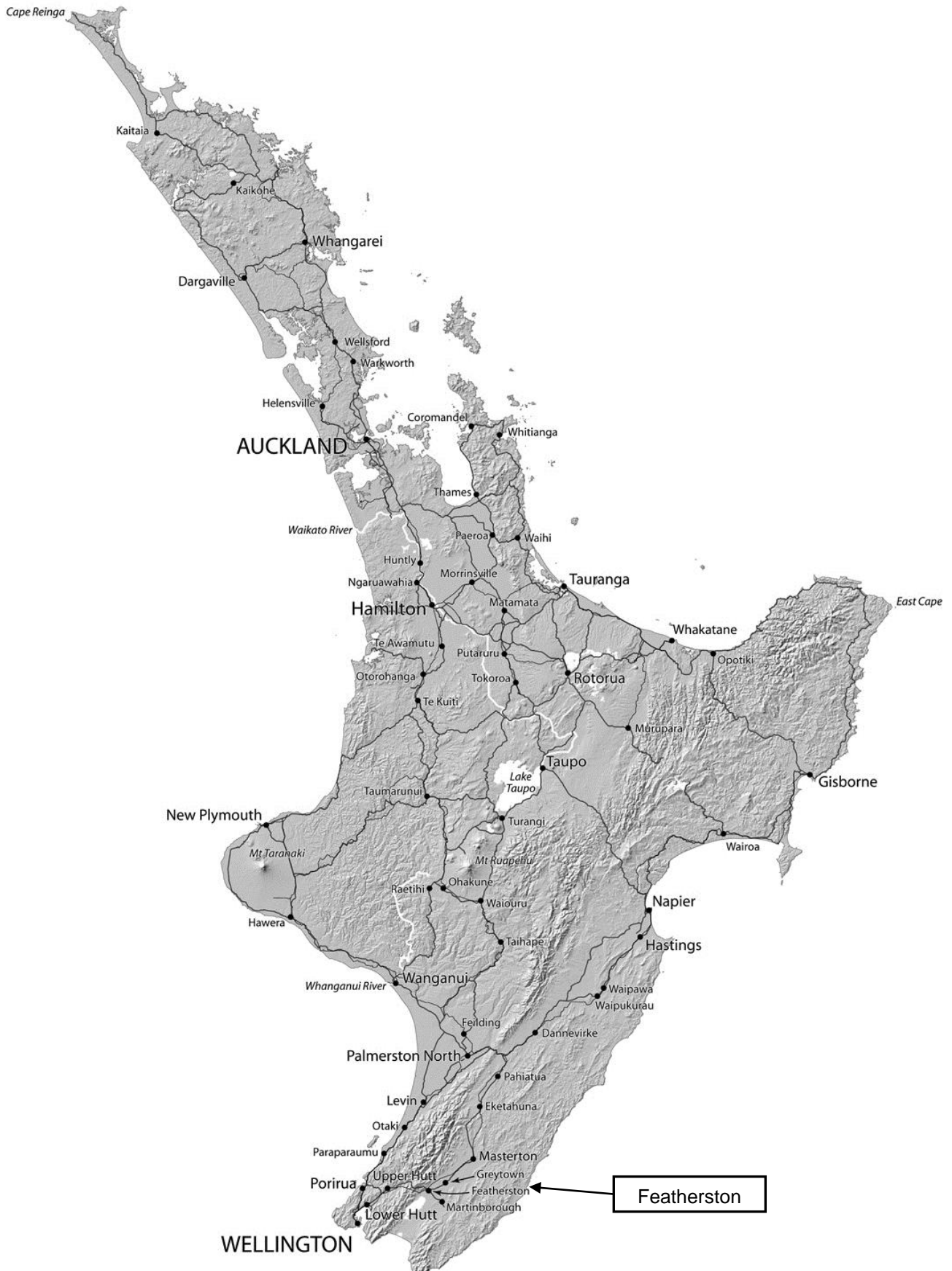
The Carkeek Observatory occupies an outstanding position in the history of Aotearoa/New Zealand as the earliest surviving astronomical observatory in the country and a building directly associated with amateurism, a major theme in the history of New Zealand astronomy and science in general. Its builder Stephen Carkeek played a critical role in local timekeeping by utilising his astronomical skills in the creation of New Zealand’s first timeball in Wellington, in addition to carrying out a range of observations that were typical activities for serious

amateur astronomers of his era. This place goes a long way towards satisfying a claim to uniqueness as a rare surviving New Zealand version of the popular Romsey-style model of amateur astronomical observatory devised in England and once widespread in that country. Of relatively light-weight timber construction made with an eye to economy, it has weathered the elements, human and animal interventions, and the passage of time with remarkable endurance. Ruined yet highly authentic, the Carkeek Observatory evokes the lone amateur astronomer at work, tracking the eternal passage of the stars and planets across the night sky.

APPENDICES

3.3. Appendix 1: Visual Identification Aids

Location Maps



Map of Extent



Extent includes part of the land described as Lot 5 DP 482853 (RT 679923), Wellington Land District and the building known as Carkeek Observatory thereon. Source: Google Earth with Quickmap overlay.

Note: The extent line follows the boundaries of the Garden Paddock. The yellow arrow indicates the observatory.

Current Identifier



RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy



Identifier **679923**
Land Registration District **Wellington**
Date Issued 19 May 2015

Prior References

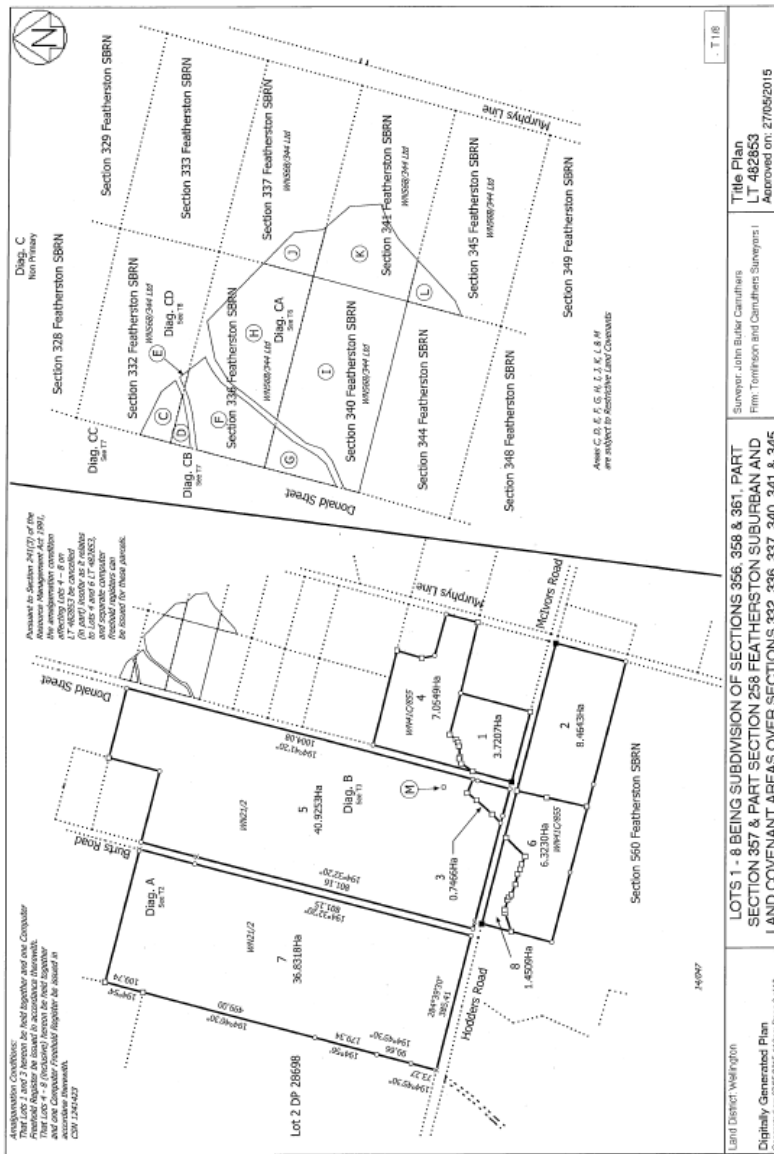
WN21/2 WN41C/855

Estate Fee Simple
Area 79.2080 hectares more or less
Legal Description Lot 5, 7-8 Deposited Plan 482853

Registered Owners
South Wairarapa District Council

Interests

Subject to Section 241(2) Resource Management Act 1991 (affects DP 482853)
Land Covenant in Easement Instrument 10091293.2 - 19.6.2015 at 2:49 pm



Note: the circled ‘M’ in Lot 5 indicates the land covenant over the observatory site.

3.4. Appendix 2: Visual Aids to Historical Information
 Historical Plans



Figure 1. Real estate poster for Torohanga, Stephen Carkeek’s property. Note the drawing of the farmhouse at left. Source: Collection of Graham Hodder.

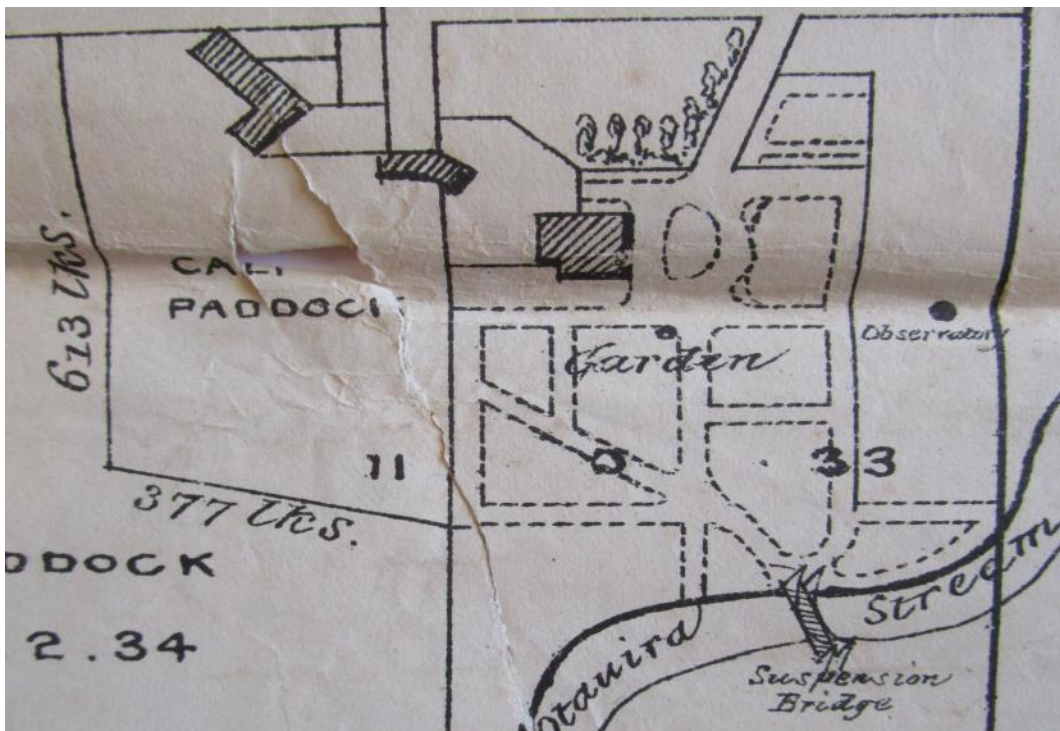


Figure 2. Detail of 1878 poster showing the layout of the farm house (hatched rectangle in front of the turning circle) and garden, including the observatory at right.

Historical Photographs

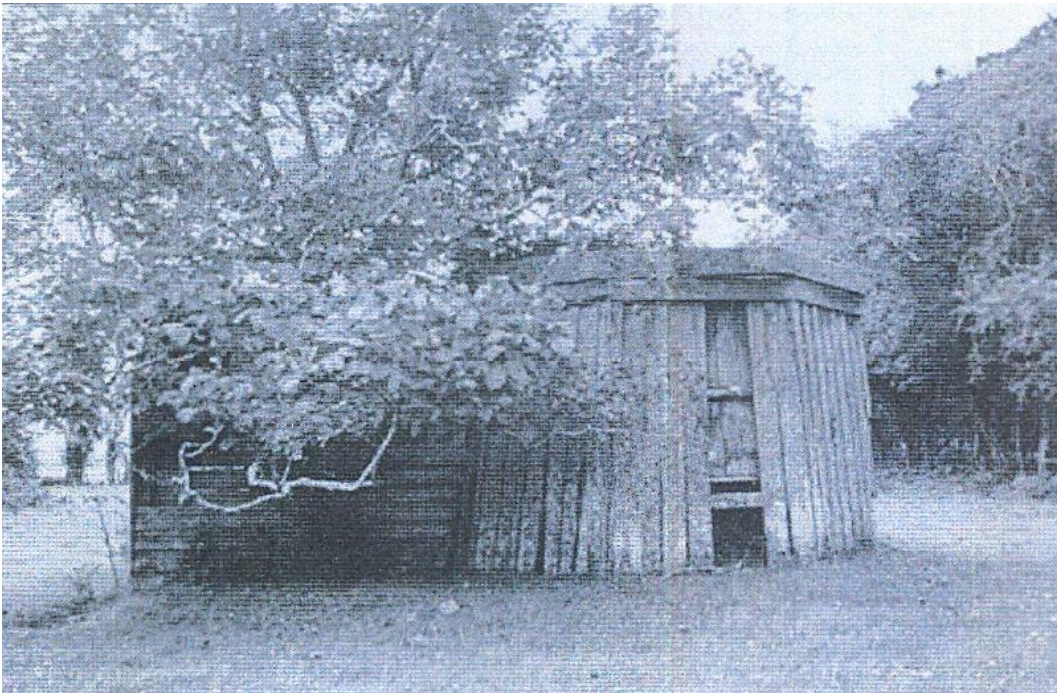


Figure 3. Carkeek Observatory, south elevation, 1987. Note the walnut tree growing through the transit annex. Source: Wayne Orchiston, 'Stephen Carkeek and New Zealand's Oldest Surviving Observatory', *Antique Telescope Society* vol. 20, 2001, p.23, photograph by Tony Wilmshurst.

3.5. Appendix 3: Visual Aids to Physical Information

Plan of Place

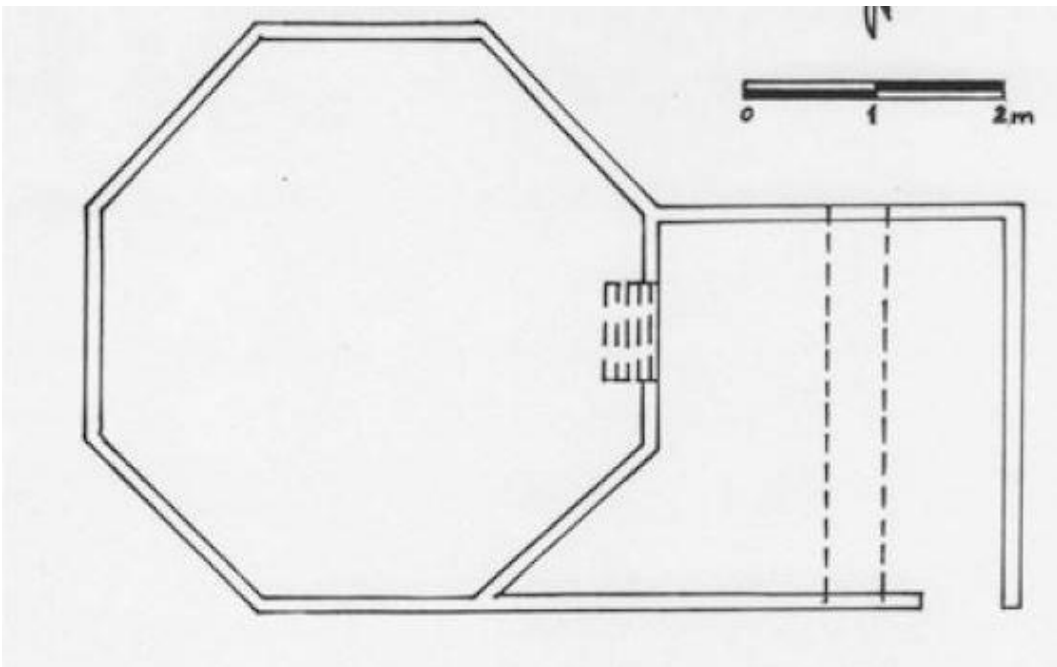


Figure 4. Basic original layout of the Carkeek Observatory. The equatorial room is at left and the transit annex at right. Source: Wayne Orchiston, *Exploring the History of New Zealand Astronomy*, Switzerland, Springer International Publishing, 2016, p.236.

Current Photographs of Place

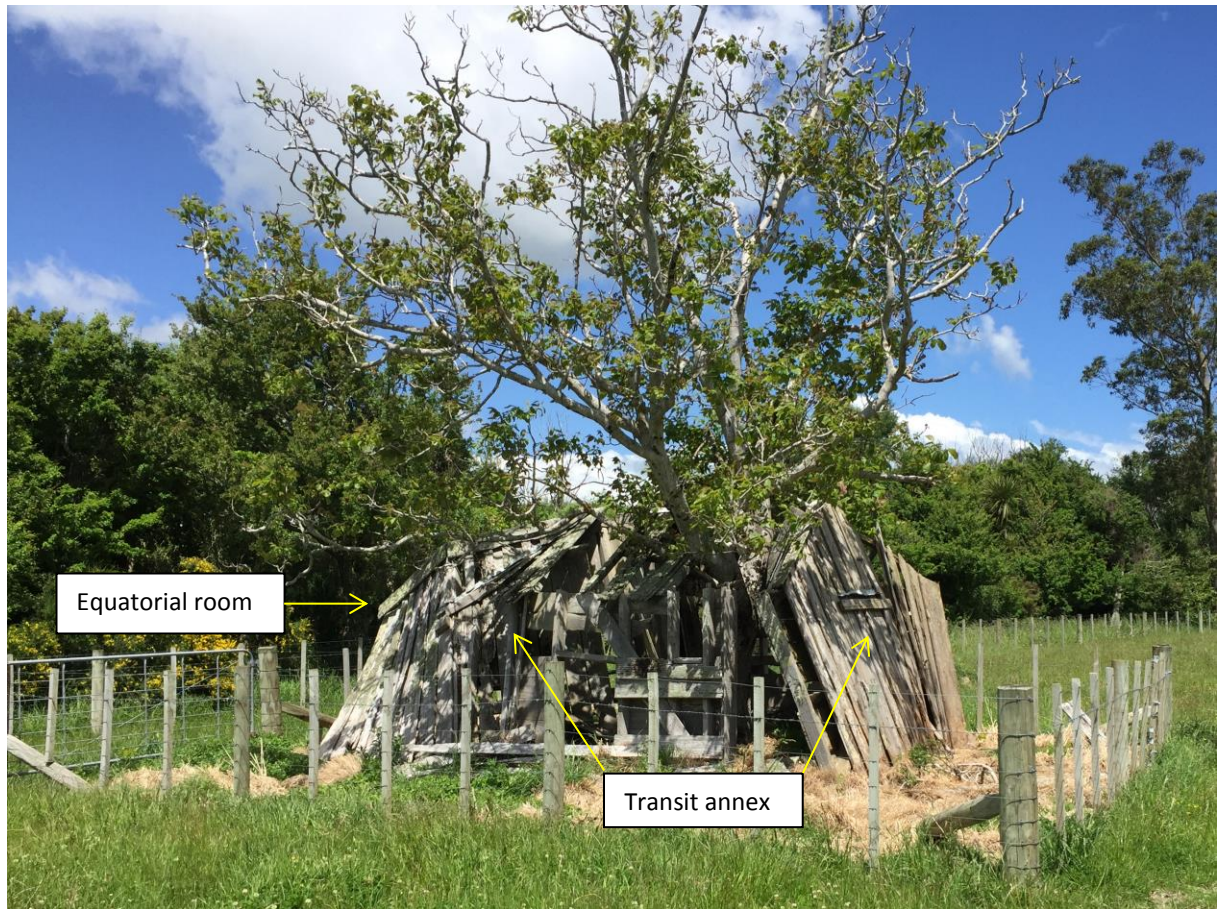


Figure 5. North elevation with the equatorial room at left and the transit annex at right. Christine Barnett, Heritage New Zealand Pouhere Taonga, 20 November 2019.



Figure 6. Interior of the equatorial room from the east. The apex-shaped door opening between the equatorial room and the transit annex is in the middle. Note the iron channel that remains fixed to the top (at right in the foreground). Christine Barnett, Heritage New Zealand Pouhere Taonga, 20 November 2019.



Figure 7. Example of mortise and tenon construction (joint with peg) and hand-made iron nails in the transit annex. Kerry Pollock, Heritage New Zealand Pouhere Taonga, 12 September 2019.



Figure 8. Example of an iron wheel, part of the mechanism which allowed the canvas dome of the equatorial room to revolve when in situ. It is now on the ground in the transit annex. Kerry Pollock, Heritage New Zealand Pouhere Taonga, 12 September 2019.

3.6. Appendix 4: Significance Assessment Information

Part 4 of the Heritage New Zealand Pouhere Taonga Act 2014

Chattels or object or class of chattels or objects (Section 65(6))

Under Section 65(6) of the Heritage New Zealand Pouhere Taonga Act 2014, an entry on the New Zealand Heritage List/Rārangi Kōrero relating to a historic place may include any chattel or object or class of chattels or objects –

- a) Situated in or on that place; and
- b) Considered by Heritage New Zealand Pouhere Taonga to contribute to the significance of that place; and
- c) Proposed by Heritage New Zealand Pouhere Taonga for inclusion on the New Zealand Heritage List/Rārangi Kōrero.

Significance or value (Section 66(1))

Under Section 66(1) of the Heritage New Zealand Pouhere Taonga Act 2014, Heritage New Zealand Pouhere Taonga may enter any historic place or historic area on the New Zealand Heritage List/Rārangi Kōrero if the place possesses aesthetic, archaeological, architectural, cultural, historical, scientific, social, spiritual, technological, or traditional significance or value.

Category of historic place (Section 66(3))

Under Section 66(3) of the Heritage New Zealand Pouhere Taonga Act 2014, Heritage New Zealand Pouhere Taonga may assign Category 1 status or Category 2 status to any historic place, having regard to any of the following criteria:

- a) The extent to which the place reflects important or representative aspects of New Zealand history
- b) The association of the place with events, persons, or ideas of importance in New Zealand history
- c) The potential of the place to provide knowledge of New Zealand history
- d) The importance of the place to tangata whenua
- e) The community association with, or public esteem for, the place
- f) The potential of the place for public education
- g) The technical accomplishment, value, or design of the place

- h) The symbolic or commemorative value of the place
- i) The importance of identifying historic places known to date from an early period of New Zealand settlement
- j) The importance of identifying rare types of historic places
- k) The extent to which the place forms part of a wider historical and cultural area

Additional criteria may be prescribed in regulations made under this Act for the purpose of assigning Category 1 or Category 2 status to a historic place, provided they are not inconsistent with the criteria set out in subsection (3)

Additional criteria may be prescribed in regulations made under this Act for entering historic places or historic areas of interest to Māori, wāhi tūpuna, wāhi tapu, or wāhi tapu areas on the New Zealand Heritage List/Rārangī Kōrero, provided they are not inconsistent with the criteria set out in subsection (3) or (5) or in regulations made under subsection (4).

NOTE: Category 1 historic places are 'places of special or outstanding historical or cultural heritage significance or value.' Category 2 historic places are 'places of historical or cultural heritage significance or value.'

Appendix 2 – Heritage NZ List Brochure

RĀRANGI KŌRERO – THE NEW ZEALAND HERITAGE LIST



HERITAGE NEW ZEALAND
POUHERE TAONGA



COMPILED UNDER THE *HERITAGE NEW ZEALAND POUHERE TAONGA ACT 2014*, THE NEW ZEALAND HERITAGE LIST/RĀRANGI KŌRERO ('THE LIST') IDENTIFIES THE NATION'S HERITAGE PLACES, INCLUDING PĀ, WHALING STATIONS, CHURCHES, MEMORIALS, URUPĀ, MAUNGA TAPU, FARM BUILDINGS, BRIDGES, MINING SITES, PUNAWAI, THEATRES, SETTLEMENTS, PUBLIC AND COMMERCIAL BUILDINGS, HOTELS, BREWERIES, PUBLIC PARKS, AND DWELLINGS. THE LIST IS THE ONLY STATUTORY NATIONAL RECORD OF OUR RICH, SIGNIFICANT AND DIVERSE HERITAGE PLACES.

IMAGES:

- 1 Cover image: The Bath House, Rotorua Government Gardens (IMAGE: PHIL BRAITHWAITE FLICKR.COM)
- 2 Alberton, Auckland (IMAGE: AMANDA TRAYES)



WHAT IS THE LIST?

The List identifies New Zealand's significant and valued historical and cultural heritage places. It is maintained by Heritage New Zealand Pouhere Taonga (Heritage New Zealand) and was formerly known as the New Zealand Historic Places Trust Register of historic places, historic areas, wāhi tapu and wāhi tapu areas, established under the *Historic Places Act 1993*. Its size, scale and national focus make the List one of the most important historical information resources in New Zealand.

WHY IS THE LIST IMPORTANT?

The List

- informs and notifies owners, the public, community organisations, government agencies and local authorities about significant heritage places; and
- is a source of information about historic places, historic areas, wāhi tūpuna, wāhi tapu and wāhi tapu areas for the purposes of the *Resource Management Act 1991*.

3 Balclutha Bridge (IMAGE: SHELLEY MORRIS FLICKR.COM)

4 St Mary's Basilica, Invercargill (IMAGE: SHELLIE EVANS FLICKR.COM)

5 Chinese miner's hut, Chinatown near Arrowtown (IMAGE: ALLISON BENNET FLICKR.COM)



WHAT'S ON THE LIST?

The List is divided into five parts

- **Historic places** – such as archaeological sites, buildings, memorials
- **Historic areas** – groups of related historic places such as a geographical area containing a number of properties or structures, a heritage precinct or an historical and cultural area
- **Wāhi tūpuna** – places important to Māori for their ancestral significance and associated cultural and traditional values
- **Wāhi tapu** – places sacred to Māori in the traditional, spiritual, religious, ritual or mythological sense such as maunga tapu, urupā, funerary sites and punawai
- **Wāhi tapu areas** – areas that contain one or more wāhi tapu.

Only historic places on the List are assigned as

- **Category 1** – a place of special or outstanding historical or cultural significance or value, or
- **Category 2** – a place of historical or cultural significance or value.

WHAT DOES ENTRY ON THE LIST MEAN?

The List is an information tool – it identifies and provides information on significant heritage places throughout New Zealand.

Entry on the List

- does not equal automatic protection
- does not directly create regulatory consequences or legal obligations on property owners
- does not directly create specific rights or control over property
- can provide heritage funding opportunities
- can lead to heritage properties being considered for inclusion in district plan heritage schedules.

HOW DOES THE LIST LINK WITH DISTRICT PLANS?

District plans are administered by local authorities and set out the changes that can be made to a property. Most district plans control proposed changes to heritage places and sites listed in the plans. Heritage New Zealand can get involved in this process and advocate for the retention of heritage values.

Local authorities are required to notify Heritage New Zealand if a building consent application is received regarding a property on the List. This allows Heritage New Zealand to offer conservation advice to property owners and local authorities. The fact that a property is included on the List should be noted on any relevant land information memorandum (LIM) supplied by a local authority.



WHAT IS THE PROCESS FOR ENTRY ON THE LIST?

Anyone can nominate an historic place, historic area, wāhi tūpuna, wāhi tapu or wāhi tapu area for entry on the List by completing an application form available from Heritage New Zealand. Staff will then assess the application and, if the application has merit, the views of owners, iwi and other interested parties will be sought and a proposal prepared. The decision on whether to enter the proposal on the List will be made by the Heritage New Zealand Board, or in the case of wāhi tūpuna, wāhi tapu and wāhi tapu areas, the Māori Heritage Council.

The precise criteria for inclusion on the List are set out in the *Heritage New Zealand Pouhere Taonga Act 2014*. Generally speaking, a property need not be large or impressive to qualify for entry on the List, but it must have significant heritage values.

Historic places and historic areas must possess some type of aesthetic, archaeological, architectural, cultural, historic, scientific, social, spiritual, technological or traditional significance.

Decisions relating to the entry of wāhi tūpuna, wāhi tapu and wāhi tapu areas will be consistent with the views of iwi, hapū and whānau, or other relevant Māori interests with historical and cultural association in any particular place.

CAN I VISIT PROPERTIES ON THE LIST?

Most properties on the List are privately owned, and their inclusion on the List does not imply that they are open to the public or available for any form of viewing. Some are owned by Heritage New Zealand, by local authorities or by other public groups and may be visited. Local visitor information centres should be able to provide advice on heritage properties open to the public.

WHAT INFORMATION IS KEPT ON THE LIST?

The List contains detailed information about a diverse range of New Zealand's heritage places. The amount of information contained in the List varies between entries and is supported by paper files.

Some of the information Heritage New Zealand holds about properties on the List includes

- Location (e.g. address, legal description)
- Date of construction or age
- Description
- History of the place
- Function of the property including current and former uses
- Architectural, archaeological and traditional information
- Photographs – contemporary and historic.

WHERE CAN I FIND THE LIST?

Paper copy

A paper copy of the List is available in all Heritage New Zealand offices. Your local city or district council also holds an updated copy of the List and details of proposed List entries in their particular area.

Online

An online version of the List is also available and is regularly updated after each meeting of the Heritage New Zealand Board and Māori Heritage Council.

Please see: www.heritage.org.nz/the-list 



FURTHER INFORMATION

1



If you'd like to find out more about the List please contact or visit any one of our Regional or Area Offices:

Northern Regional Office
Premier Buildings
Level 2, 2 Durham Street East
Private Box 105-291,
Auckland 1143
Ph: (64 9) 307 9920
infonorthern@heritage.org.nz

Central Regional Office
Level 7, 69 Boulcott Street
PO Box 2629
Wellington 6140
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Southern Regional Office
International Antarctic Centre
38 Orchard Road
PO Box 4403
Christchurch Mail Centre, 8140
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infosouthern@heritage.org.nz

Northland Area Office
Level 1, 62 Kerikeri Road
PO Box 836,
Kerikeri 0245
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infonorthland@heritage.org.nz

Lower Northern Area Office
Level 1, 28 Wharf Street
PO Box 13339,
Tauranga 3141
Ph: (64 7) 577 4530
infolowernorthern@heritage.org.nz

Otago / Southland Area Office
Level 4, 109 Princes Street
PO Box 5467,
Dunedin 9058
Ph: (64 3) 477 9871
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Free phone 0800 HERITAGE

IMAGES:

- 1 The tohu maumahara at Rangiriri (IMAGE: AMANDA TRAYES)
- 2 T Gilchrist and Sons General Store, Oturehua (IMAGE: SHELLEY MORRIS FLICKR.COM)