PORT AUTHORITY OF NSW HERITAGE INVENTORY

State Heritage Inventory

SHI Number: 4560010	Study Number: N/A	
Item Name: Camp Cove Tide Gauge		
Location: Brotherson House, Port Botany		
Address: Gate B103 Penrhyn Rd, Port Botany	DUAP Region: Sydney South	
Suburb / Nearest Town: Port Botany 2036	Historic Region: Sydney	
Local Govt Area: Randwick	Parish: Botany	
State: NSW	County: Cumberland	
Other/Former Names:		
Area/Group/Complex:		Group ID:
Aboriginal Area:		
Curtilage/Boundary:		
Item Type: Movable / Collection	Group: Government and Administration	Category: Meteorological Station
Owner: Port Authority of New South Wales		
Current Use: Display object		
Former Uses: Automatic tide gauge recorder		
Assessed Significance: State	Endorsed Significance:	

Statement of Significance:

The Sydney Harbour Trust established a permanent tide station at Camp Cove in c.1915 to supplement the readings of the Fort Denison tide gauge station. This tide gauge (now in Port Authority of New South Wales office at Brotherson House, Port Botany) was the first tide gauge installed at the Camp Cove tidal station. It commenced readings in March 1916 and remained in use until 1 January 1990. The data obtained from the Camp Cove tide gauge has provided invaluable information about the movement of tides which has assisted with navigational safety and meteorological monitoring and has informed an understanding of tidal patterns and sea level changes. This information has also been critical to climate change research and coastal planning. (Criterion a).

The Camp Cove tide gauge main instrument demonstrates a high degree of mechanical and manufacturing precision. Its high level of intactness and the assembly of its various parts, including the clock, drum, stylus with crank sliding mechanism, pulley wheel, and frame reflect a high degree of technical acuity. This technical achievement is enhanced by the quality of craftsmanship and materials exhibited in the manufacture of the clock, brass frame, and purpose-built timber framed glass case with ovolo edges. (Criterion c)

The volume of data produced by the Camp Cove tide gauge over approximately 73 years has contributed to our understanding of tidal movements and changing sea levels in Port Jackson. Digitisation of these records has ensured that the data will continue to further research and understanding of tidal patterns and oceanography. This data has informed, and continues to inform navigational and maritime activity, oceanographic and climactic research, and coastal habitat restoration and preservation. (Criterion e)

The Camp Cove tide gauge has representative significance as a moderately intact example of an early twentieth century analogue tide gauge. It retains primary components of this type of instrument, including its pendulum clock, drum and chart, stylus, brass frame, and timber framed glass case.

Although altered, and removed from its original setting, the instrument remains legible as an early twentieth century analogue tide gauge recorder. (Criteria g)

Historical Notes or Provenance:

Tide gauges are an oceanographic instrument used in ports and harbours to automatically record changing water levels relative to a specified datum. The data obtained from these instruments provides valuable information about the movement of tides which is necessary to assist with navigational safety. Tide gauge records have also been used to understand and predict tidal patterns, to monitor sea level changes over time, to identify storm surges and to assess the risk of coastal flooding. This information is used to help understand the impact of climate change and to inform oceanographic research and planning in coastal environments.

The first tidal recordings in Australia commenced at Fort Denison in 1866. The original Fort Denison tide gauge was the Smalley gauge (1866), named after George Robarts Smalley, Government Astronomer. In 1872 the Smalley gauge was replaced with the Russell tide gauge.

Sydney Harbour Trust was formed in 1901 and until 1936 was responsible for the general improvement, preservation, and daily running of Port Jackson. Under the authority of the Trust numerous upgrades were made at Port Jackson, including improvements to harbour lighting and installation of electric fog bells. A new tide gauge recorder, manufactured by Harrison & Sons of Darlington, England, was installed at Fort Denison—replacing the Russell's tide gauge—between 1908-1911.

In c.1915-16 a second permanent tide gauge station was established at Camp Cove, Watson's Bay, as a 'back up' to supplement the Fort Denison tide gauge records. Between 1911-1915 a small timber clad structure was built adjacent to the former military wharf (now removed) at the northern end of Camp Cove. The structure, known as a tide gauge house, was purpose built to accommodate the Camp Cove tide gauge instrument. It was built on a concrete foundation with an opening allowing a 4 inch iron pipe to run through to a stilling well contained within the internal tide gauge room. The iron pipe was designed to facilitate the flow of water from the bay into the tide gauge stilling well, thus allowing the tide gauge instrument to record changing water levels.

The Camp Cove automatic tide gauge was installed in c.1915-1916 and the instrument commenced daily readings in March 1916. It was built by Harrison & Son of Darlington and had a near identical design to the Fort Denison tide gauge instrument. The tide gauge used a conventional float-operated chart recorder, comprising a drum carrying a 24-inch chart of graph paper (known as the tide sheet) which was rotated by a pendulum clock. Data was recorded on the tide sheet via a stylus fixed to a crank sliding mechanism connected to the drum and float via a system of wires, tensions, counterweight, and pulley wheels. The float resided in an 18 inch earthenware pipe in the stilling well which was open to the rise and fall of Camp Cove's waters.

After the dissolution of the Sydney Harbour Trust in 1936, the Maritime Services Board became responsible for the management, care and operations of the Camp Cove tide gauge. This responsibility involved maintaining the tide gauge, tending to its mechanical parts, and changing the tide sheet daily.

In 1971 the Australian Height Datum replaced the Standard Datum, which had been in use since the 1897 and was defined by the value of Mean Sea Level (MSL) at the Fort Denison Tide Gauge. The Camp Cove automatic tide gauge was one of 30 tide gauges distributed along the coast of Australia that were used to establish a nationwide network of heights, known as the Australian National Levelling Network. The project involved setting the Mean Sea Level to zero at 30 tide gauges and adjusting 97,320 kilometres of primary two-way spirit levelling across the country. The MSL data was observed over a three or four year period.

The Camp Cove tide gauge recorded its last reading in 1989.

After the Maritime Services Board was reconstituted under the *Marine Administration Act 1989*, the Port of Sydney (Port Jackson) has been administered by a secession of administrative bodies.

Since 2014 the Port Authority of NSW has been responsible for the management and operations of the Sydney Harbour tide gauges. Under the care of the Port Authority of NSW, the main instrumentation (clock, drum, stylus, brass frame, pulley wheel and timber framed glass case) was restored. The object is now kept on display at the Port Authority of New South Wales marine operations facility at Brotherson House, Port Botany. The location of the lower section, comprising the weights, system of wires and cables, the float and the lower cabinet, is not known.

The Camp Cove timber tide gauge house and access jetty are managed by the NSW National Parks and Wildlife Service.

Themes:	National Theme:	State Theme:	Local Theme:
	3. Developing local, regional and national economies	Science	(none)
	3. Developing local, regional and national economies	Technology	(none)
	3. Developing local, regional and national economies	Transport	(none)

Designer: Harrison & Son of Darlington, England

Maker / Builder: Harrison & Son of Darlington, England

Year Started:	Year Completed:	Circa: 1916

Physical Description:

The tide gauge instrument is housed in a timber framed glass cabinet at the Port Authority of NSW marine operations facility at Brotherson House, Port Botany.

The timber framed glass case has ovolo profile edges at the base and two top hinges that allow the front and top panes to be lifted open. The timber is uncoated and has a clear matte finish.

The tide gauge's main instrumentation comprises a brass clock that rotates the cylindrical metal drum in keeping with the time. The drum is secured in a solid brass frame with a large pulley wheel to one side and the clock on the other side. The clock has a round face with white background and black roman numerals; the centre of the clock face bears the manufacturer's mark in small capital letters 'Harrison & Son Darlington'. It retains both hands. Along the front bar of the frame is a crank sliding mechanism holding the stylus. The original system of cables, weights, pulleys and the float has been removed. The location of these elements is not known.
Physical Condition: The tide gauge main instrumentation (brass frame, clock, drum, and pulley wheel) and the timber framed glass case is in good condition. It has been recently restored and there are no apparent signs of defect or damage. The condition and location of the secondary components (pulleys, weights, cables, and float) could not be confirmed.
Modification Dates: The main instrument (brass frame, clock, drum, stylus, and pulley wheel) was relocated from the Camp Cove tide gauge house to Brotherson House, Port Botany. It was subsequently restored and is displayed in a timber framed glass case that appears to be part of the original cabinetry. (After 2014) The secondary components (pulleys, weights, cables, and float) were separated from the main instrument and the location of these part is unknown. (After 1990).
Recommended Management: Preparation of a Moveable Heritage Management Plan for Port Authority of NSW moveable heritage assets including the Camp Cove Tide Gauge to provide a comprehensive guide to the future conservation and management of the items.
Management: Statutory Instrument
Further Comments:
Criteria a) The Sydney Harbour Trust established a permanent tide station at Camp Cove in c.1916 to supplement the readings of the Fort Denison tide gauge station. This tide gauge (now in Port Authority of New South Wales office Brotherson House, Port Botany) was the first tide gauge installed at the Camp Cove tidal station. It commenced readings in March 1916 and remained in use until 1 January 1990. The data obtained from the Camp Cove tide gauge has provided invaluable information about the movement of tides which has assisted with navigational safety and meteorological monitoring and has informed an understanding of tidal patterns and sea level changes. This information has also been critical to climate change research. The information obtained from the instrument has informed, and continues to inform navigational and maritime activity, oceanographic and climactic research, and coastal habitat restoration and preservation.
Criteria b)
Criteria c)

The Camp Cove tide gauge main instrument demonstrates a high degree of mechanical and manufacturing precision. Its high level of intactness and the assembly of its various parts, including the clock, drum, stylus with crank sliding mechanism, pulley wheel, and frame reflect a high degree of technical acuity. This technical achievement is enhanced by the quality of craftsmanship and materials exhibited in the manufacture of the clock, brass frame, and purpose-built timber framed glass case with ovolo edges.

Criteria d)

Criteria e)

The volume of data produced by the Camp Cove tide gauge over approximately 73 years has contributed to our understanding of tidal movements and changing sea levels in Port Jackson. Digitisation of these records has ensured that the data will continue to further research and understanding of tidal patterns and oceanography.

Criteria f)

Criteria g)

The Camp Cove tide gauge has representative significance as a moderately intact example of an early twentieth century analogue tide gauge. It retains primary components of this type of instrument, including its pendulum clock, drum and chart, stylus, brass frame, and timber framed glass case.

Although altered, and removed from its original setting, the instrument remains legible as an early twentieth century analogue tide gauge recorder.

Integrity / Intactness:

References:	Author:	Title:		Year:
	Sydney Harbour Trust	Sydney Harbour Trust Commissioners Tenth Report		1910
	K W Sweetman	Centenary of Fort Denison Port of Sydney Journal 5 No 7		1957
	A M Ward	Automatic Tide Gauge, Port of Sydney Journal		1949
	The Sun	'Air plays tricks with Tide', 26 December 1938, p. 5.		1938
	Australian town and country journal	'Fort Denison tide gauge history, Port Jackson', 7 January 1914, p. 17.		1914
	The Daily Telegraph	'Close watch on instruments, harbor tides', 30 June 1946, p. 2.		1946
	Volker Janssen and Simon McElroy	'Fifty years of the AHD in NSW', *Position*, June/July edition.		2021
Studies:	Author:	Title:	Number:	Year:
	A Tsaccounis	Fort Denison Tide Gauge History Port Jackson, Port Authority of New South Wales		2019

	Susan McIntyre-Tamwoy Heritage Consultants	Sydney Ports Corporation Heritage and Conservation Register	4560010	2004
	NSW National Parks & Wildlife Service	Fort Denison Conservation Plan		1997
	Trueman Ludlow Pty Ltd: Howard Tanner and Assoc Prof Ian Jack; W Ashton	Woollahra Heritage Study		1984

Parcels:	Parcel Code:	Lot Number:	Section:	Plan Code:	Plan Number:
Latitude: -33.96750040321129			Longitude: 151.22042479872226		

Listings:	Name:	Title:	Number:	Date:
	Heritage Act – S.170 NSW State agency heritage register	Automatic Tide Gauge	4560010	1/07/2004

Data Entry:	Date First Entered:	Date Updated:	Status:
	24/06/2004	10/9/2024	Basic

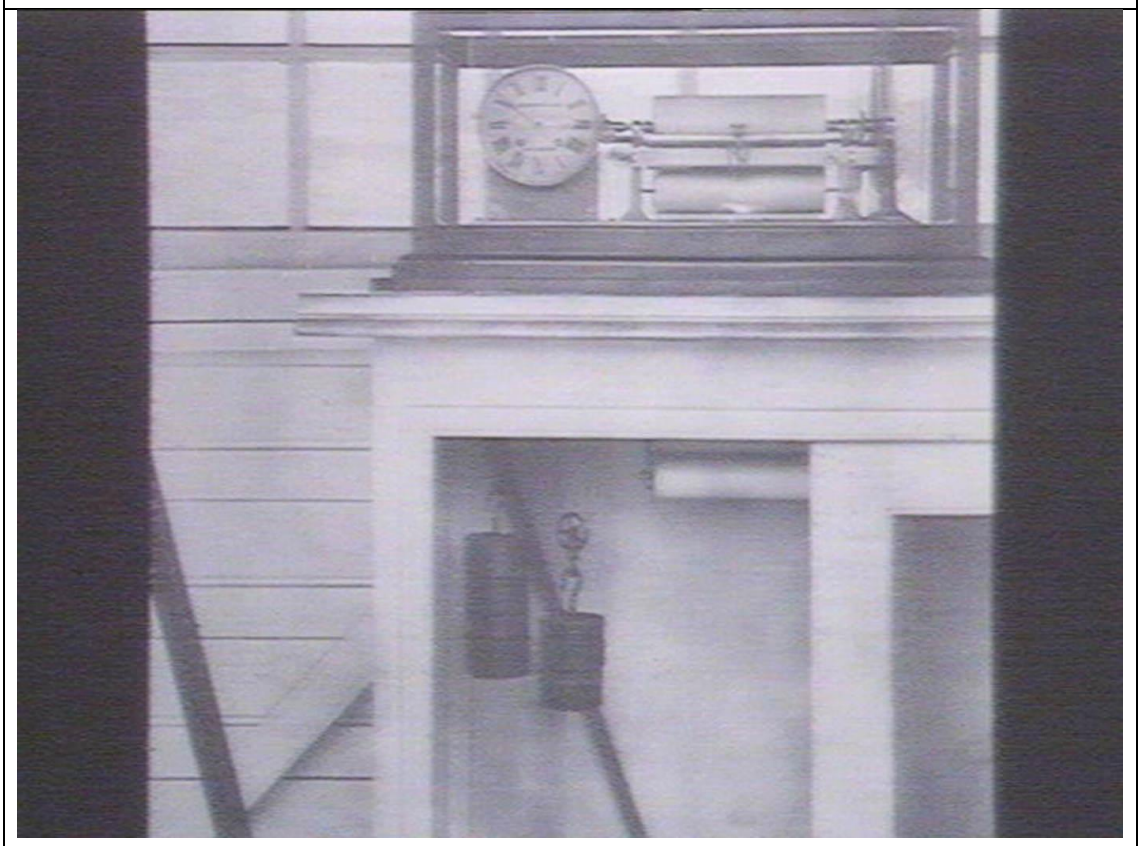
Image: 1

Caption: Tide gauge at Camp Cove, 1917
Copyright: Out of copyright. Photograph falls under Crown Copyright – Copyright restrictions apply from date made plus 50 years.
Image By: Government Printing Office 1 - 21171, Original negative held by State Archives & Records Authority of New South Wales.
Image Date: 1917
Image File: Camp Cove tide gauge, 1917_SLNSW

Image: 2

Caption: Automatic Tide Gauge
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Image By: Ben McGuinness, Port Authority of New South Wales
Image Date: 13 March 2023
Image File: IMG_1147.jpg

Image: 3

Caption: Automatic Tide Gauge
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Image File: IMG_1148.jpg

Image: 4

Caption: Automatic Tide Gauge
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Image File: IMG_1149.jpg

Image: 5

Caption: Automatic Tide Gauge
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Image Date: 13 March 2023
Image File: IMG_1150.jpg