5 HISTORICAL DEVELOPMENT - HAWKESBURY RIVER BRIDGE, WINDSOR

5.1 The Transport Network

5.1.1 The Role of the Bridge

The road bridge over the Hawkesbury River at Windsor was completed in 1874 at a crossing point previously served by a ferry and then a punt. The bridge has a history of modification and adaptation, with three distinct phases. These phases encompass the construction of the original low-level bridge in 1874, raising the bridge in 1897 and the replacement of the timber deck with concrete in 1922. Lesser works have also been undertaken throughout the bridge's history.

A review of the political and economic climate places the construction of this bridge in context. A thriving economy based on agriculture and mineral wealth encouraged expansion of settlement in New South Wales from the mid-nineteenth century onwards. To support this growth infrastructure and transport were critical; these factors provide the context for the construction of this bridge.

The analysis demonstrates that the bridge must be considered as part of a wider network of roads, bridges and the railway servicing the local community and linking it to a much wider regional context. The transport system was influenced by the changing economy and political concerns of different periods and subject to evolving technologies.

5.1.2 Linking Windsor and Sydney by Road

In the first years of settlement the principal means of communication between Sydney and Green Hills, later Windsor, was by water. Communication by means of the river remained of great importance until the later years of the nineteenth century when its navigation was hindered by increasing levels of silt. Before that, though, a road to connect Windsor to the main settlement was an important consideration in planning the outward spread of the settlement.

A road was established between Green Hills and Parramatta by 1794, only a short time after the first grants were made on the Hawkesbury. This was the basis of the Old Windsor Road. In 1802 a bridge was constructed over South Creek taking the place of an earlier punt located east of this site. The current road alignment at South Creek is derived from this work. In 1805 Surveyor James Meehan established an alignment between Parramatta and Kellyville that became the basis for the New Windsor Road. In 1812-1813 John Howe, a prominent Windsor identity was engaged to build a new turnpike road between Parramatta and Kellyville, including seventy new bridges. It provided a more direct route to Windsor.[385]

A coach service was established in 1824 to link Parramatta and Windsor but was suspended later in the decade due to the poor state of the road. Passenger and mail coach services were re-established by the 1830s. In 1833 Windsor Road was proclaimed as a Main Road and Old Windsor Road a parish road. A toll house was established on the road at the South Creek crossing.[386] The opening of the railway line to Richmond in 1867 reduced the importance of Windsor Road particularly for the transport of goods and produce. However, the road has continued to the present day as a major transport link to Sydney and Parramatta, particularly as these areas have become dormitory suburbs but its capacity and travelling conditions have been the subject of complaints for nearly as long as it has been in existence.

[385] Old Windsor Road and Windsor Road Heritage Precincts, Item Number 4301011 from the RMS *Heritage and Conservation Register.*
[386] *Ibid.*

5.1.3 The Condition of the Road

Complaints about the state of the road were heard from its earliest years; in 1810 Governor Macquarie declared it to be almost impassable. The poor state of the road caused the passenger coach service to be suspended in the 1820s. Although services were re-established in the following decades sections of the road were still considered to be impossible for vehicular traffic. Options for repairing or reopening portions of Old Windsor Road were considered as a solution. In the 1830s-1840s a convict road gang was assigned to the road for its maintenance; too few men and inept management reduced the value of the work.[387]

5.1.4 Responsibility for the Road

After its initial construction maintenance for the road for many years was divided between several parties, a fact that certainly influenced its poor condition. As early as 1797 Governor Hunter ordered landowners bordering the road to undertake improvements along it, including widening it to twenty feet. Private contractors such as John Howe were responsible for several substantial programs of works and improvements. Toll houses were established in several places and the money from these taxes were intended for use in improvements; the South Creek Bridge was funded from this source. As noted, a convict road gang was assigned to the road in the 1830s and 1840s.

The proclamation of Windsor Road as a Main Road under the provisions of an Act of Parliament determined that it would be maintained at public expense. Trusts were established for several roads for this purpose. The Windsor Road Trust was formed in 1849 to maintain the road between Vinegar Hill (now called Rouse Hill) and Windsor. The declaration of Old Windsor Road as a Parish Road required funding for its upkeep to come from local residents.[388] Local government took on this function after the implementation of the 1858 Municipalities Act.[389] Main roads, including Windsor Road, remained the responsibility of the colonial, later State government through its agencies, beginning with the Department of Public Works. The decline in the commercial importance of the road, particularly for freight after the construction of the railway in 1867, was responsible for the minimal works carried out on it in the later half of the nineteenth century. The increasing importance of motor transport from the 1920s and 1930s saw resurgence in road works and improvements, some of which were undertaken as depression-era employment relief programs.[390]

From the 1950s and particularly 1960s Windsor Road has had to service the expanding residential frontier of Sydney. Areas identified in the original County of Cumberland Scheme as green belts were gradually consumed for residential development, with this process now reaching the Hawkesbury and Nepean banks. As Windsor Road reached capacity major upgrading and motorway construction was required for existing traffic. However, improved road access brought more traffic to the area, and the urban release areas along it added thousands of new residents to the area.

5.2 Railways

5.2.1 Establishment

Twenty-four years after the commencement of Britain's railway program with the Stockton to Darlington Railway, which opened in 1825[391], Australia entered the railway age with the proclamation of the *Sydney Railway Act 1849*. This Act authorised the privately-owned Sydney Railway Company to build a railway from Sydney to Parramatta in 1850. The company failed to procure funding to complete its brief and it was taken over by the government of NSW in January of 1855. By September of the same year, the Sydney to Parramatta line was completed.[392] The benefits of the railway for

[387] Old Windsor Road and Windsor Road Heritage Precincts, Item Number 4301011 from the RMS *Heritage and Conservation Register.*
[388] Clive Lucas, Stapleton & Partners, (August) 2005, *Windsor Road and Old Windsor Road Conservation Management Plan*, prepared for NSW Roads and Traffic Authority.
[389] Kass T, 2006, RTA Thematic History: A Component of the RTA Heritage and Conservation Register, 2nd Edition, page 18.
[390] ozroads history: Old Windsor Road and Windsor Road www.ozroads.com.au
[391] Otto Cserhalmi + Partners PL, 2002, *Eveleigh Carriageworks: Conservation Management Plan Volume 1,* p 34.
[392] *Ibid.*

moving people and produce were immediately recognised and coincided with pressures to expand settlement in all directions from Sydney.

5.2.2 Expansion of the Railways

Throughout the 1860s to the 1880s the colonies adjoining NSW, that is Queensland, Victoria and South Australia, were benefiting from their proximity to NSW's outlying agricultural zones. The NSW Government, determined to redirect the goods and trade back through Sydney, embarked on a program that saw railway lines extending to the far reaches of the state. John Whitton, Chief Mechanical Engineer of the NSW Railways, was instrumental in that expansion starting in the 1860s.[393] As recognition of the benefits of the railways gained political momentum, and this along with the practicalities of rail transport over road and river transport, the majority of transport infrastructure funding was directed towards improving the railway network. Roads were also important for railway transport as produce was first transported by dray to the rail depots. Despite this, 80% of government transport funding was dedicated to the expansion of the railway system.[394]

5.2.3 Implications of the Railway for Road Development

Roads were an integral part of the expansion of the railway system; produce was first transported by dray to the rail depots and often delivered from those depots by road. But with the majority of expenditure diverted to railway construction for many years a large proportion of road construction was undertaken by private contract at least to the 1880s. Economies in materials and methods were favoured to increase profits; timber bridge construction, for example, was favoured for this reason.

Another influence on the decision makers in government was the boom period of the gold rush in Victoria and New South Wales. The discovery of gold resulted in rapid population movement and growth and provided an ideal economic landscape in which private construction flourished. In the late 1880s global factors combined with domestic responses to encourage rapid economic growth and a largely privately funded construction boom. This was followed in the 1890s by an economic depression of major proportions that would last a decade and exceed the effects of the Great Depression in the 1930s.[395] [396] After WWII when car ownership grew and the size of vehicles such as trucks and their loads increased dramatically, new bridges were constructed of other, more durable materials and the construction of timber bridges all but ceased.[397]

5.2.4 The Railway and Windsor

The residents of Windsor and Richmond recognised the potential value of the railway to their area almost immediately; a petition for a line to their district was made in 1856.[398] It was not until 1864 that a branch line was made from Blacktown to Richmond via Windsor[399] but the rail system was never expanded to cross the river and service the agricultural areas that surrounded the town. Goods and produce from the northern side of the river that required transportation had to be brought to the railhead on the southern side of the river.

The railway to Windsor also played a role in the increase of tourism to the area, which was becoming a popular holiday destination from the 1850s.[400] The activities related to rail construction contributed to the siltation of nearby rivers, including the Hawkesbury, through deforestation, the displacement of earth and the particularly wet years between 1863 and 1870.[401] Produce from the region continued to be delivered to Windsor via the river for shipment to the railhead at Richmond. Ultimately the combination of the efficient rail system and the strangulation of the river highway through siltation, saw the end of river transport; another solution had to be found.

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[393] *Op. Cit* Otto Cserhalmi + Parners p 35.
[394] McMillan Britton and Kell, 1998, *Timber Truss Bridges: Study of Relative Heritage Significance of All Timber Truss Road Bridges in NSW*. Report to NSW Roads and Traffic Authority, pp 30 – 31.
[395] Fisher and Kent, 1999, *Two Depressions, One Banking Collapse,* pp 21, 22.
[396] McLean I W, 1997, *Recovery from the 1890s Depression: Australia in an Argentine Mirror,* pp 6-7.
[397] Chambers, D., 1997, *Timber Bridges Study* – Unpublished report and individual bridge citations prepared for National Trust of Australia, (Victoria) Bridges advisory committee, p 12.
[398] "Richmond Railway Station and yard group" SHR listing ID 01236.
[399] "Windsor Railway Station Group" RailCorp S170 listing.
[400] Rosen S, 1995 *Losing Ground: An Environmental History of the Hawkesbury-Nepean Catchment,* p 66.
[401] *Op. Cit Rosen 1995,* p 75.

5.3 Early River and Creek Crossings

5.3.1 The Hawkesbury

A wharf had been established at Green Hills in 1795 and this served as the principal landing place until its replacement in 1815. The first ferry service to link the northern and southern sides of the river was located close to this wharf, probably to the west of the present bridge site. The ferry service was established in 1814 by John Howe, the same man who built a large portion of the Windsor Road and the second bridge across the South Creek. The ferry remained in private operation until 1832 when it was resumed by the Government. The ferry was replaced by a punt running on a cable across the river apparently in the same location. The punt and ferry, and archaeological evidence for them, are discussed in the historical analysis in this report and a separate maritime archaeological report.

5.3.2 Bridging South Creek

Andrew Thompson built a floating bridge across South Creek in 1802. This was replaced by John Howe in c.1813. Howe's bridge was in turn replaced in 1848 by a timber arch bridge, then an iron lattice bridge in 1879. The current bridge dates to 1974 and is constructed of concrete.[402]

5.3.3 Crossing the Nepean River

The Nepean River was initially traversed by means of a ford at Emu, the place where William Cox and his party crossed the Nepean in 1814.[403] Soon after a crossing was built by John Blaxland, to get from the road to his property across the Nepean River; it was later named Blaxland's Crossing. Emu Ford was replaced by a bridge in the mid-1840s and a timber bridge was built in 1859 to replace the ford at Blaxlands Crossing at Wallacia.[404]

John Whitton, Engineer-in-Chief for the New South Wales Railways, was responsible for the construction of two bridges on the Nepean section of the river, the Menangle Rail Bridge in 1863 and the Victoria (Nepean) Bridge in 1867. The Victoria Bridge was built as a metal road and rail bridge and now functions solely as a road bridge.

5.3.4 The Richmond Bridge

A bridge was constructed in 1860 approximately 10 kilometres upstream from Windsor by the privately owned Richmond Bridge Company. The Richmond Bridge was a low-level crossing bridge constructed in timber. It was replaced in 1905 by the concrete bridge that currently crosses the Hawkesbury River at Richmond.

[402](Explore the Hawkesbury at: http://www.hawkesbury.nsw.gov.au/__data/assets/pdf_file/0008/19970/B_WMAPD_WindsorHeritageWalk_ThePeninsulaPrecinct.pdf

[403] The Old Emu Ford, *Nepean Times,* Saturday 18 July 1914, p 3.

[404] Penrith City Council, History, http://www.penrithcity.nsw.gov.au/index.asp?id=289; I289 *Wollondilly Council Local Environmental Plan 2011.*

5.4 A Bridge for Windsor

5.4.1 Lobbying

There had been agitation for a bridge across the Hawkesbury River since 1864. Mr. J. A. Cunneen presented a petition from the people of Windsor to the Legislative Assembly in that year requesting the construction of a new bridge.[405]

5.4.2 Selecting A Site

In a letter to the Public Works Department, dated 11 October 1864, Edward Orpen Moriarty, Engineer-in-Chief for Harbours and Rivers, states that the borings and levels for the bridge had been completed, but a better location would be "20 chains down the river".[406] It is not clear from which point Moriarty was taking as his base to measure "20 chains down the river" but later evidence suggests that the starting point was close to the wharf (20 chains is about 402 metres).

In December 1864 he made another inspection and survey of potential bridge sites, recommending a site 'somewhat below the township' to that originally suggested near the wharf. This was due to the difficulties arising from rock in the riverbed, as well as the need to navigate the river all the way to the wharf. A minute paper sent from Moriarty to the Undersecretary for Public Works and received by him on February 20, 1866 refers to Moriarty's survey in Windsor where he was instructed to select a suitable site for a bridge.

5.4.3 The Type of Bridge

In a briefing paper to the Legislative Assembly dated 1865[407], Moriarty gave a quote of £11,000 for a low-level timber bridge and £20,000 for a high level iron bridge. The iron bridge was recommended for its sturdiness with respect to floods and because "…*Government works – such as bridges over the main rivers – should be of as permanent a character as it is possible to make them…"*.[408] After his survey of 1866, Moriarty recommended that *"£20,000 be placed on the next estimates for the construction of a high level Iron Bridge at Windsor* [sic]*"*.[409] The recommendation for a high level iron bridge was voted down 62 – 22 by the Legislative Assembly.

The community also desired a high level bridge, giving greater clearance over the river in times of high flood levels. It took another nine years before the Government directed the Commissioner and Engineer for Roads to invite tenders for a low level bridge, the Legislative Assembly having voted funds towards construction of the bridge in June 1871.[410] The decision to build a low-level bridge was one considerably governed by expense; it was later claimed that a high level bridge would have cost £60,000; as it was, the low-level bridge costs blew out to £10,000.[411]

5.4.4 The Builders

Tenders were advertised for the work and the successful applicants were Andrew Turnbull and William King Dixon. Dixon had come to Australia in 1852 as engineer for the construction of the first railway in NSW and was presented with a gold watch in appreciation of his efforts.[412] Dixon, "foreman of the railway works, Chippendale" married Miss Cale in June 1855[413] and died two years after the Windsor Bridge was completed, "suddenly, of cholera" at the age of 45.[414]

Andrew Turnbull was a "clear-headed Scotchman" who came to the colony from Southampton, England.[415] He was an astute businessman who worked as a whaler and in the Ballarat and Bendigo

[405] "A New Bridge Over the Hawkesbury at Windsor" in *Australian Town and Country Journal,* Saturday 22 August 1874, p 20.
[406] SR Ser. 12419 Cont. 2/896B.
[407] SR Ser. 12419 Cont. 2/896B.
[408] *Ibid.*
[409] *Ibid.*
[410] *Op. Cit. Australian Town and Country Journal 1874,* p 20.
[411] *Ibid.*
[412] Bowd D G, 1982, *Macquarie Country: A History of the Hawkesbury*, p95.
[413] "Marriages", *Sydney Morning Herald,* Friday 29 June 1855, p 8.
[414] "Deaths", *Sydney Morning Herald,* Tuesday 15 February 1876, p 1.
[415] Obituary for Andrew Turnbull, *Windsor and Richmond Gazette,* Saturday 23 January 1909.

gold fields and appears to have been successful at everything he turned his hand to, being "a man of many admirable parts".[416] Turnbull was the clerk of works for the construction of the piers for the bridge over the Nepean River (probably Victoria Bridge designed by John Whitton), he built the bridge at Windsor with Dixon, who became his business partner before Dixon's death, and later took on the contracts to build "numerous other bridges in the State"[417] including one over Cattai Creek on Wisemans Ferry Road.[418]

5.5 Constructing the Bridge

5.5.1 The Beginning and the End

Construction on the bridge commenced in January 1872; divers were used to fix the bracing beams below the water before the superstructure was built.[419] During the work several changes were made to the original plan. By the time it was complete, the length of the bridge had been extended from 406 feet to 480 feet (123.7 to 146.3 metres) and the original number of main spans rose from eight to eleven. The work was delayed by floods a number of times. Despite the setbacks and alterations it was reported in 1873 that the contractors were working at a good rate; only one cylinder remained to be placed and work had commenced on the timber elements.[420] The final pier was sunk in December 1873.[421] The total cost was £10,283.[422] [423]

5.5.2 Piers and Piles

In addition to being 480 feet long with eight piers, the plan for the new bridge was for a 44 feet span between each pier and timber abutments at either end of 32 feet and 22 feet.[424] The structure was to be supported by sinking eleven pairs of piers in the river, ten pairs of which were iron cylinders and No. 10 Pier (identified as Pier X in some plans) at the Wilberforce end, was constructed of four timber piers and cross-bracing.

Each pier comprised iron cylinders 3 feet 6 inches in diameter, approximately 6 feet in length (1.84 to 1.86 metres).[425] Each cylinder section was connected by internal flanges. Plans show that the cylinders that were to be placed above the bottom length of the screw pile were removed. The cast iron cylinders were cast at Mort's Dock and Engineering Works in Balmain.[426]

The completed piers were filled with a 'ring of 9 inch radiating bricks enclosing a cone of concrete'. This description is consistent with what was interpreted in 2005 as 'construction debris', although the *Australian Town and Country Journal*[427]suggests a more orderly placement of the masonry than was reported by an inspection carried out in 2005 (refer to Plate 72 in "Bridge Elements).[428]

The cast iron piers were sunk through 12 feet of water, 25 feet of riverbed and 4 feet of rock, on average about "40 feet below summer level"[429] (that is, approximately 12 metres). They were secured to the rock by Lewis bolts (Refer Plate 61 for diagram of Lewis bolt at the base of the columns). Lewis Bolts have a wedge-shaped end that is placed in an indentation cut into bedrock; it is then secured by the addition of concrete.

The plans indicate that where screw piles were to be used, a row of three would be sunk into the rock[430] but plans indicating where screw piles were proposed have not been found. The plan titled

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[416] Obituary for Andrew Turnbull, *Windsor and Richmond Gazette,* Saturday 23 January 1909.
[417] Obituary for Andrew Turnbull, *Windsor and Richmond Gazette,* Saturday 23 January 1909.
[418] The bridge that Turnbull built over Cattai Creek was replaced in 1946 by a concrete beam bridge.
[419] *Op. Cit., Australian Town and Country Journal, 1874.*
[420] "Town Talk", *The Australian, Windsor, Richmond, and Hawkesbury Advertiser,* Saturday 25 October 1873, p 2.
[421] *Op. Cit., Australian Town and Country Journal, 1874, 20.*
[422] *Op. Cit. Bowd*, 1982 p 63.
[423] RMS Plan 0182 492BC0104, p 11.
[424] *Op. Cit., Australian Town and Country Journal, 1874, 20.*
[425] Commercial Diving Solutions 2011, *U/W Bridge Inspection, Contract 10.2535.0889 B 415 Windsor Bridge, 9.5.2011 to 20.5.2011,* p 5.
[426] *Op. Cit., Australian Town and Country Journal, 1874, 20.*
[427] *Op. Cit., Australian Town and Country Journal, 1874, 20.*
[428] CTI, 2005, *Underwater Graphitisation Survey. Bridge at Windsor (BN 415)*, p23.
[429] *Op. Cit. Australian Town and Country Journal, 1874,* p 20.
[430] RMP Plan 0182 492BC0104 pp 11, 15.

"Windsor Bridge – Diagram of Piers"[431] shows that a test screw pile was attempted at No. 6 Pier in the middle of the river (Plate 61). The plan indicates that the cylinders above the screw mechanism were removed but that the section with the thread was left *in situ.* It can be inferred from the location of the proposed screw pile that the intent was to place one between two iron cylinders at each pier. Difficulty was experienced almost immediately with the screw pile; driftwood and boulders in the river bed fouled its progress and the Commissioner and Engineer for Roads, Mr Bennet, abandoned plans to use them[432]. Sand-pumps and air-lochs [*sic*] were used to remove boulders and logs to clear the way for the piers at the bottom of the river.

5.5.3 Superstructure, Deck and Hand-rail

The bridge comprised eleven bays, each with five girders made of ironbark. The deck was made with ironbark planking, each plank being five inches wide and 21' 6" long. The length of the deck was 455 feet and it was twenty feet wide (approximately 139 and 6 metres respectively) between the kerb logs. The *Australian Town and Country Journal 1874* describes construction of the deck in detail:

> *The extraordinary floods at Windsor which reach to a height of 51 feet above low water, or 36 feet above the decks of the bridge, made it necessary to have the superstructure unusually strong; and much ingenuity is shown in the design for securely fastening it to the piers.*
>
> *The deck is 21 feet 6 inches wide; and is composed of planks five inches thick, securely fixt to five ironbark girders, 17 and 18 inches by 16 inches and 44 feet long, strongly bolted to corbels and capsills firmly secured to the iron piers. The whole of the timber is ironbark, which has little buoyancy under water, and the girders are fine specimens of our colonial wood.*
>
> *All the joints are covered with iron fish-plates, bolted with inch bolts, and it is evident from the massive fastenings throughout, and the great strength of the structure in every detail, that the engineer has taken every precaution to prevent the floods from making a breach in any part of the bridge.*
>
> *The handrail is also ingeniously contrived to protect it from the large quantity of drift timber brought down by floods*.[433]

The bridge was designed in a way that would minimise damage to it during high flood events. A collapsible hand rail was installed allowing it to be lowered parallel to the roadway out of the way of flood debris.

5.5.4 Completion

The *Hawkesbury Herald* (1902) reported that during the construction of the bridge the Hawkesbury River had been in flood a total of thirteen times, but despite these setbacks, the bridge was completed and opened on on the 20th of August 1874 (Plate 62). Plate 63 shows a photograph of Windsor Bridge in its original configuration. The completion of the bridge was a major achievement and event in the life of Windsor and the surrounding region. The opening was a major day of celebration.

When complete, the Windsor Bridge was a compromise between the two options presented by Moriarty; a low level bridge with iron piers with a simple timber-beam superstructure. Although considered a low-level bridge when first erected, the Department of Roads and Bridges was at pains to note that while the low-level Richmond Bridge was under three feet (0.9 metres) of water, the Windsor Bridge remained above the water and it continued to stay "…*crossable twenty-two hours after the stoppage of the traffic at the Richmond bridge"*.[434]

[431] RMS Plan 08142 091 BC 0104; sheet 4 of 17; p 5.
[432] *Op. Cit. Australian Town and Country Journal, 1874,* p 20.
[433] *Op. Cit. Australian Town and Country Journal, 1874,* p 20.
[434] *Op. Cit. Australian Town and Country Journal, 1874,* p 20.

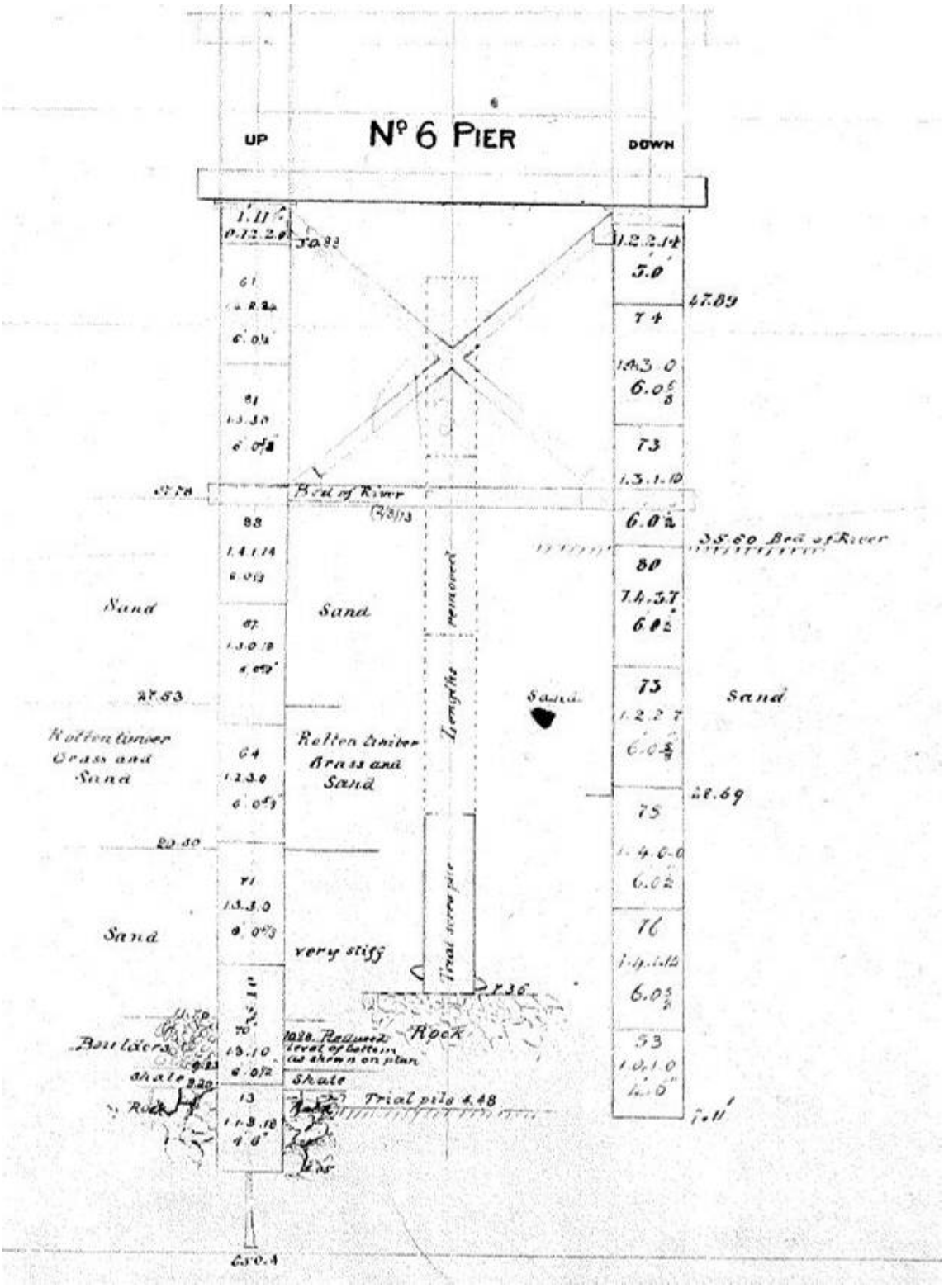

Plate 61: Detail of Plan showing the trial screw pile in No. 6 Pier (central pier). Note the diagram of the Lewis bolt at the bottom of the up pier, "the Bed of River", "Rotten Timber Grass and Sand" and the level of the "rock".[435]

[435] RMS Plan 018 492BC0104.

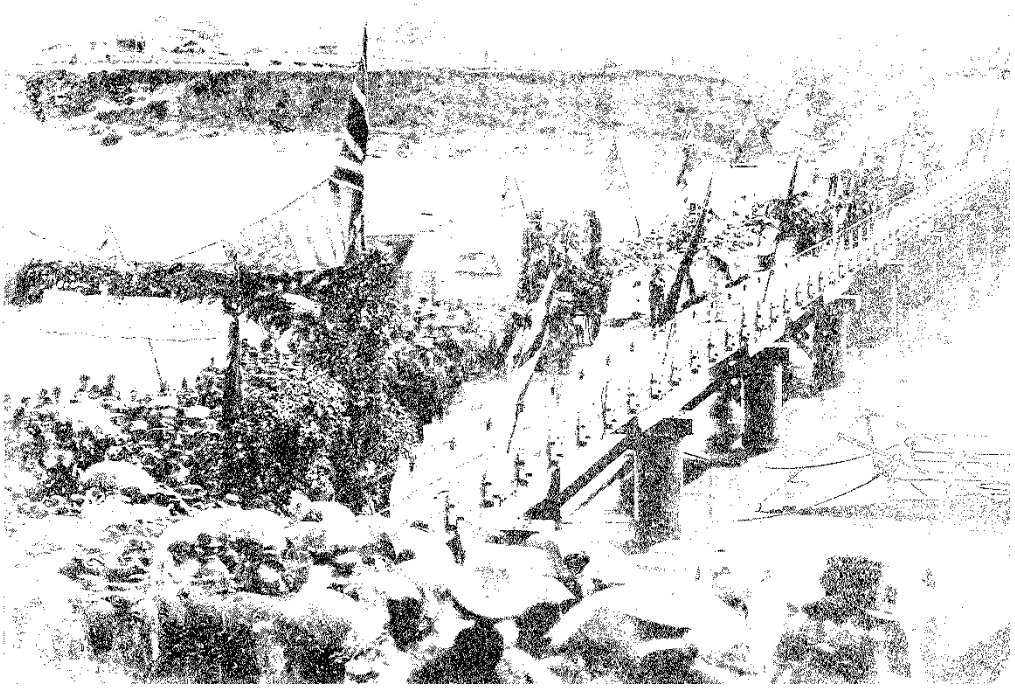

Plate 62: "Opening of Windsor Bridge August 20th, 1874". Note the punt downstream (to the right) of the Bridge appears to cross underneath but is actually tied to it.[436]

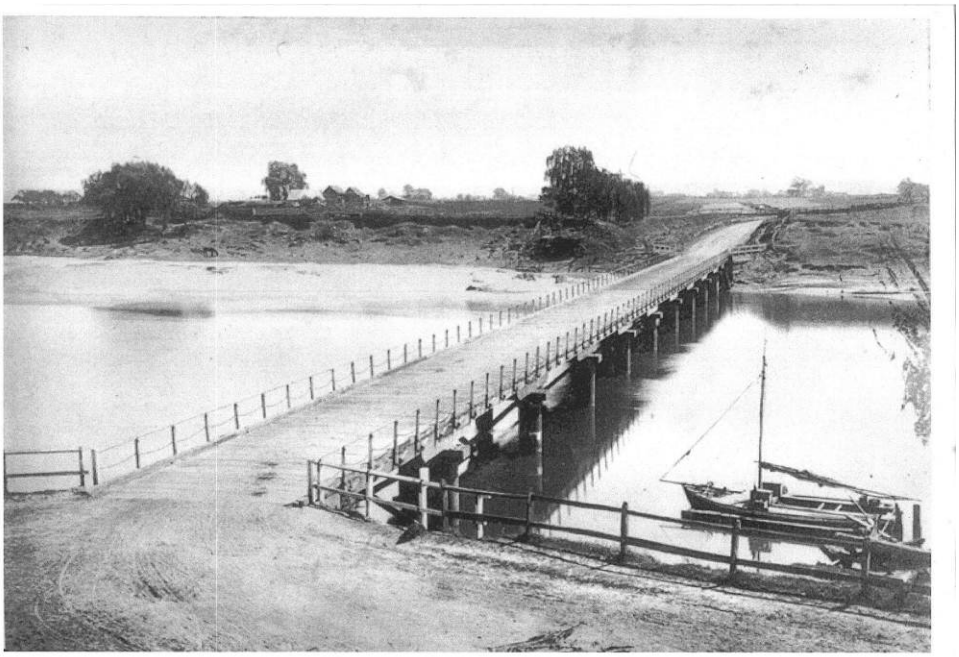

Plate 63: Windsor Bridge, c 1888, in original low level configuration[437]

[436] Windsor Municipal Council 1979: 15th page.
[437] SLNSW.

5.6 Raising the Height of the Road Deck

5.6.1 Long-term Concerns

From the time that a low level bridge was chosen for the Hawkesbury River crossing there was opposition to the choice. Low-level bridges were designed to remain resilient to the most frequent flood levels by becoming submerged enough for driftwood and debris to pass over them[438], but the local community wanted a bridge that would remain usable in all but the most significant flood. Local concern over the inability to cross the Hawkesbury over a low level bridge in even a minor flood was present before construction even commenced.[439]

Moves to raise the height of the bridge deck by eight feet resulted in funds being sought locally in addition to funding granted by the Legislative Assembly[440]. Funding was slow to be found:

> *Some time ago tenders were accepted for the redecking of the Windsor Bridge. The work is said to be now delayed owing to the dearth of money in the Treasury. As the bridge is in an extremely dangerous condition, residents are loud in their denunciation of the delay in repairing the structure, which is largely availed of by the public.*[441]

It was not until 1897 that the bridge was raised eight feet in height.

5.6.2 New Work

The new height of the road deck was achieved by the installation of new cylinders eight feet in length placed on top of the original cylinders. The new cylinders were filled with concrete, which in 2005 was assessed as of 'good quality'.[442] The handrails were replaced at this time with a design featuring balance weights, enabling them to be raised and lowered by a single person.[443]

The higher level of the bridge meant that the deck finished above the existing land on the northern side and to rectify this gap an additional length of twenty feet as well as a new timber piers were added to this end. The number of spans of the bridge remained the same. In addition to raising the height of the deck, the approaches to both sides of the bridge were raised, removing hazards associated with the short, sharp descent to the low level bridge. The impacts of the work with respect to Thompson Square and the approach on the Wilberforce side have been discussed in the historical analysis report presented elsewhere in this document and archaeological evidence for this work is discussed in the archaeological assessment and analysis.

5.6.3 Temporary Bridge

While work was carried out on the bridge the connection between the two sides of the river was maintained by the construction of a temporary bridge adjacent to the existing structure. RMS plans[444] show the proposed position of this temporary bridge to have been upstream and directly adjacent to the existing bridge, on its own set of piles and independent of the existing structure (Plate 64). The temporary bridge took six weeks to construct and was 460 feet long.[445]

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[438] Allan P, 1924, 'Highway Bridge Construction: The Practice in New South Wales' in *Industrial Australian and Mining Standard* August 14, p 243.
[439] "Low Level Bridge At Windsor: To the Editor of the Herald", *Sydney Morning Herald,* Saturday 17 June 1871, p 5.; "Low Level Bridge At Windsor: To the Editor of the Herald": *Sydney Morning Herald,* Wednesday 28 June 1871, p 5.; "The Proposed New Bridge At Windsor: To the Editor of the Herald", *Sydney Morning Herald*, Saturday 1 July 1871, p 7.
[440] "Windsor Bridge – To Be Raised At Last", *Windsor and Richmond Gazette*, Saturday 29 June 1895, p 7.
[441] "The Windsor Bridge", *Australian Town and Country Journal,* Saturday 26 August 1893, p 16.
[442] *Op. Cit.* CTI, p 23.
[443] "Windsor Bridge", *Windsor and Richmond Gazette,* Saturday 3 April 1897, p 6.
[444] RMS Plan 018 492BC0104 (p 49 of map book).
445 Op. Cit., *The Australian Town and Country Journal*, Saturday 26 August 1897, p 6.

5.6.4 The bridge has been raised

The work was completed in seven months, well ahead of the predicted twelve month construction period.[446] Plate 67 shows the form of Windsor Bridge after it was raised.

446 "Windsor Bridge", *Windsor and Richmond Gazette*, 3 April 1897, p 6.

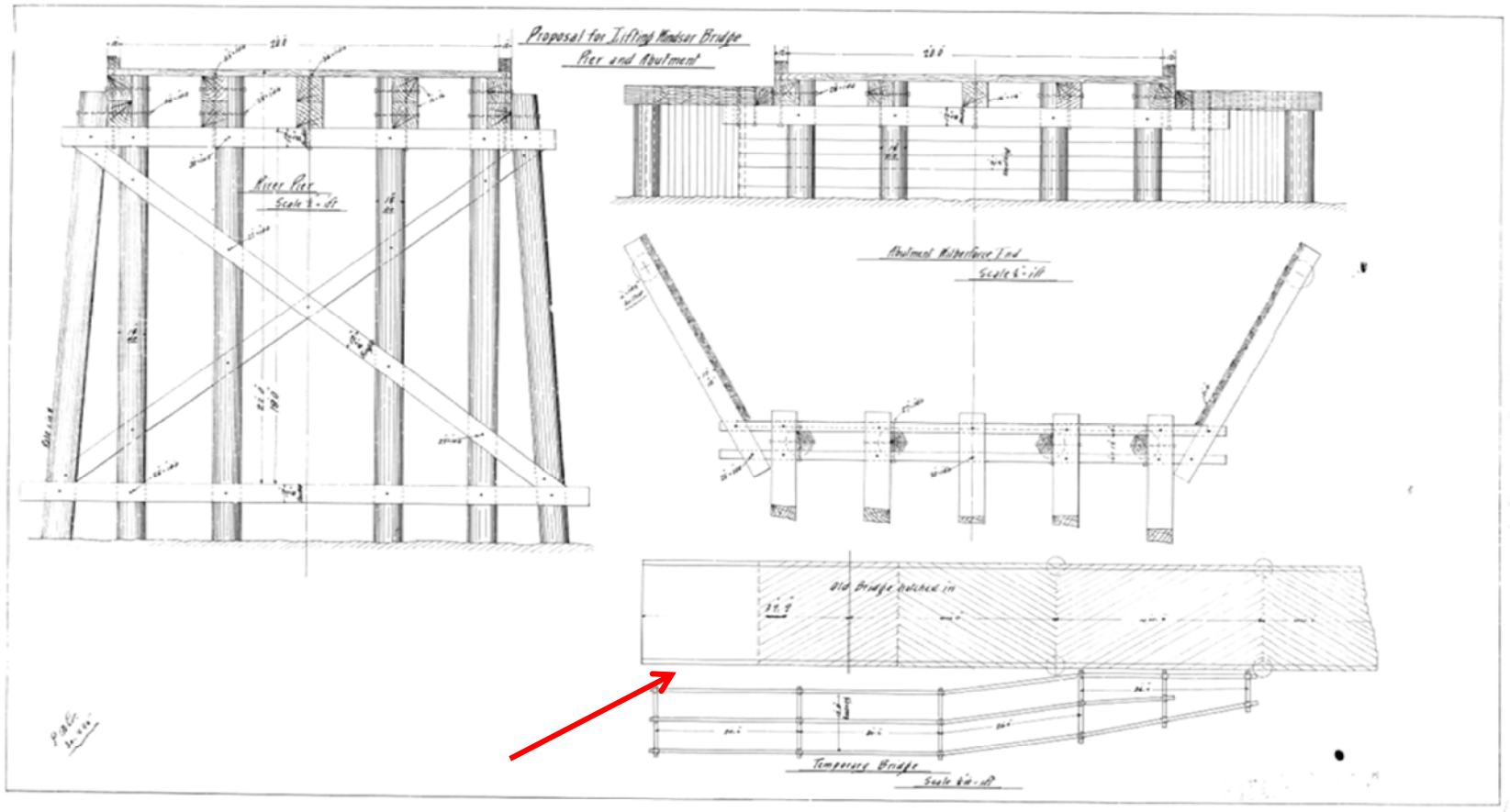

Plate 64: Plan (dated 30.8.95) of the proposed temporary bridge that was built to accommodate traffic during the raising of the existing bridge. The section of decking (indicated) that was added is at the Wilberforce end of the bridge, suggesting that the temporary bridge was on the upstream side.[447]

[447] RMS plans 0182 492BC0104 sheet 8 of 19

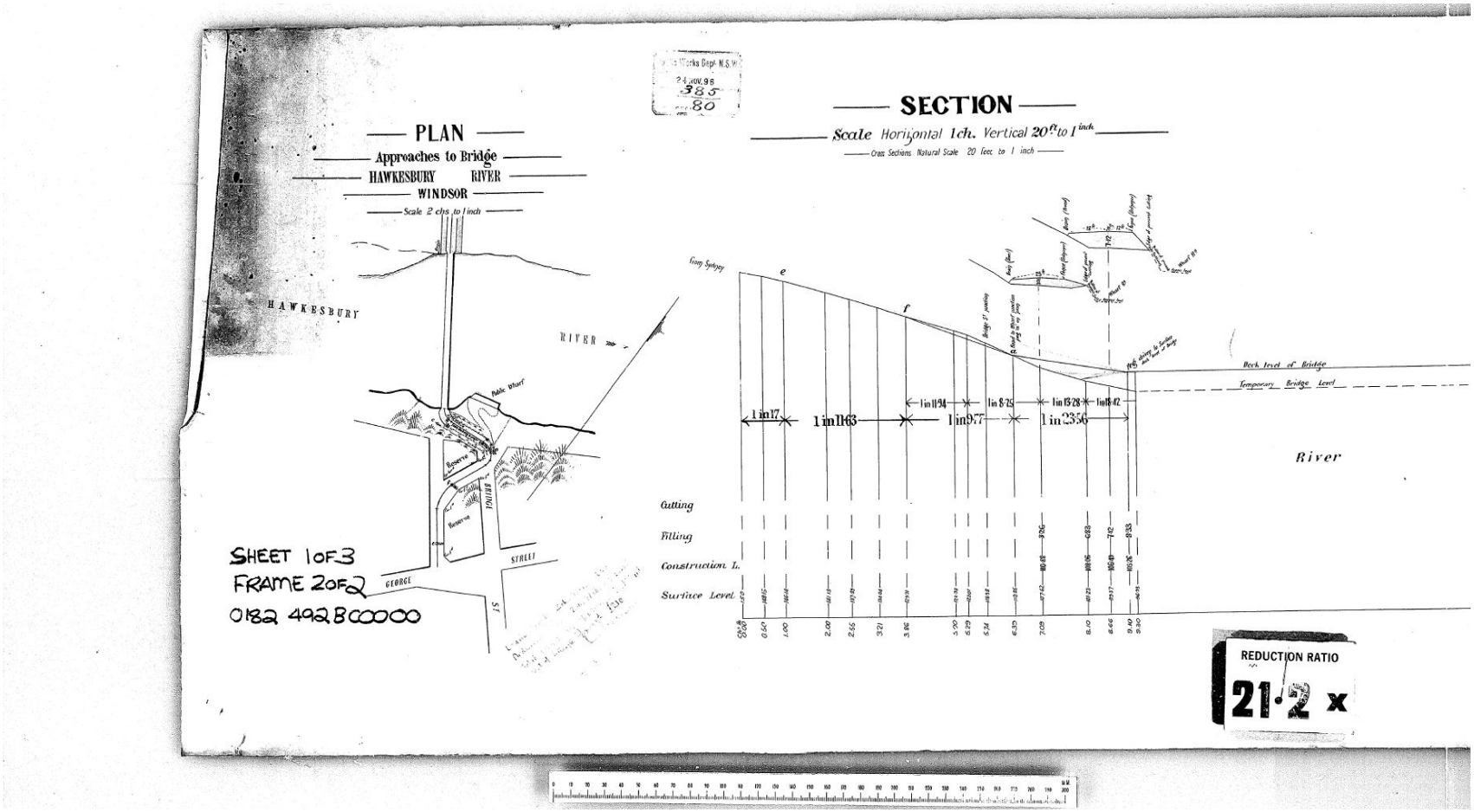

Plate 65: Plan and longitudinal section of the proposed modifications to the bridge showing the level of the temporary bridge in relation to the proposed new level.[448] *Review of the small sections above indicates a steep drop from the road to the old bridge decking, which was to be rectified by the proposed works. Of interest are the words "Drain (paved)" in two locations, the level of "Wharf Road" in relation to the level of road behind the fence. Refer to Plate 66 for detail.*

[448] RMS plans 0182 492BC0000, sheet 1 of 3, frame 2 of 2.

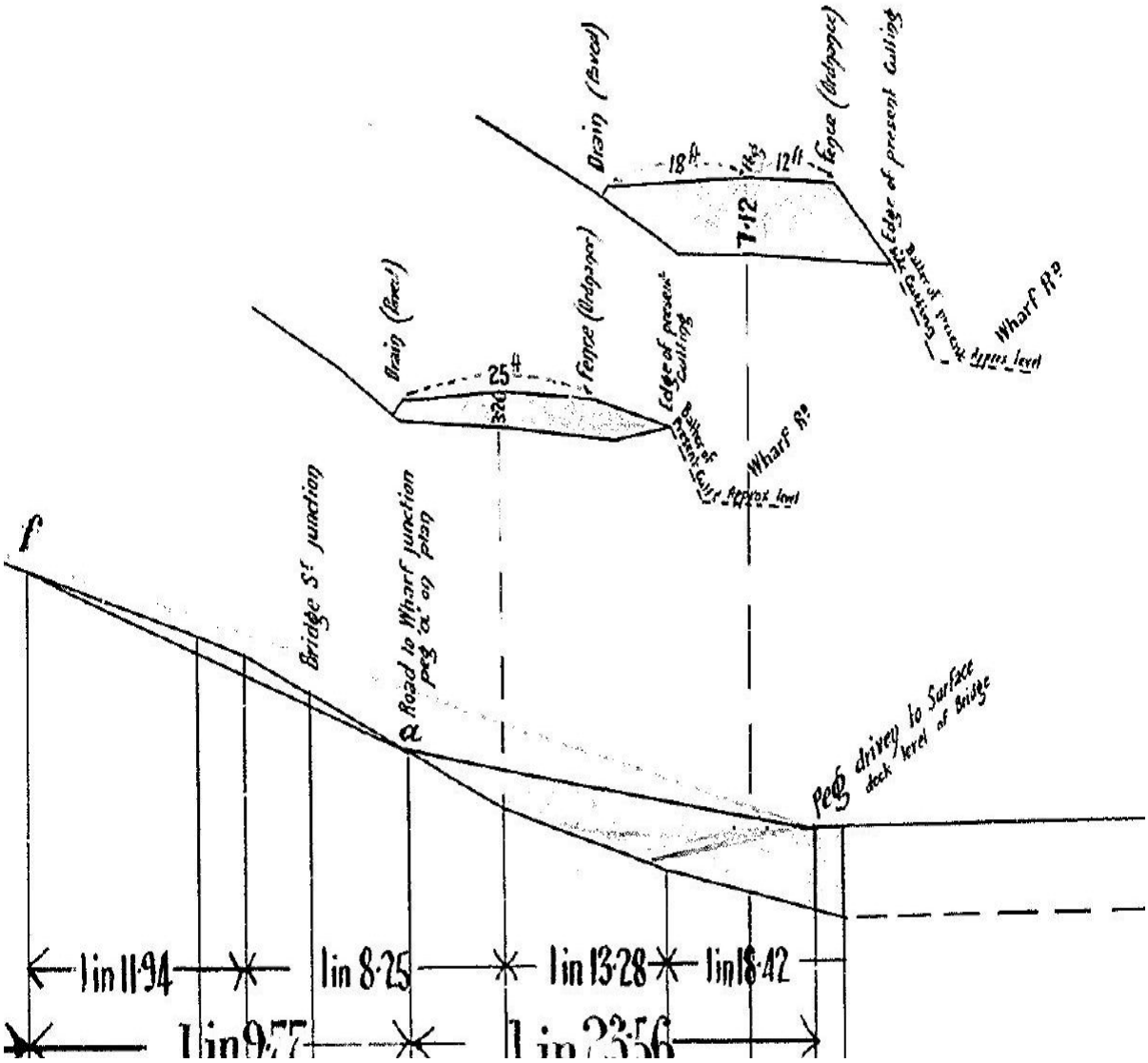

Plate 66: Detail of Plate 65 showing two sections of the topography prior to the modifications associated with raising the deck. Note the locations of "Drain (paved)"; "Fence (ordnance)"; "Edge of present cutting approx level"; "Wharf Rd".[449]

[449] RMS plans 0182 492BC0000, sheet 1 of 3, frame 2 of 2.

Plate 67: Windsor Bridge, from Wilberforce Side, after raising but prior to concrete replacements and additions 1897-1922[450]

5.7 A Bridge of Iron and Concrete

5.7.1 Poor Condition

The condition of the bridge was a matter of concern early in the 20th century and was the impetus for improvements to be made in concrete:

> *"…a large proportion of the timber in the bridge is in a very bad way and it will be necessary to replace defective girders or reconstruct to a different design.*
>
> *As the spans are unusually great for the plain beam type of bridge and the girders and corbels of very large dimensions, I would suggest that Mr Stephen be asked to look into the question of amended design."*[451]

5.7.2 Concrete Replacements

In 1922 the bridge superstructure was replaced, marking its final phase of modification. It involved the installation of new concrete girders and deck on the existing piers. The construction was undertaken by the State Monier Pipe and Reinforced Concrete Works under the supervision of Mr Mitchell, the company's manager[452] at a cost of £12,925.[453] The work caused "a good deal of anxiety" as some of the timbers were over 50 years and it was time for them to be renewed. Upon inspection of the bridge determined that the whole superstructure had to be replaced.[454]

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[450] SLVIC c1933, date is incorrect.
[451] *Chief Engineer National Works, 3 March 1914: SR Ser. 12419 Cont. 2/896; SR Ser. 12647 Cont. 21/13530*
[452] Windsor Bridge. Reconstructed with Reinforced Concrete. Cost £12,925. Official Re-Opening, in the *Windsor and Richmond Gazette,* Friday January 1922, page 1, 2 5.
[453] Dept of Public Works, Report of the Department of Public Works for the Year Ended 30 June, 1922 p 37; Windsor Bridge. Reconstructed with Reinforced Concrete. Cost £12,925. Official Re-Opening, in the *Windsor and Richmond Gazette,* Friday January 1922, page 1, 2 5.
[454] *Ibid.* The article suggests that Percy Allan made these comments in his response to a toast to him and his department.

In order to maintain traffic flow, the concrete girders were "…*built on the bank and carried into position*".[455] The author of the article goes on to say that "…*therefore the design is unique and proves the versatility of Mr Mitchell, manager of the State Monier Pipe and Reinforced Concrete Works, and of Mr Humphreys, foreman of the bridge work*."[456]

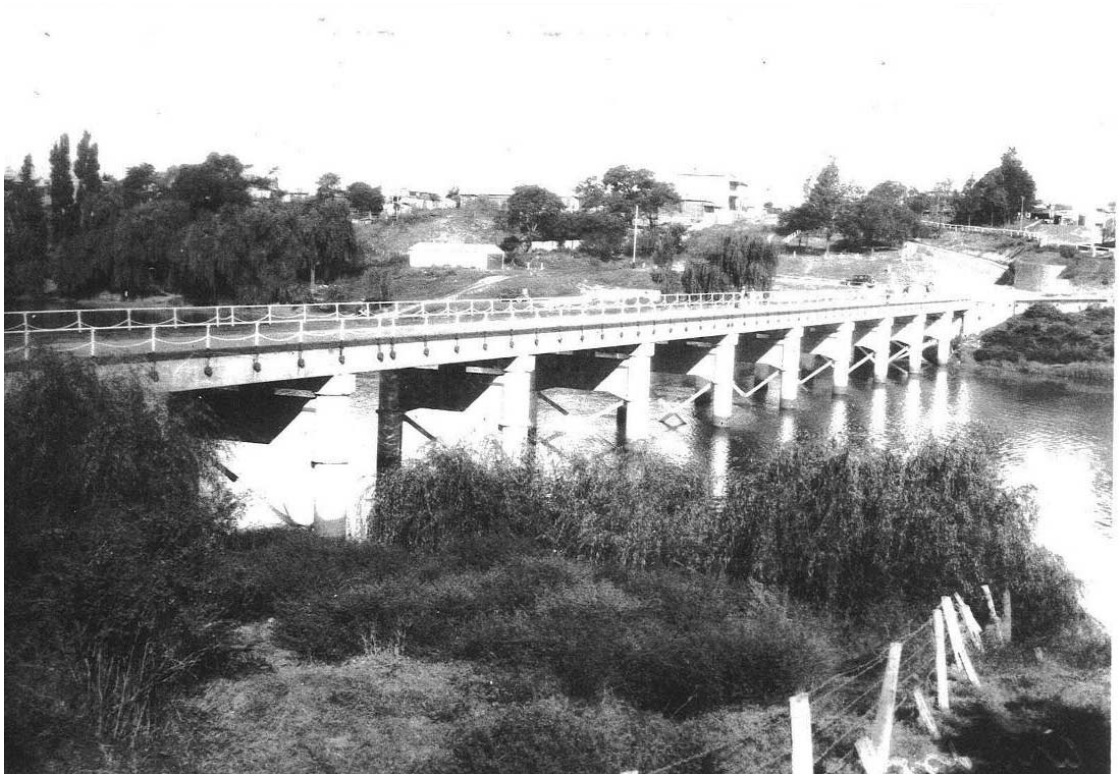

Plate 68: Windsor bridge after concrete deck was installed in 1922[457]

5.7.3 Celebrations for the Official Re-Opening

The official re-opening of the bridge was attended by a smaller group that had attended the 1874 celebrations, which by a 1922 account included

> *"…wild rejoicing…For Windsor people know how to jubilate in those far off days…and the escapades indulged in would cause the hair of the present-day sober generations to "stand on end like quills upon the fretful porcupine"".*[458]

In contrast, the official re-opening in 1922 was attended by a smaller and more decorous group of about 50 people. In attendance were Percy Allen (Chief Engineer for National and Local Government Works), the Hon. John Estell (Secretary for Public Works and Minister for Railways), M E K Bowden (Federal Minister for Nepean), Mr G W Mitchell (manager of the State Monier Pipe and Reinforced Concrete Works), Mr G Humphreys (foreman of the bridge works), Mr Brinsley – Hall (ex-MLA), Colonel J J Paine, Rev, N Jenkyn and Ald J W Ross (ex Mayor).[459] During the ceremony Colonel Paine toasted the Public Works Department for the role that it had played in the refurbishment of the bridge.

[455] *Ibid.*
[456] *Ibid.*
[457] Mitchell Library Small Picture File.
[458] Windsor Bridge. Reconstructed with Reinforced Concrete. Cost £12,925. Official Re-Opening, in the *Windsor and Richmond Gazette,* Friday January 1922, page 1, 2, 5.
[459] *Ibid.*

In fact,

> *"It gave him peculiar pleasure to couple with the toast the name of Mr Percy Allan, Chief Engineer of the Works Department. Mr Allan gave his instructions and his staff officers carried them out".* [460]

The function was catered for by Mr Beveridge.[461]

5.8 Later Changes

5.8.1 Cutting Through Thompson Square

The approaches to the bridge were realigned and reconstructed through Thompson Square in 1934 to provide an easier approach from the Windsor side. Plate 68 shows Windsor Bridge in its post-concrete deck form; Plate 69 shows the cutting, thought to be shortly after construction. Work to install an additional chain on the railing was approved in 1935 but never occurred, and a proposal to install chain link netting on the handrails in the same year also amounted to nothing.

Cross bracing renewal work was undertaken in 1941 when steel and skilled labour was in short supply, due to the resources required for the war effort. After the war when car ownership increased as did the size and loads of vehicles, new bridges were constructed of other, more durable materials and the construction of timber bridges all but ceased.[462]

5.8.2 Pedestrian Footway and Crash Barriers

Correspondence from 1965[463] requesting provision for separate pedestrian traffic set in motion the chain of events that eventually led to the installation of a cantilevered footway on the downstream side of the bridge in May 1968.[464] The cost of the footway was shared between four authorities; the DMR and MWS&DB contributed $15315.50 each and, Windsor Municipal Council and Colo Shire Council $1000 each. The footway also provides a means of accommodating services on the bridge; RMS files contain discussions and plans of cables for the Post Master General (later Telecom/Telstra), Prospect County Council (electricity) and the Mains Water Sewerage and Drainage Board.[465]

When the footway was completed a new vehicular crash barrier was installed on the downstream side of the bridge, between the existing road deck and the new footway to ensure that cars were not able to encroach on the footpath. The collapsible handrail was retained on the upstream side as well as on the outer, downstream side of the footway. Whilst the railing was generally capable of deterring foot traffic from falling, this was not always the case; on the 1st of January 1933 Geoffrey Mortley fell from the bridge and died from his injuries several days later.[466]

The unsafe condition of the collapsible handrail is referred to several times throughout the life of the bridge in RMS files[467] but was demonstrated in an incident in 1980 when a driver crashed through the collapsible handrail into the Hawkesbury River, resulting in the death of a passenger.[468] A replacement crash barrier similar to that put in place in 1968 was installed on the downstream side of the bridge when the footway was built in 1980. Concerns over the suitability of the handrail on the footway were also raised not long after and proposals made to replace the old handrail with a new type of collapsible handrail were followed through in 1986.[469] Plate 70 shows the footway and crash barriers in 2012.

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[460] *Ibid.*
[461] *Ibid.*
[462] *Op. Cit.,* Chambers 1997, p 12.
[463] RMS file 91.1526.1.
[464] RMS file 91.1526.2.
[465] RMS files 91.1526.2.
[466] RMS file 91.1526.1; "Geoffrey John Mortley", *Windsor and Richmond Gazette,* Friday 11 January 1935, p 10.
[467] RMS file 91.1526.1, 2 and 3.
[468] "Man Charged after Bridge Fatality", *Windsor and Richmond Gazette,* Wednesday 3 Sept 1980, cited from RMS file 91.1526.3.
[469] RMS file 91.1526.3.

Plate 69: Undated image of 1934 alignment through Thompson Square, thought to be shortly after its opening.

Plate 70: The Footway (left) and replacement crash barriers, in 2012. View to south east to Thompson Square.

5.9 The Bridge in the 21st Century

The piers on which the Windsor Bridge stands are now almost 138 years old. The bridge has served the local and regional community in all but the highest of floods. The bridge has been modified a number of times to adapt it to the changing economic and transport conditions of the nineteenth and twentieth centuries. Those modifications have ensured it survived frequent floods, the exponential increase in vehicular traffic and heavy vehicles, all the while retaining a modest character within a largely rural landscape.

The bridge is aging and along with it the elements that have held it up and been reinforced through time are eroding through natural forces and age, all the while carrying the burden of more frequent and heavier traffic.

The bridge has always been an important element for the community from its construction to the present day. The reaction of the community to the proposal to create a new bridge over the Hawkesbury and demolish the old demonstrates this relationship.[470]

[470] "Labor Calls for Bridge Consultation", *Hawkesbury Gazette,* 3 May 2012; "Heritage Concerns Fill Windsor Bridge Community Meeting", *Hawkesbury Gazette*, 12 September 2011; "Heritage Concerns Over New Windsor Bridge", *Hawkesbury Gazette*, 22 April 2009.

6 SITE ANALYSIS

6.1 Introduction

Windsor is a place that retains a substantial proportion of historical fabric that not only remains *in situ* but has been re-used and absorbed into the modern landscape.

This section of the report analyses the components that make up what is termed “the cultural landscape”. It comprises built elements, landscape components, views and vistas. This evidence is informed by the historical analysis. Investigating these individual elements within this historical framework enables us to understand how the present-day environment has come to be here and how that environment informs us of the history and associations of this place.

For the purposes of this discussion, “Thompson Square” refers to the precinct or conservation area and includes all the buildings surrounding the reserves and all the roads within the space defined by the Hawkesbury River to the north, and the buildings facing inwards along Old Bridge Street, George Street and the Thompson Square road way. This definition differs slightly from the SHR listing for Thompson Square as it includes the Macquarie Arms Hotel and the house at 5 Thompson Square, which are not included in the SHR Thompson Square Conservation Area listing but are listed individually on the SHR. It also differs from Macquarie's Thompson Square, which did not include buildings but was a reserve, which one day would be surrounded by buildings.

6.2 The Cultural Landscape

6.2.1 What is a Cultural Landscape?

The definition of cultural landscapes, their formation and their significance is an ongoing and complex discussion. Generally it is agreed that cultural landscapes are places that have been shaped by human action and where the relationship of the cultural with the natural landscape is still evident.

The United Nations Educational, Scientific and Cultural Organisation" (UNESCO) considers cultural landscapes to be sites that demonstrate the "great diversity of the interactions between humans and their environment".[471] UNESCO defines three main categories of cultural landscapes:

- "clearly defined landscapes" such as gardens
- "organically evolved landscapes" that have been created through use and retain evidence of their early formation through to the present day
- "associative cultural landscapes" that are often intangible and have been created through the cultural associations with natural elements.

The cultural landscape of Thompson Square fulfils the definition of the second category. It exhibits "significant material evidence of its evolution over time" – a "continuing landscape".[472] This means that the landscape retains elements that are recognisably historic elements from many periods; the newer elements of the place are not particularly intrusive and the past remains readable. At Thompson Square there are buildings from several periods, roads and landscape elements also from different periods of time and views to the river and open land on the northern bank that give meaning and context to the place.

Cultural landscapes are composed of many elements and do not rely on any one "spectacular" element to make them significant; they are not necessarily important because of one or more important monument or elements within them. A significant cultural landscape can be a system of fields that demonstrate historical land alienation and use, or a modern town that retains the ability to be identified with past social practices, building techniques and uses. An important aspect of cultural landscapes is that they show a continuity of use to the present; one landscape and its components can tell many parts of a story.

[471] http://whc.unesco.org/en/culturallandscape/#1.
[472] *Ibid.*

Thompson Square is a cultural landscape. Aboriginal people recognised the location's attributes, and it was these resources that influenced the type and form of European settlement.

Thompson Square is the product of both natural and human actions; filling and reclaiming land from the river front, cutting to make the gradient from the ridge to the river more accessible, the effects of building and demolition and the environmental forces of flood waters. The buildings that create the periphery of Thompson Square, the space defined by those buildings, the open space, roads and landscape within the square, the rural landscape on the northern bank and the bridge that links the two together are layers of evidence left by past communities, still use today, that create a unique identity and sense of place.

Cultural landscapes contain more than the elements that survive above the ground; much history and information is preserved below the ground often of the earliest or most unusual aspects of lives and events or periods of occupation that have been substantially removed by later development. This is archaeological evidence and it extends and compliments the resources that survive above ground. Thompson Square and its environs is likely to preserve a substantial archaeological resource; this is discussed in Sections 7 of this report.

6.2.2 The Built Environment

The Built Environment to 1815

Details of each element within Thompson Square are presented in data sheets in Appendix 4.

Thompson Square is framed on three sides with one and two-storey buildings, the earliest being officially opened in 1815 and the latest, an anomaly in the group being built in the 1950s, was built with some care, to avoid the sandstock brick wall. The buildings addressing Thompson Square are occupied and kept in good repair, something which has guaranteed their survival; the fabric represented by the surrounding built environment includes sandstock brick walls, sandstone, machined brick, stucco render on brick and timber slab outbuildings.

A brick retaining wall survives within 4 Old Bridge Street. Early plans, overlaid and geo-referenced to a modern aerial photograph show that the existing rick wall follows the historic line of the property as surveyed by Abbot (1831) and Armstrong (1842). This feature is not within the project area but directly adjacent; it is also highly likely to be a relic of substantial significance. The brick wall has been mentioned in this section because of its visibility and because it is very likely to be a fragile element of the cultural landscape on the border o the construction work zone (Figure 2).

The Western Side of Thompson Square

The Doctors house at 1-3 Thompson Square, which was built on the site of an earlier inn in 1844 (Plate 35 and Plate 36*),* is one of the landmark features within Thompson Square. It is still in use as are all other historical buildings within Thompson Square. Adjacent to the Doctors House is an early Victorian cottage, which in turn is the neighbour of what is now the Hawkesbury Museum, built during the 1830s. Adjacent to the Museum and on the corner of Thompson Square and George Street is the Macquarie Arms Hotel, the earliest surviving Georgian building with important landmark qualities.

The Southern side of Thompson Square

The buildings on the southern side of George Street address Thompson Square. They are of a range of dates and architectural styles from the early Victorian (62 George Street) to the early Inter-War period (Hawkesbury Garage); shopfittings and signage are contemporary elements. All these buildings have been upgraded and are currently used as commercial premises.

The Eastern Side of Thompson Square

Facing Thompson Square from Old Bridge Street is a row of buildings illustrating different architectural and historical phases of the place. The former School of Arts building at 14 Bridge Street, built in 1861 is on the site of one of the government storehouses (Plate 15), is visible from all angles at the southern end of the square, except where the view is blocked by trees. Across the road at 10 Old Bridge Street, now a music shop, stands a fine example of a two-storey Regency (c.1856) building, variously occupied as a house, a school and a maternity hospital. Next door at no. 6 (or 8), currently a solicitor's office, is an 1860s house with stables and next to it to the north is no 4 Old Bridge Street, built in the 1950s. No 4 Old Bridge Street is a mid-century vernacular house built on brick piers and with verandahs on two sides. It is included in the Thompson Square Conservation Area, not because of its architectural qualities but because it is almost certainly built over Andrew Thompson's buildings and garden, which were incorporated into the government domain (as are numbers 6 [or 8] and 10).

Connections to the Landscape

The buildings provide a frame that, despite the level of vegetation within the reserves now, defines the open space. On the river side of the square, Windsor Bridge articulates with the space and connects to the still rural landscape to the north. From the north side of the river, the bridge frames Thompson Square and connects it to the north bank.

Open Space

The open space, being upper and lower Thompson Square parklands, Old Bridge Street and the 1930s alignment of Bridge Street, has undergone extensive change over the last 218 years, some of it detrimental to the town square setting, but retaining the ridge at George Street and the steep slope to the river.

Early images of the space by Evans (1807, 1809) suggest that it had a small beach at the head of a shallow inlet with sloping ground rising to a ridge in the south. From 1795 to 1810 this sloping ground was gradually cleared and buildings of various types and scales were constructed principally towards the western and southern sides with fewer improvements to the north and east. It was a relatively sparsely occupied place and the open space around was irregular providing an area to move to and from the buildings and wharf.

There are several views of Thompson Square made between 1807 and 1812 and the changes in thee images chart the changes made to this place.

Images alone are insufficient to document the development of the cultural landscape but there are several surveys that can complement the pictures of this place. The shortcoming in comparing illustrations to plans of Green Hills and Windsor is that the earliest maps of the place were produced by government surveyors, Meehan being the earliest in 1812, after the clean up that was ordered by Macquarie and probably for the purpose of showing government property. The earlier 1794 Alt plan is not focused on the open space in Green Hills and would have been too early to pick up the buildings that are believed to have been built prior to the Macquarie program of demolition.

The current situation of Thompson Square is that it has been impacted by the 1934 Bridge Street cutting, which is an intrusive addition to the landscape and almost certainly destroyed a substantial proportion of relics such as sections of the brick drain. Not only did the 1934 road isolate, rather than just demarcate the upper and lower parkland areas to their current form, further landscaping obscured evidence of the early road from George Street to the wharf and bridge. Although the Square has been divided into an upper and lower parkland area since at least the mid nineteenth century; the lower parkland area is currently isolated from the commercial centre of Windsor by the busy road and is consequently difficult to get to. The large number of trees within the reserves and the proliferation of vegetation, mostly introduced species, on both banks of the Hawkesbury River obscure views to and from the Square and disconnect elements such as the bridge and the remains of the timber wharf, that are articulated to the Square. A detailed visual assessment is presented in Appendix 1 and is summarised later in this chapter.

6.3 Windsor Bridge Description

6.3.1 Introduction

This section identifies the different elements of the bridge, fabric types and evidence of its construction phases. The Windsor Bridge has undergone a number of changes to its form and structure over time. It features elements dating from as early as 1874, with major changes occurring in the 1920s, 1940s and through until 1986. Only metal and concrete elements of the bridge are now present, with the last timber element being for kerb logs which were removed in 1936. A recent photograph of the bridge is shown in Plate 71.

Although a substantial amount of detail exists about the components of the bridge, how the piers were dug through the riverbed and embedded into bedrock is not clear. The RMS s170 data sheet states that the bridge has caissons for the piers. Primary archival sources do not mention caissons; instead the bridge plans include elevations of "piers with cylinders" or "piers with screw piles". In addition, the *Australian Town and Country Journal* mentions that divers were used to install the cross-bracing and that "*By the use of the sand-pump and air-lochs, boulders, drift-wood, and logs, several feet in thickness, were removed at considerable depths, and each pillar firmly bedded and lewised four feet into solid rock*".[473] The use of caissons may be implied but not confirmed.

6.3.2 The Use of Caissons?

The use of caissons to install piers is a complex process that involved the creations of a de-watered environment in which labourers could work to excavate the river or sea bed. A caisson can be cylindrical or rectangular in shape and performs the same function as a coffer dam. The depths reached in the Hawkesbury River would probably have required pneumatic caissons to de-water and pressurise the working space. The labourers could then work within the cylinder, or within a larger pressurised space beneath the cylinder.

The piers of Windsor Bridge are narrow at 3 feet 6 inches (about 1 metre) but may have been able to accommodate one labourer to dig and fill a bucket or a larger working space beneath the cylinder. So while it is possible that pneumatic caissons were used for the construction of the Windsor Bridge, and by the 1870s it wasn't unusual for pneumatic caissons to be used in this way, it is difficult to picture this technique being used where the cylinders are only 1 metre in diameter. It is possible that because the riverbed is sandy, manual digging was unnecessary. The cylinders could have been sunk from above the water line with the use of temporary timber staging and weighted machinery to push them down through the river bed. The sand-pump would have emptied the cylinders and the Lewis Bolts would have been manually attached to the bedrock.

Neither explanation is convincing: pneumatic caissons with labourers on the riverbed or an automated method of pumping the sandy deposit. The problem of removing debris from the bottom of the river and of how the cylinders were sunk through the riverbed and bolted to the bedrock remains unanswered.

[473] *Ibid.*

Plate 71: General view of Windsor Bridge from the bridge underpass.

6.3.3 Cast Iron Piers

The cast iron piers are a major structural component of the bridge: they are hollow cylinders, about 25 feet (7.6 metres) beneath the river bed connected to bedrock by Lewis Bolts. Cast at Mort's Dock and Engineering Works in Balmain, the piers were filled with brick and concrete[474] with the brick laid in two radiating lengths of specially tapered bricks (Plate 74). The original height of each pier is about 25 feet (7.6 metres) long, with additional 8 feet (2.4 metres) sections bolted to the top flange to raise the bridge in 1897.[475]

The original plans were for the piers to be constructed of two iron cylinders with a screw pile between them, but it is unlikely that screw piles were used. *The Town and Country Journal*[476] mentions that during the construction of the Windsor abutment the strata found below the surface made it "doubtful whether screw piles could be used", and that "a test screw pile…was put down in the middle of the stream; but the rock could not be reached, owing to the difficulty of removing the drift timber".[477] The information recorded in *The Town and Country Journal* makes it clear that screw piles were not used, however they were tested. One contemporary plan shows were a screw pile was attempted on Pier 6 (Plate 61) but was not ultimately used.

The piers were originally braced with wrought iron, but the current bracing to have been replaced with steel in 1941, utilising some of the original bridge components. Subsequent inspections state that the bracing was half its original thickness in certain piers and in excellent condition in others, suggesting that bracing was only renewed on select piers. The metal bracing consists of a Rolled Steel Joist (RSJ) transom in piers which have not had bracing replaced. The transom located at or below the waterline and has cross bracing made of channel section steel above.

The top level of bracing in the raised section has been encased in a reinforced concrete cross beam. Plans show these beams to be tied to the piers by means of diagonal reinforcing steel – presumably with holes drilled into the piers to accommodate this. The shape of the concrete section, following the

[474] A New Bridge over the Hawkesbury at Windsor in*The Australian Town and Country Journal,* Saturday 22 August 1874 p 20.
[475] Windsor Bridge, *The Windsor and Richmond Gazette,* Saturday 3 April, 1897 p 6.
[476] A New Bridge over the Hawkesbury at Windsor in*The Australian Town and Country Journal, Saturday 22 August 1874 p 20.*
[477] *Ibid.*

angles of the cross braces at the top and bottom corners, indicates that the bracing remains within the girders. In addition to the concrete cross girder, a concrete headstock has been cast across the piers to support the bridge girders. This headstock is anchored both to the concrete girders and the piers but no anchoring to the cross girder is shown. The headstocks, like the bridge spans, were cast in two halves. The current state of a typical pier is shown in Plate 73.

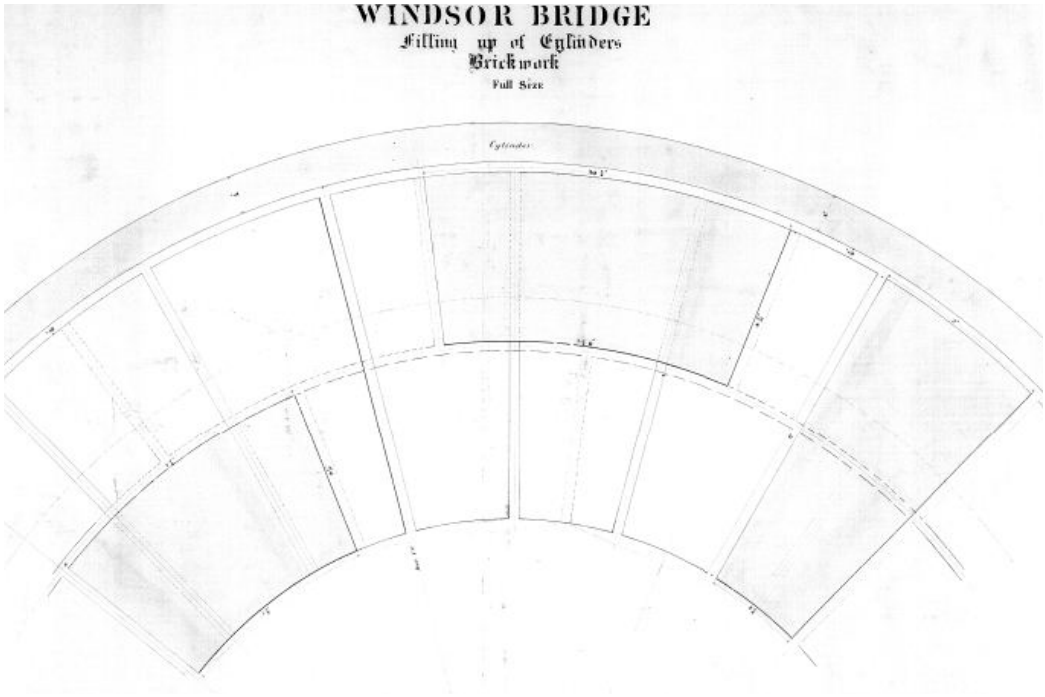

Plate 72: Windsor Bridge: Filling up of Cylinders. Brickwork.[478]

Plate 73: Pier 1 from Windsor bank, showing original 1874 cylinders beneath the 1897 extension, lower level metal cross bracing, concrete cross girder, headstock as well as deck elements.

6.3.4 Mass Concrete Pier

[478] RMS Plans 0182091BC0104:10.

The mass concrete pier (Pier 10, also Pier X on the PWD plans) at the northern end of the bridge was installed when the superstructure was re-constructed in reinforced concrete in 1922. The existing timber pier was not considered sufficient to bear the increased weight of the concrete deck and was replaced with concrete. The timber pier was added during construction following scouring of the northern bank, increasing the length of the bridge by adding a new span.[479]

The new pier is built on a concrete base which sits on top of ten piles, six of which were existing piles and four were newly driven. The piers are noted in the plan (Plate 74) as 3 feet (0.914 metres) diameter Monier cylinders, and feature a similar concrete cross girder as those installed on the iron piers during re-construction, with the headstock cast in two halves. A notation on the plan directs holes to be left in the headstock to allow reinforcing steel to be inserted when girders are cast to allow the structure to be anchored together (Plate 74). There is no bracing on the lower levels, however an underwater inspection undertaken by diver R. Hellings in June 1952 described the metal bracing on Pier 10 as being in 'good condition'.[480] The pier features the same kind of concrete cross girder that was installed on the iron piers at the time of re-decking but it does not have any bracing on the lower levels. The current state of Pier 10 is shown Plate 75.

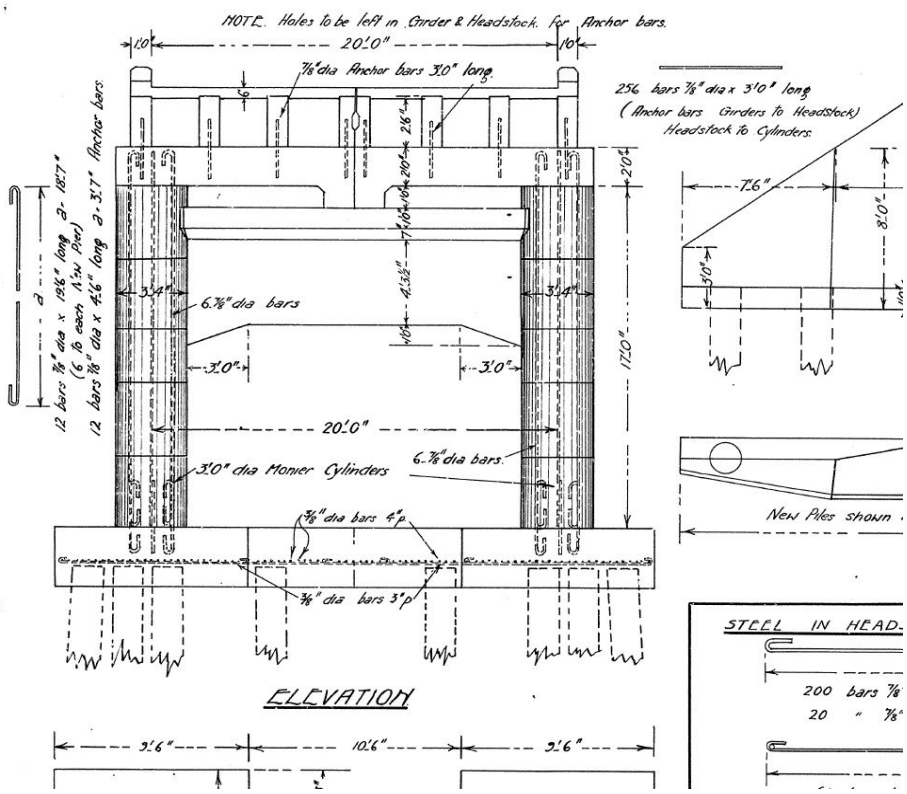

Plate 74: Detail of Department of Public Works "Plan New Concrete Pier – Pier No.10.[481]

[479] A New Bridge over the Hawkesbury at Windsor in*The Australian Town and Country Journal, Saturday 22 August 1874 p 20.*
[480] RMS file 91.1526.1.
[481] RMS 0182 092 BC 0104.

Plate 75: Pier 10 Monier Cylinder, from Wilberforce bank.

6.3.5 Abutments

The abutments support the end spans of the bridge and are located where the bridge connects the approaches to it. The abutments contain the embankment fill used to build up the approaches that maintains the road height heading on to the bridge. The abutments on the Windsor Bridge are of two types: cast iron cylinders with concrete, and all concrete piers.

Abutment A

Abutment A is at the southern end of the bridge. It comprises three cast-iron cylinder piers with a concrete retaining wall cast behind them. A concrete headstock was installed on Abutment A, probably at the time of the re-construction of the superstructure of the bridge. Like the deck, the headstock on this pier has been cast in two halves. The downstream side of the headstock appears to have been modified to incorporate a RSJ where the footway and services have been installed. The piers are of a smaller diameter than the piers in the stream. Plate 76 and Plate 77 show the current state of Abutment A.

Plate 76: Abutment A showing three small diameter piers, possibly screw piles, utilised in its construction.

Plate 77: Downstream side of Abutment A showing top of cylinder, and footway additions at left.

Retaining wing-walls are also present, constructed with cast-in-place reinforced concrete, at the same time of reconstruction of the bridge spanning members. However, while bridge plans of that date refer to a "New Abut B"[482] and there is evidence that they were in place by 1967, there does not seem to be any specific description of works for abutment A during the 1920s re-construction operation.

Abutment B

Abutment B at the northern end of the bridge is probably formed of mass concrete cast on top of nine piles. The drawing for the new deck, which shows reinforcing bars through the new deck components, does not include reinforcing bar within the abutment or Pier 10. The girder ends have been encased in the concrete panels of the abutment, suggesting they were initially placed on a pipe concrete pile and crosshead arrangement.

This abutment also features retaining wing-walls cast at the same time as the mass concrete abutment. The abutment has been augmented at a later date by the addition of a concrete apron extending out from the original abutment and wingwall, with driven concrete piles and a cast-in-place headstock. Infill panels are set at a lower level on the upstream side, and steel sheet piles on the down stream side in front of the original wing-walls, as shown in Plate 78.

Plate 78: Abutment B looking downstream showing later additions (below) to 1922 cast abutment and wingwalls.

6.3.6 Reinforced Concrete Girders and Deck

The superstructure of the bridge consists of eight precast reinforced concrete girders with the centre pair narrower and closely spaced. A cast-in-place reinforced concrete road deck is tied to the beams via the hook ends of the reinforcing bars. The girders and deck were cast *in situ* by the State Monier Pipe and Reinforced Concrete Works in 1922. The work was undertaken on each side of the bridge in turn, allowing traffic to continue using the other half; evidence of this is still visible today on the underside of the bridge with the headstocks and girders showing a seam down their centre where provision has been left for the other half of the casting to occur. The deck was stripped and resealed in 1980.[483]

6.3.7 Steel and Concrete Footway

[482] RMS 0182 492BC0104.

[483] RMS File 91.1526.3.

The footway is constructed of welded RSJs, attached to the bridge headstocks on the downstream side of the bridge. The footway deck consists of concrete slabs on top of metal girders. The footway is described as consisting of "composite material supported on steel cantilever beams connected to the underside of the deck"[484].The pedestrian path consists of concrete slabs, with 330 slabs being cast for the purpose.[485] The path has changed due to the tendency for large gaps to appear between the slabs and it now has a timber surface over the top.

In addition to carrying pedestrian traffic the intent of the footway structure was to carry services including a water main, telephone cables and an electrical conduit. These were progressively installed after the footway was constructed; the telephone cables in c. 1973,[486] and the installation of expansion joints on the electrical conduit in c. 1985. The services, as well as the means of attaching the footway, are shown in Plate 79.

The footway was altered to take a larger water main by the MWS&DB in 1976/1977, with the effect of raising the height of the footpath by 203 mm.[487]

Plate 79: Underside of footway showing services below walkway in addition to means of attaching footway to concrete headstock.

6.3.8 Metal handrails and crash rails

When it was opened in 1874, the bridge featured innovative collapsible pipe and chain wire railing that was designed to be lowered during flood to avoid damage. A drawing dated 28/2/[18]73 shows an arrangement using a 4 x 4 inch timber post with hinged base, hinged top metal pipe rail and iron rod middle rail, designed to collapse by folding sideways. A metal bracket stop held the posts in an upright position (Plate 80). The handrail appears to have been redesigned some time between 1896

[484] RMS s170 Register listing Hawkesbury River Bridge, Windsor, Item No. 4309589.
[485] RMS file 19.1526.2.
[486] RMS file 91.1526.3.
[487] RMS file 91.1526.2 – plan no 208/71.

and 1922 with the addition of a counterbalance – (so it could be raised again by one person). A collapsible rail was consistent with the intent of the low level bridge to survive heavy floods by being submerged below maximum flood level, reducing the chances of floating debris colliding and snagging. When the footway was constructed in 1968 a vehicular pipe crash barrier was installed on the edge between the roadway and footway to prevent cars crashing into the footway. The collapsible footways were retained on the outer edges of the bridge, but they were eventually replaced with a new, more substantial collapsible handrail in 1983; it was designed to be lowered forward onto the footway. A vehicular pipe crash barrier in a similar style to that between the footway and road deck was installed in 1981.

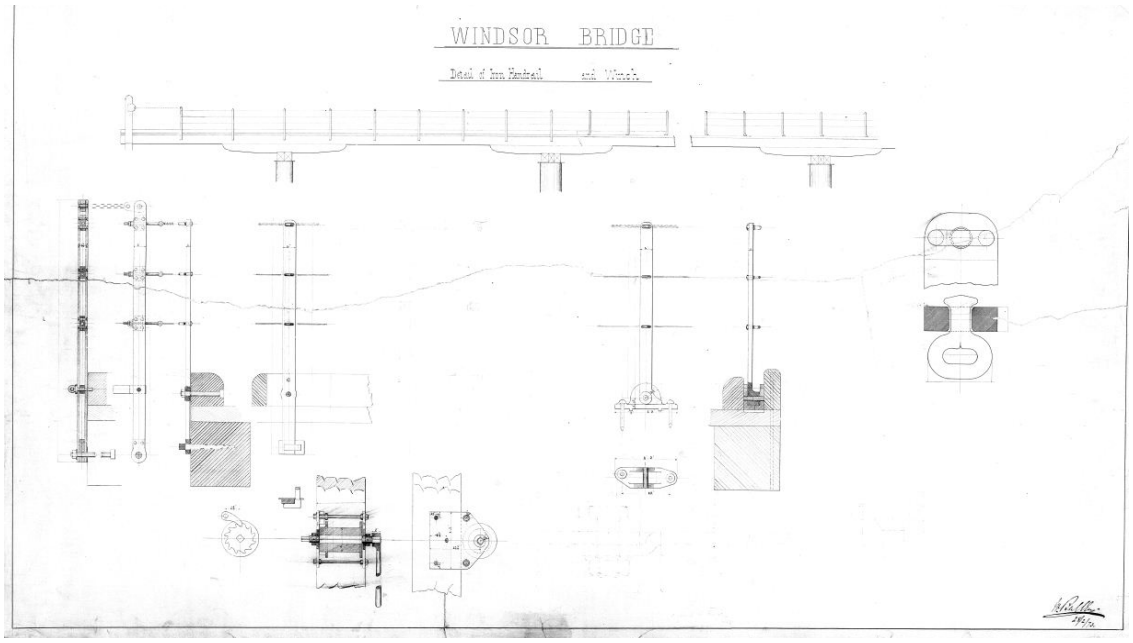

Plate 80: 1873 plan for the collapsible handrail on the Windsor Bridge[488]

[488] RMS 0182 492BC0104 sheet 11.

Plate 81: A photograph c 1896-1922 showing collapsible handrails with counterweight on the Windsor Bridge[489]

[489] State Library of Victoria.

6.4 Current Condition - RMS Files

The condition of the bridge has been assessed as 'poor' by both the RMS and independent experts.[490] [491] [492] Of particular concern is the condition of some of the iron cylinders. Drilling indicates that in some sections beneath the water line that the piers are as thin as 18 mm compared to about 40 mm when new. Cracks are also present in some piers. Above the waterline the iron is considered to be in good condition, with minor surface rusting caused by impacts from flood debris.[493] [494]

Concerns have been raised over the quality of the fill within the original 1874 cylinders. A technical report prepared by CTI (2005) noted that brick is present behind the iron. This has been interpreted as construction debris, but the piers are actually filled with an arranged ring of bricks 'enclosing a cone of concrete'.[495] (Refer also to Plate 72).

The condition of the concrete elements is also considered to be poor. Carbonation within the concrete used in the cross girders, headstocks and girders is weakening the overall structure. Access UTS[496] compiled a report on the condition of several spans and noted that in the case of span one, which had been checked four years earlier, the degradation in strength was in the order of 16%. The report concluded that if the bridge were decommissioned in the near future it would still be operable in its current condition with current loads.[497] The bridge does not have a load factor but use stress on the bridge is managed with a speed limit of 40 km/hr.

Rehabilitation of the bridge is considered possible by removing the deck, boring down through the cylinders and inserting reinforcing steel, then filling back up with concrete to make new piers within the existing piers. This method would require that the bridge was closed for a year. While it would ensure the *in situ* retention of the iron pier cylinders this method of rehabilitation would result in destruction of the concrete deck.[498] The cost of the bridge's rehabilitation however, has removed this option from consideration.

Table 4 below summarises the evolution of the Windsor Bridge over time.

[490] CTI 2005.
[491] Access UTS 2011, p 6.
[492] RMS File 05m726.1.
[493] *op cit* CTI 2005.
[494] *op cit RMS.*
[495] A New Bridge over the Hawkesbury at Windsor in*The Australian Town and Country Journal, Saturday 22 August 1874 p 20.*
[496] *op cit* Access UTS, p 6.
[497] Access UTS 2011 p 6.
[498] RMS Files 05m726 1 and 2.

Table 4: Evolution of the bridge over time

Year	Action	Form	Fabric removed	Fabric Added
1874	Initial construction of bridge	Low level bridge on brick and concrete filled cast iron piers with wrought iron cross bracing with one timber pier with Timber Girders. Collapsible Handrail. Timber kerb 'logs'	Nil	Brick and concrete filled cast iron piers with wrought iron cross bracing with one timber pier with Timber Girders. Collapsible Handrail. Timber kerb 'logs'
1897	Raising of the bridge by eight feet using iron caissons to form piers.	High (mid) level bridge on iron and concrete piers with double iron cross bracing one timber pier with Timber Girders Collapsible handrail – updated design Abutment and approach raised higher to meet bridge height – and built up at both ends. Timber kerb logs	Deck replaced. Old version of Collapsible Handrail.	New cylinder extensions eight feet long, New bracing on top level. New handrails of updated design.
1922	Re-construction of the bridge superstructure with reinforced concrete girders, deck and pier crossheads	High (mid) level bridge on iron and concrete piers iron cross bracing and concrete cross girders with one Monier reinforced concrete pier. Concrete girder deck cast in two halves to facilitate traffic continuity. Collapsible Handrail. Retains timber kerb logs.	Metal cross bracing (not entirely clear if bracing remains within concrete girder) Timber deck components (with exception of kerb logs) Timber pier X *[sic]* replaced with Monier concrete pier Timber abutment at Wilberforce end.	Concrete decking: headstocks, girders, road deck. Concrete cross girder to replace top cross bracing Concrete pier New concrete abutment at Wilberforce end.
1934	Change in approach through Thompson Square – Cutting	Bridge form unchanged though its associated approach from the south side is altered	Nil	Nil
1936	Replacement of timber kerb 'logs'	Concrete kerbing replaces timber. Interesting that timber kerb is retained after deck is concreted. Possibly to facilitate collapsible handrail	Timber kerb logs	Concrete kerb logs
1941	Iron cross bracing renewed and replaced with steel.	New RSJ transom at base of bracing, and new steel channel section used for bracing. Note that in 1952 a diving inspection remarks that the RSJ transom is half its original thickness. It is likely that only some bracing was renewed.	Original 'gussets' retained at top of bracing. Iron cross bracing and some componentry removed.	Steel cross bracing (only on some piers): New collars on bracing, RSJ used for transom, channel section used for bracing
1968	Addition of	Attachment of Steel	Some drilling in	Steel girders and concrete

Year	Action	Form	Fabric removed	Fabric Added
	underslung cantilevered footway	and Concrete footway with service pipes below. Addition of tubular crash railing on top of concrete kerb on downstream side (next to footway). Collapsible handrail retained on Footway and on upstream side of bridge. Services are attached to footway – power, water and telephone (this occurs over time and not at the exact time of installation. Water main is increased which changes the appearance of the bridge slightly).	concrete and piers results in minor removals.	slabs for footway. Pipelines and conduits for services.
1980/1986	Replacement of collapsible handrails.	Collapsible handrail replaced on footway (downstream side) and upstream side of bridge due to safety concerns (first aired in 1930s or earlier) – metal tubular crash railing installed on upstream side, new collapsible handrail installed downstream.	Removal of original collapsible handrail gets rid of the most visible 1874 element.	Metal and wire collapsible handrail, lowered inwards to be secured to the deck.

6.5 Comparative Analysis – Windsor Bridge

6.5.1 Introduction

Windsor Bridge's design was originally of cast iron piers and cross bracing, with a timber superstructure, which included timber beams, cross-heads and deck. The iron piers, comprising of two concrete filled cylinders per pier, short spans and low level and profile, was built to withstand floods by allowing floodwaters to pass over it with good clearance. The combination of a narrow beam/deck and strong piers sunk deep into the river substrate was built to withstand the force of the frequent floods.

The form of the bridge today remains the same, with the bridge continuing as a low level bridge although it was raised by eight feet (approximately 2.5 m) in the 1890s. The superstructure and cross beams are now comprised of concrete, replacing the timber elements in 1922.

This section of the report reviews certain bridge types in NSW in order to place Windsor Bridge within the context of transport infrastructure of the nineteenth century. The purpose of the analysis is to determine if the bridge is a rare technological achievement. Further to this, the comparative analysis clarifies how rare the item now is regardless of how common it may have been when first built. It is important to understand how many bridges of this type were constructed, when they were constructed and how many survive; this information will inform the assessment of significance.

6.5.2 Identifying Comparable Bridges

Methodology

The following comparative analysis focuses on bridge types; those constructed of timber, concrete and metal, rather than on individual bridges. The purpose of this analysis is to understand the technological context of the Windsor Bridge. Masonry bridge construction is not included in this analysis as stone and brick were not integral to the Windsor Bridge; however, examples of masonry and timber bridges have been included to demonstrate the variable substitution of materials.

Individual bridges were identified through secondary reports accessed for the preparation of the history of the Windsor Bridge. The relevant bridges were then researched on the RMS Heritage and Conservation Register, the State Heritage Register, the State Heritage Inventory, which led to follow-up on the heritage schedules of local environmental plans and regional environmental plans. In addition, assistance was sought from, and provided by, RMS heritage officers, and an engineering heritage expert at Biosis Research (Gary Vines). The following comparative analysis includes discussion on historical developments that are relevant to bridge design and construction.

6.5.3 Government and Private Initiatives

Government was initially reluctant to fund bridge construction in the rapidly expanding colony, ensuring the many road bridges and roads were constructed by private enterprise. In Windsor, the bridge over South Creek was built in 1813 by John Howe, who with James McGrath also built the government wharf at Windsor. Howe's Bridge comprised a 214 (62.2 m) deck supported by four rows of timber piles 24 feet (7.3 m) high (Chambers 1997: 1). The bridge attracted a toll and was eventually taken over by government in 1832 (Bowd 1982: 114). The use of timber for road bridges was formalised by Government in 1861 (Cardno MBK February 2001: 60).

6.5.4 Timber Crossings

Bridges made from timber were the most common types throughout the nineteenth and early twentieth centuries. Local hardwoods of high quality were readily available and this made timber bridges ideal for a developing road network. For many years Australia lacked an iron and steel industry that could produce sufficient product to meet this need; imported metal was expensive. Many new bridges were needed to support the outward expansions of settlement; timber was preferred for its availability, workability and cost.

The earliest bridges built in the colony were timber; a crossing at the Tank Stream made between 1788 and 1792 (SHR ID 00636; Cardno MBK 2000: 13) is the earliest recorded.

Corduroy Bridges and Roads

The simplest bridges were corduroy bridges, and where they were built on the ground, corduroy roads. These structures were essentially log bridges, of rude construction and consisted of longitudinal logs overlain by smaller transverse logs. Smaller logs running the length of the bridge acted as kerbs (Cardno MBK 2000: 14). The survival of corduroy roads and bridges is rare.

Timber Beam Bridges

Early bridge forms that have endured are timber beam bridges, which were the most common form of road bridge, making up 87% of the total bridge number by 1902 (Cardno MBK 2000: 17). A timber beam bridge over the Duck River at Granville was built in 1797 and by 1805 another ten timber beam bridges were recommended for the food supply route of Parramatta Road (RTA 2000: 13). Timber beam bridges remained the most common bridge type for road until reinforced concrete took over as the most common building material from the 1930s (O'Grady: 273 – 286).

Timber beam bridges remained the most economical and popular choice for bridging narrow expanses (truss bridges were used for wider expanses; refer below) and were designed to be either high or low level types. Concrete and masonry piers were also used in situations where the bridge was low and the foundations shallow. Typically built without handrails, low-level bridges were edged with raised timber kerbs; these kerbs were, eventually replaced by steel guardrails.

High-level road bridges were expensive, so the flood risks associated with low-level bridges were considered acceptable. The risks were managed by building the deck high enough to remain above low flood levels but low enough to become submerged sufficiently to allow driftwood to pass over during times of high flood. In a small number of situations, collapsible handrails were incorporated into

the design to provide safety for travellers but reduce the risk of driftwood becoming entangled and compromising the strength of the bridge.

This investigation has identified four low-level timber bridges that had a collapsible handrail incorporated into their design: Windsor Bridge (extant), Richmond Bridge (demolished), Fladbury Bridge (extant) and the Colo River Bridge (*pers. Comm.* Ian Berger RMS 6 July 2012; it is not known if the bridge survives). It is unlikely that a large number of collapsible handrail bridges were ever constructed.

In 2002, the RTA (now RMS) reported that out of approximately 4,000 timber beam bridges, 82 were under the Authority's control, two of which were considered to be "state" significant but are not on the State Heritage Register. Management strategies for all but the state significant items is to demolish and replace all timber beam bridges of "nil" or "local" significance. Examples of timber beam bridges are becoming rarer as Roads and Maritime Services replaces them in response to age and increasing load limits and design requirements (RTA 2002: 5).

The two "state" significant timber beam bridges identified by RMS in 2002 are the Fladbury Bridge and the Wollogorang Bridge.

Summary descriptions of these two bridges and the Richmond Bridge (a demolished low-level timber bridge on the Hawkesbury) are listed below:

- Fladbury Bridge over the Severn River near Glen Innes: built 1910
    - RMS s170 Register item number 4301623;
    - Extant although it is unlikely that much 1910 fabric remains. The deck was last replaced in 2004, and the beams presumably in the last 30 years (life span of bridge most timbers). The bridge no longer has handrails.

- Wollogorang Creek near Goulburn on the Federal Highway
    - A search of the RMS s170 Register and the State Heritage Inventory (online) did not return any results;
    - Demolished or removed from s170 Register.

- Richmond Bridge, Richmond (demolished)
    - The first crossing of the Hawkesbury constructed in 1860;
    - The now demolished timber bridge was built by the privately-owned Richmond Bridge Company under the supervision of Edward Moriarty, who was the Chief Engineer, and later the Engineer-in-Chief of Harbours and Rivers for the Public Works Department;
    - Constructed as a low level bridge of ironbark it was 28 feet wide with a deck that was 14 feet above the water level;
    - The bridge was built with removable hand rails;
    - The piles were covered in a copper/zinc alloy
    - Replaced 1905 with reinforced concrete arch bridge – still with collapsible handrails (extant)

Plate 82: The low level Richmond Bridge, built 1860[499]

Plate 83: Fladbury Bridge, Glen Innes[500]

Truss Bridges – Timber and Composite

Timber truss bridges, based on a European style devised in the 16th century, were more commonly built from the mid-1850s. The truss on bridges was improvised from the mediaeval practice for strengthening roof structures (Fraser 1986: 49). American engineers in the 1840s were experimenting with various forms of truss bridges as well, looking to build stronger bridges over larger expanses. The

[499] SL Government Printing Office 1 – 06242.
[500] RMS s170 listing Image 4301623a.

strength in truss bridges is predominantly in the interlocked side panel creating a self-supporting structure resting on piers, trestles or abutments (McMillan Britton & Kell 1998: 33 - 34).

A variety of truss bridges were constructed in NSW starting in the 1860s as part of a program of the Public Works Department to improve roads and railways. Under the tenure William C Bennett (Commissioner of Roads and Bridges), the Public Works Department undertook improvements that included the construction of timber truss bridges in addition to timber beams and some iron lattice bridges. Between 1860 and 1886, the department built 147 timber truss bridges with spans ranging from 55 to 100 feet (16.7 m to 30.5 m) (McMillan Britton & Kell 1998: 37).

During the early government works period, timber truss bridge design was dominated by the Old PWD style, which was based on the early American Queen Post truss (McMillan Britton & Kell 1998: 37). Innovation was made as engineers joined the Public Works Department, many of whom were British or European and who brought their training with them (McMillan Britton & Kell 1998: 41).

When the timber truss style emerged government spending was focused on improving the rail system, which was a priority in the second half of the nineteenth century. Advances in rail technology in the United Kingdom influenced activities in the colony and rail emerged as a significant aspect of the developing nation. But iron was far more expensive than timber and was used only where necessary and particularly when the nation began to go into recession in the 1890s.

Over time the engineering qualities of the truss were improved and adapted to service the needs of new types of vehicles. Composite truss bridges were constructed from a combination of timber for compression and steel for tension (McMillan Britton & Kell 1998: 47).

Several truss road bridge types were built in NSW starting with the Old PWD type

- Old PWD – timber, 1860 – 1886, designed by British engineers working in NSW
- McDonald – timber, 1886 – 1893, retains British style
- Allan – timber with cast iron connection pieces, 1893 – 1929, similar to American Howe Truss
- DeBurgh – composite, 1899 – 1905, similar to American Pratt Truss
- Dare – composite, 1905 – 1936, similar to Allan Truss with main difference being a steel bottom chord (McMillan Britton & Kell 1998: 9 – 10)

Over 400 timber truss bridges were built in NSW (MBK 1998: 42); RMS manages 48 of the surviving 63 timber truss bridges in the state. Of those 48 bridges, 29 are listed on the State Heritage Register. As part of its timber truss management strategy, RMS propose to replace 22 out of the total 48, retaining 26 that best reflect the history and diversity of timber truss bridges in NSW. In 1998 RMS proposed to remove 12 timber truss bridges from the State Heritage Register and nominate an additional three

(http://www.rta.nsw.gov.au/roadprojects/projects/maintenance/timber_truss_bridges/index.html).

Examples of significant timber truss Bridges:

- Monkerai Bridge Over Karuah River
    - 1882 Old PWD Truss
    - RMS Listing ID 4300133 (National significance)
- Pearce's Creek Bridge, Galston
    - 1893 – 1894 McDonald Truss
    - State Heritage Register Listing no. 01478
    - RMS Listing ID 4300009 (State significance)

- Vacy Bridge over the Paterson River, Dungog
    - 1898 Allen Truss
    - State Heritage Register Listing no. 01483
    - RMS s170 Register Item ID 4301025 (State significance)

- Beckers Bridge over Webbers Creek, West Gresford
    - 1902 DeBurghs Truss
    - State Heritage Register Listing no. 01457
    - RMS s170 Register ID 4300128 (State significance)

Plate 84: Bridge over Tunks (Pearce's) Creek, Galstone: an example of a McDonald truss bridge.[501]

6.5.5 Metal Bridges

The first bridge wholly constructed from iron was completed at Ironbridge, Coalbrookedale, England in 1779. In Australia, when iron was first used for bridges, it was for foundation piers, particularly in areas where heavy floods occurred (DMR 1976: 58). New South Wales did not receive its first iron bridge until 1851 (Burns Roe Worley *et al* Feb 2004: 107; Fraser puts the date at 1863 (Fraser 1986: 44) when a bridge with a metal superstructure was built over Wallis Creek in Maitland (the bridge has been demolished). Other iron bridges followed, including the first major iron bridge, the Prince Alfred Bridge, over the Murrumbidgee River at South Gundagai (1865), Denison Bridge, Bathurst (1870) on the SHR, and the bridges over Iron Cove (1882) and the Parramatta River (c1883) in Sydney (Burns Roe and Worley *et al* Feb 2004: 107).

Iron and steel girders were seldom used on road bridges by the Public Works Department, which almost exclusively built timber road bridges (Fraser 1986: 49). Metal was reserved for the expansion of the rail network. Local iron from the Fitzroy Iron Works at Mittagong was produced for smaller projects from the 1850s while more substantial structures were generally imported from Britain for assembly in New South Wales (Fraser 1986: 1, 44). The cost of these bridges was prohibitive and they were only used when timber would not suffice. Where metal was used, initially cast iron, then wrought iron, became the dominant material until after the 1890s, when steel became locally available

[501] RMS s170 listing Image 4300009a.

(Cardno MBK 2001). The opening in 1916 of the steelworks in Newcastle NSW gradually made the material more accessible (Fraser 1986: 44).

Metal bridges accounted for less than 3% of the entire bridge population from 1867 to 1927, although they were the dominant form of bridge for major crossings. Major bridges were declared national works in the 1906-07 Department of Public Works Annual Report, providing them with a state funding source and removing control of structures from local councils (where local council would have been responsible). Bridges in the national category included those of substantial size, cost and transport network significance beyond the local area. Along with 257 other bridges, Windsor Bridge was declared a national work (Cardno MBK 2001: 61; RMS file 91.1526.1); for this reason some of the elements were constructed of cast iron even though it was a road bridge.

The use of cast iron for bridge piers was common from the mid nineteenth century in railway construction, but rare for road bridges, and when used, was almost universally in combination with riveted wrought iron girders. Apart from Windsor, another exception to the usual practice of iron for rail is the McFarlane Bridge over the Clarence River at McLean (refer below).

Examples of significant metal bridges are as follows:

- Prince Alfred Bridge over the Murrumbidgee in South Gundagai;
    - 1861 – 1867 Wrought iron half through bridge, modified Howe truss
    - RMS s170 Register Item ID: 4301652 (state significant)
    - Not listed on State Heritage Register

- Dennison Bridge, Bathurst,
    - 1870 metal Pratt truss bridge (early example - the second oldest in NSW)
    - State Heritage Register Listing no. 01665
    - Owned by Bathurst Council

- Grafton Rail and Road Bridge, Grafton,
    - Was originally a bascule bridge to accommodate river traffic, completed in 1932;
    - Unusual in that this is the only bridge that is double-decked, a result of its historical development
    - State Heritage Register 01036
    - ARTC s170.

- McFarlane Bridge, over the Clarence River South Arm.
    - Built 1906 as a bascule type bridge. It has a steel truss girder opening span, a steel tower span and 15 long timber approaches;
    - Has round timber stringer approach spans on small cast iron columns;
    - Original timber abutments have been replace with concrete piles and headstock but the girders, compound corbels and deck remain timber;
    - Based on a newly imported American model.
    - Listed on the RMS s170 Register Item ID 4300642 as state significant for a number of reasons including engineering innovation, as well as rare as one of two of the oldest surviving bascule type bridge in NSW, the other being the Coraki Bridge over the Richmond River in Richmond Valley;
    - Listed on the heritage schedule of the *Clarence Valley Local Environmental Plan 2011* as an item of local significance (I275); the bridge is listed as an item of regional environmental significance on the North Coast Regional Environmental Plan, which will be cancelled in the near future;

Plate 85: The McFarlane Bridge over the Clarence River at McLean; the bridge was built in 1905/1906 and comprises a predominantly timber deck on cast iron piers. The opening span and tower span are constructed of steel.[502]

6.5.6 Concrete Bridges

The early use of concrete in New South Wales for bridge construction was as fill in iron cylinders; it strengthened the piers and limited corrosion. It was also used in the construction of abutments in mass concrete (Burns Roe Worley *et al* Jan 2005: 82). The modern use of concrete to manufacture large structures had its genesis in France in 1865 when unreinforced mass concrete was used to build an arch aqueduct that was self supporting (Burns Roe Worley *et al* Jan 2005: 79).

Improvements in the technology were made in Europe in the 1880s and 1890s and a trial for a reinforced concrete structure was made in Australia in 1894; a culvert under Parramatta Road, Burwood has been suggested as a possible location of one of these sites. Not long after this, in 1896, two sewage aqueducts over Johnstons and Whites Creeks in Annandale were constructed by the same firm. These aqueducts remain in use today (Burns Roe Worley *et al* Jan 2005: 83). In the international context, reinforced concrete bridges were constructed as early as 1889 in the USA with a bridge in the Golden Gate Park and another built between 1894 and 1899 in over the Kansas River at Topeka in Kansas (Vines 2010: 11).

Small advances to improve the strength and design of concrete bridges were constant in the early years of the twentieth century. (Burns Roe Worley *et al* Jan 2005: 86). By the end of World War 1, timber was becoming scarce and the materials that went into creating concrete were more readily available (Burns Roe Worley *et al*: 88). The increase in road traffic and speed was also an incentive to improve the strength and durability of road bridges.

The following information is reproduced from the RTA report *Concrete Beam Bridges: Heritage Study of Pre-1948 Concrete Beam Bridges (Sydney, South West and Southern Regions)* prepared by Burns Roe Worley & Heritage Assessments and History (January 2005). It contains sites relevant to the Australian context.

[502] RMS s170 Listing Item ID 4300642.

- 1894 Experimental Monier arch on Parramatta Road, Burwood as culvert; Survival unknown
- 1896 Aqueducts over Johnstons and Whites Creeks at Annandale by Carter Gumnow & Co. (or Public Works?); SHR 01325; RMS s170
- 1896 Unreinforced arch bridge over Black Bobs Creek near Berrima by J W Park; Survival unknown
- 1899 Anderson St Bridge: the first reinforced concrete bridge built in Victoria by Carter Gummow & Co.
- 1900 The first reinforced Monier arch bridge built in NSW: Reads Gully near Tamworth, by Carter Gummow & Co.
- 1905 Bridge over the Hawkesbury River at Richmond using Monier arches
- 1907 First reinforced concrete beam bridge in NSW, at Rockdale
- 1918 Fullers Bridge, Lane Cove: first continuous beam bridge

Examples of listed concrete bridges include:

- Hillas Creek Bridge, Gundagai built 1938; A reinforced bowstring concrete arched bridge located along a disused stretch of road bypassed by the Hume Highway upgrade in 1983. Assessed as state significant (RMS s170 Register Item No. 4309569); also listed on the heritage schedule of the *Gundagai LEP 2011*.

- Hawkesbury River Bridge at North Richmond built 1904-1905. One of the earliest surviving pre-stressed concrete arch bridges and probably the only surviving Monier concrete bridge in NSW. Assessed as state significant (RMS s170 Register Item No. 4309511)

- Gladesville Bridge, Victoria Road, Drummoyne/Huntleys Point built 1959 - 1964. A four-box pre-stressed concrete arch bridge. Assessed as State significant (RMS s170 Register Item No. 4300309).

6.5.7 Bridges of Combined Materials

In some situations the standard design for road bridges was modified to adapt to specific environmental conditions, particularly in relation to the inconsistent behaviour of Australian waterways (Allan 1924).

The decision to build a high or low-level bridge could be subject to community agitation. Sometimes low level bridges were modified to become high level bridges not always successfully.[503]

In NSW bridges constructed of combined elements survive in various conditions.

- Clarence River Road Bridge at Tabulam
    - 1903 DeBurgh timber truss bridge supported on concrete piers with timber beam approach spans on timber trestles;
    - State Heritage Register Listing no. 01461
    - RMS s170 Register Item ID 4301043; This bridge is considered to be “highly rare – longest timber truss bridge built, concrete piers” (significance assessment on SHR listing)

- Hampden Bridge in Wagga Wagga
    - 1895 designed by Percy Allan as a Howe through timber truss bridge spanning 33.5 m on cast iron piers
    - Listed on the *Wagga Wagga Local Environmental Plan 2010* (I85)
    - The bridge is structurally unsound has been earmarked for demolition[504]

[503] Cardno MBK in RTA 2000: 22
[504] *The Daily Advertiser* 24 March 2012 (Wagga Wagga)

- Morpeth Bridge over the Hunter River, Morpeth
  - 1898. Timber overhead braces Allan Truss with concrete-filled iron cylinders
  - State Heritage Register Listing no. 01476
  - RMS s170 Register Item ID 4301092

- Windsor Bridge over the Hawkesbury River, Windsor;
  - The subject bridge – when originally built, it fell into this category;
  - 1874 timber beam on cast iron cylinders for piers, height of piers increased in 1897 by adding cylinders on top, Incorporated collapsible handrails;
  - Final major refurbishment in 1922 saw the introduction of substantial concrete elements including the deck, girders and wingwalls – this was in the early period of concrete use in Australia;
  - RMS s170 register as State significant Item Number 4309589;
  - *Hawkesbury LEP 1989* without a specific level of significance;
  - *Draft Hawkesbury LEP 2011* as an item of local significance.

Plate 86: Morpeth Bridge[505]

[505] RMS s170 Register 4301092a

6.5.8 Significant Modified Bridges

The question of significance is often framed in terms of the survival of original fabric. With respect to heavily used infrastructure, the modification of the item may not necessarily reduce significance because changes are required to ensure the item continues its intended function. In the case of road bridges, changes to only one part of the item are confirmation that the remaining sections were strong enough to retain and function with the addition weight of those changes and the increased usage. Research into bridges that retained their significance after substantial modification identified four items, two in NSW and two in Victoria; all were designed and built as composite bridges. The use of concrete in these situations was early in the application of the material and prior to the advances made in concrete technology. In each case the modifications were the addition of concrete decking, with the concrete cast to mimic the form of the timber, which demonstrates the resilience of the substructure and government's process of accommodating the fast paced changes of the twentieth century.

Four significant modified bridges are:

- Knapsack Viaduct, Lapstone, NSW
  - 1863 – 1867 design by John Whitton (NSW Railways);
  - Original use was to carry the Western Railway Line across Knapsack Gully on the Zig Zag Railway;
  - Railway use of the bridge ended in 1913, adapted to road use in 1926 and finally converted to bicycle and pedestrian use after 1993;
  - Originally comprised of a timber deck on dressed sandstone piers and arches, the timber was replaced with a reinforced concrete deck in 1939;
  - The concrete deck was designed to be aesthetically sympathetic to the structure;
  - Possesses historical, associative, aesthetic and technical significance;
  - It is considered to be highly intact and of state significance (RMS s170 Register Item Number 4301012).

- Bolinda Creek Road Bridge, Bolinda, VIC
  - 1867 designed by Shire of Springfield engineer Morgan and built by Burnley and Ramsden;
  - Originally built with a bluestone masonry substructure and timber deck, the bridge has three spans of 6.17 metres (22 feet) outer spans and a central span of 8.84 metres (29 feet).
  - The deck and girders were replace with a concrete deck in 1924, designed, by T Ewing, to be aesthetically sympathetic to the original form;
  - Original timber side railings were replaced by concrete post and pipe rails in the 1920s, which were in turn replaced by the current side barrier railings of rectangular steel top and bottom tube with welded vertical bars;
  - Widened in 1966 to accommodate increased traffic loads;
  - Possesses technical, historical, social and aesthetic significance at a state level;
  - Its intactness from 1966 contributes to its significance.

    (Data from Biosis Research (G. Vines) National Trust of Victoria Classification Report for "Bolinda Creek Road Bridge" National Trust Brides Database Reg. No. 8415; VicRoads Structure ID: SN6110; Municipal Heritage Overlay: 159; RNE: 000540).

- Taradale Bridge, Taradale VIC
  - c 1867 built as a stone and timber beam bridge;
  - Reconstructed in 1915 using concrete girders;
  - Reinforced concrete slab overlay was installed in 1989;
  - Now comprises of brick, bluestone wall abutments and central pier with two spans of reinforced concrete T girders;
  - The steel ARMCO barrier currently in place probably replaced the 1915 steel pipe handrails;
  - Possesses technical, historical, social and aesthetic significance at a regional level.
    (Data from Biosis Research (G. Vines) National Trust of Victoria Classification Report for "Taradale Bridge" National Trust Bridges Database Reg. No. 7059; VicRoads Structure ID: SN0168).

- Hawkesbury River Bridge, Windsor, NSW (Windsor Bridge)
  - The subject bridge
  - 1874 design by the Public Works Department
  - Modified in 1897 by raising the deck 8 feet (2.4 metres) and again in 1922 with the replacement of the timber deck with a reinforced concrete beam deck and girders over the existing cast iron piers;
  - The concrete deck was designed to be aesthetically sympathetic to the structure and was described as having a "unique" design with respect to the way in which it was built (refer Section 5.0 Bridge History).
  - Concrete added to cross-bracing in the 1940s to further strengthen;
  - Built to withstand flood waters passing over it, and adapted to deal with increased road-user demands;
  - Possesses historical, aesthetic/technical, social and research significance;
  - RMS s170 register as State significant Item Number 4309589;
  - *Hawkesbury LEP 2012* as an item of local significance.

6.5.9 Discussion

Assessment of the rarity or otherwise of the Windsor Bridge has to be understood in terms of both its individual components and the combination of those components as it is not the structure that was built in 1874, but is a palimpsest of evolving bridge technology and design. Comparison to the Knapsack Viaduct and the Bolina and Taradale bridges may be misleading because these three bridges represent a construction technique of masonry and brick that fits in better with a common aesthetic. The skill that has gone into the masonry abutments and piers of the other bridges may appear to diminish the aesthetic and technical appeal of the Windsor Bridge because they appear grander and in keeping with the commonly held belief that aesthetic values translate simply to beautiful; "beautiful" can have a restricted meaning. The issue however, is about how rare the Windsor Bridge was when it was first built and how rare it is now.

Of the original bridge fabric, only the iron cylinders and cross-bracing survive; the deck of the bridge is now concrete beam and concrete has been added to the cross bracing. The original timber beam superstructure, including deck, and the collapsible hand rails, which were not commonly attached to low-level bridges, do not survive. Extra cylinders were added in 1894 to raise the height. The bridge is a composite of several phases of work.

The use of iron cylinders for the piers and cross-bracing was more representative of construction methods reserved for the railways; the timber deck, whilst simple, responded to the budgetary constraints and the environmental conditions of the Hawkesbury. Iron piers are rare in a bridge constructed for road traffic. Windsor Bridge was deliberately designed to be submerged during heavy flooding in order to preserve its structural integrity. Had it been constructed wholly of timber, it would not have survived so long; of masonry, the cost would have been high as the design would have had to have been a single span. The complex technology used in the piers combined with the simple technology of timber beam was a clear decision to create a bridge that would last and respond to its specific environmental conditions. It was also an economic response as it kept costs low by using

short span timber beams/stringers. It still required substantial cast iron cylinder piers, and more of them, but fewer piers would have meant longer spans, which would have in turn have required more complex truss spans, or deep girders which would have presented a greater obstacle to floods, and so would have had to be elevated above flood level. The decision to build a low-level bridge was shown, in time, to have been inadequate, and moneys were spent coming out of the 1890s recession to rectify the problem.

The use of reinforced concrete beams for the deck in 1922 is considered to be an early use of the material despite the experimental designs in the late nineteenth century. Only a relatively small number (nine) of reinforced concrete bridges dating to prior to 1922 survive in NSW; and even fewer on substantial historic crossings such as Windsor. The construction technique of building the girder on the river bank and moving them into position was an innovative way to keep traffic flowing in one lane while the other was being raised; this aspect of the program was considered at the time to be unique (WRG Friday 20 January 1922.)

Another bridge built to the original design of the Windsor Bridge (that is, closely spaced large diameter cast iron cylinder piers with timber beam spans) was not located during research for this document. Windsor Bridge is the only example of a bridge which was originally comprised of combined large diameter cast iron cylinder column in combination with timber beam spans (today still evident in close spacing of piers). It is one of only three large low level flood bridges, intended to be submersed in floods, rather than stand above the normal high flood level.

The only other road bridges with large diameter cast iron cylinder piers are the group of lift bridges on the Darling and Murray Rivers, also Murrumbidgee and probably some other large rivers. But these are generally associated with large truss spans.

Comparison to three other modified bridges that retain significance despite substantial changes supports the continued significance of the Windsor Bridge. Modifications to all four bridges were made to be sympathetic to the original form of the structure while accommodating growing traffic requirements. In addition, modifications and improvements made to the bridge and its approaches demonstrate its historical importance with respect to the relationship of the northern and southern banks and the communities on both sides. The historical evidence for the circumstances of its construction and opening also demonstrate the importance to the community of this infrastructure.

6.5.10 Conclusion

The Windsor Bridge is considered to be a rare item, within the state, relating to its initial construction, its subsequent modifications and survival. Its composition of iron cylinder piers is extremely rare in a bridge built only for road traffic. In combination with timber beam spans, it is unique. The original form survives, with replacement of the superstructure with concrete, in the closely spaced piers, and low profile beam/deck combination.

6.6 Summary of the Visual Assessment

6.6.1 Introduction

The visual setting of a place is a key component of its cultural significance. How items are viewed and how they relate to each other and to their landscape is also crucial to cultural significance and to maintaining a sense of place. A detailed visual analysis of the study area has been conducted for the purposes of this report and is included as Appendix 1. In addition to the visual assessment in this report, the report prepared for the Urban Design components of the project (Spackman Mossop and Michaels 2012 with Hill Thalis Architecture + Urban Projects) also contains a visual assessment. The two assessments are complementary but not identical in purpose; the purpose of the visual assessment in this report is specifically aimed at identifying historic views, vistas and settings that persist to this day.

In order to understand the visual setting of the study area, the analysis in Appendix 1 focuses on two aspects. Firstly, a search was made of publicly accessible archives for historical images of the project area (pictorial and photographic). Fifty-seven images are included in Appendix 1 (Section 2.0) dating from as early as 1807 through to 1959. The aim was to compare historic views and vistas that were photographed or painted with existing views and vistas. This comparison was undertaken to identify enduring views that have become part familiar or recognisable.

Secondly, as part of the site surveys conducted for this report, an analysis has been made of current views and vistas within the study area.

The following section provides a summary of the results of the visual analysis in Appendix 1. This information is used to address the issue of potential impacts of the project on the significant values of the study area.

Additional visual and urban design documents have been prepared to inform the current project. The RTA (now RMS) commissioned the NSW Government Architect's Office to prepare landscape and visual assessment for Bridge Options 1 and 6.[506] The aim of the GAO report was to provide preliminary assessment advice with respect to the two identified options.

6.6.2 Historically significant views

Views to Thompson Square have been recorded since 1807 to the present day; they include drawings, lithographs, watercolours and photographic images. More than half of the historic images of the study area are views from the north side of the river towards Thompson Square. In comparison just over a third of images look in the opposite direction from Thompson Square to the rural land on the northern river bank.

The distribution of images through time reflects the availability of cameras from the latter half of the nineteenth century with the earliest images at the start of the nineteenth century being illustrations. The continuity of Thompson Square, the bridge and the northern bank as photographic subjects demonstrates their popularity as a captured image; it would appear that views towards Windsor and the area around Thompson Square in particular, have been highly valued over time. The earliest images of Windsor included in Appendix 1 date from 1807[507] to 1813 (illustrations attributed to George William Evans and Philip Slaeger) and they attempt to convey the image of a new and picturesque township on the elevated banks of the river. As an important public space within the town and as a thoroughfare and meeting point for road and river traffic, it should be no surprise that Thompson Square and the area around it has been repeatedly used over time to represent the town of Windsor.

The images are consistent with the aesthetic of the nineteenth century landscape. The country has been tamed by removing the surrounding bushland; the surrounding countryside is placid with cultivated fields; the river can now be crossed safely (so the images imply) by way of a sturdy bridge; and the ordered pattern of buildings – and permanency – is visible from most angles.

It is evident in the historic images that once the bridge was built in 1874, it became a key landmark. The bridge features prominently in over two thirds of the images and in most of these images the bridge is not just a peripheral feature, but the central subject. It therefore appears the bridge has been viewed as a subject worthy of illustration and photography since it was constructed. The landmark quality of the bridge would appear to derive from both its picturesque nature, which is partly owed to its location, as well as its importance as a connector between Windsor and the west.

The images in Appendix 1 also chart important changes in the visual character of Thompson Square over two hundred years. It has evolved from an irregular open space around buildings to a well defined space around which buildings have been constructed. As well it has developed from an open ground largely cleared of all vegetation to a land-formed and landscaped place.

By the 1940s, the density of plantings, some of which appear to be self-seeded, had assumed an appearance not dissimilar to that present today, but contrasting considerably with the earlier images of Thompson Square from before the 1880s. Vegetation mapping undertaken by Spackman, Mossop and Michaels (SMM) identified three landmark specimens – a Bunya Pine (*Araucaria bidwillii*) and two Norfolk Island Pines (*Araucaria heterophylla)*. The large tree growing on the corner of Bridge and George Street in the upper parkland area is a large Silky Oak (*Grevillea robusta*), is thought to be an early planting and is now an old tree (SMM 2012: 46). It is possible that these trees are shown in the historic photographs of the square; however confirmation that these are the same trees is not possible from photographs alone.

[506] Government Architects Office 2009.
[507] An 1807 watercolour is available for viewing in the Small Picture File of the Mitchell Library but has not been reproduced in this report due to copyright restrictions.

6.6.3 Current views and vistas

The analysis of current views in Section 3.0 of Appendix 1 is divided into two sections and the current views and vistas are mapped at the end of Appendix 1.

The first section discusses views which have a largely external component; that is, looking either towards or from Thompson Square. The second section examines views largely contained within Thompson Square itself.

Views to and from Thompson Square

Opportunities which once existed for views to and from Thompson Square are now inhibited. In particular, the growth of vegetation along the river banks has restricted views and limited access to the foreshore. In particular, the northern bank of the river downstream of the bridge is not easily accessible; opportunities for views towards Thompson Square from this direction are now only possible from Wilberforce and Freemans Reach Roads.

Views within Thompson Square

Within Thompson Square there are limited views through gaps in the trees towards the bridge, the river and beyond. The points that provide the most open and panoramic views are from the high terrace in front of the Doctors House overlooking the river, and from the ridgeline looking down the corridor of Old Bridge Street towards the river. The terrace in front of the Doctors House is easily accessible, but the views down Old Bridge Street are mostly from within the road corridor.

Other important views within Thompson Square are from buildings on each side. The plantings within the Square restrict these views to some degree. Furthermore, the busy road through the middle of the Square and the poor pedestrian access from one side of the Square to the other makes it difficult to move through the Square and experience the different perspectives of the landscape.

6.6.4 Significant views through time

Some views to and from Thompson Square remain constant from the earliest depiction of the place. Views back to Thompson Square from Freemans Reach and to the north from the Doctors House are still possible, with few obvious changes to the landscape. A recurring element of significant views is the Hawkesbury River and its relationship to Thompson Square. The river was recognised early in the life of the settlement as being a vital link between Green Hills/Windsor and Sydney. As a substantial water course it was a visually prominent part of the landscape and integral to the choice for the settlement. As well as transportation, the river provided water for drinking and irrigation and frequent floods that were unanticipated by the new inhabitants. The visual curtilage however, has decreased through the increase in plantings within Thompson Square and along the river banks and restricted accessibility to the waterfront on the downstream side of the bridge.

One element which has remained visually prominent since it was constructed in the 1840s is the Doctors House. Whereas views to and from other significant buildings which frame Thompson Square, such as the Macquarie Arms Hotel and the Hawkesbury Museum, have progressively become obscured by vegetation, the prominent position of the Doctors House and its scale have combined to ensure that it has been a key visual element in views to and from Thompson Square throughout the period examined. The Doctors House is often framed with the Windsor Bridge in the foreground or adjacent.

Views across the parkland areas from buildings are also important as the visual connection, albeit through the trees, is important to the appreciation the relationship of the buildings to each other and the square that they address. Views are clearer from the upper parkland area to the buildings on Thompson Square road and George Street but they are also still possible to and from Old Bridge Street, again through the trees. The realignment of Bridge Street descends into a cutting, inadvertently lowering vehicles from view as they travel to the bridge.

Since its construction, the existing bridge over the Hawkesbury at Windsor has also played a prominent role in many depictions of the town. As the earliest crossing of the Hawkesbury River and in a prominent location in a particularly sensitive historic precinct, the bridge is an integral part of the visual identity of the place, and while it can be argued that the landform and location forced the most common depictions, and the fact of a new settlement in the colony was impetus to capture it in some form, those views, vistas and scenes have become iconic. The relatively instantaneous results from

photography, as opposed to time consuming manual depictions such as paintings, made capturing images of Windsor easier and faster; the picturesqueness of the place invited the activity.

The setting of Thompson Square and the surrounding area has changed gradually with the most prominent and intrusive change being construction of the existing road to the bridge in 1934 although its depth makes it unobtrusive from many angles. Vegetation growth has also narrowed or closed off previous well-established vistas.

A setting such as this is rare in an increasingly urbanised environment where constant "improvements" are made to commercial and residential precincts. Rarer still, is the survival of such an early and legible historic landscape within the confines of the greater Sydney region. Compare Windsor to Sydney where connections to the early historic past of the colony are either obscured or removed by the consequences of economic growth. Parramatta Park is an obvious exception as it retains some of its traditional internal visual and historic relationships. Parramatta Park is also an exemplary landscape because of its size and its original official purpose.

In summary, the significant historical views that are still accessible in some way are:

- Views from close to the corner of Freemans Reach Road and Wilberforce Road back to Thompson Square. These include the Windsor Bridge and the Doctors House as prominent features.
- Views from Wilberforce Road sweeping across Thompson Square but obscured by vegetation on the riverbanks.
- Views from the Doctors House to the north east taking in the Windsor Bridge, the Hawkesbury River and the country side on the north bank including Bridgeview.
- The view from the George Street ridge down Old Bridge Street and directly across the Hawkesbury River to the north bank and Bridgeview.
- Views across Thompson Square are still possible as glimpses through vegetation.

6.7 Comparative Analysis - Thompson Square

6.7.1 Introduction

The following comparative analysis of Thompson Square has been undertaken to inform an assessment of its cultural heritage significance (Sections 8.6.1 and 8.8.1 of this report). This comparative analysis is particularly important for assessing whether Thompson Square is rare or representative of a particular class or type of culturally significant place (NSW Heritage Assessment criteria F and G). This is indicated through the comparison of Thompson Square with other similar places. The relative significance of these places (local, State or National) will also help to determine the relative significance of Thompson Square.

6.7.2 Identifying Comparable Places

Methodology

Identifying places to compare to Thompson Square relies firstly upon identifying the key characteristics of Thompson Square as an historic place and the key themes in its historical development. A succinct description of Thompson Square and its historical development is provided below. The next step is to identify places that share similar origins and similar historical themes. This step has relied on the consultants' general knowledge on the one hand combined with a search of heritage item registers and databases, specifically the Australian Heritage Database and the NSW Heritage Inventory. The comparable places identified are then succinctly described and compared to Thompson Square with note being taken of their assessed level of significance.

Given the limitations of the current report, it is not possible to undertake detailed research on each of the comparable places. This comparative analysis has therefore relied upon existing heritage item assessments and readily available secondary sources.

Description of Thompson Square

The public space which eventually became Thompson Square began to take shape from as early as 1795 when the settlement at Green Hills was founded. This was the centre of activity at Green Hills

where access to and from the Hawkesbury River was concentrated, where government buildings were erected, and where the business of the settlement was conducted. In this earliest phase the space which became Thompson Square developed informally - an organic growth generated by the activity taking place in and around the nucleus of the Green Hills settlement.

Under orders from Governor Macquarie in 1810 the Green Hills settlement became the Town of Windsor and a regular street grid was planned extending southwest from the existing village. A large block within the new town was set aside as a reserved square (now McQuade Park), but the area where public activity took place, was also retained, named and formalised by Governor Macquarie into Thompson Square. For the time being it continued to be the focus of government activity and of commerce at Windsor.

During the course of the nineteenth century the focus of mercantile activity at Windsor extended from Thompson Square to the town, particularly along the length of George Street, and by 1861 the last of the government buildings adjoining Thompson Square had been demolished. Thompson Square however remained an important thoroughfare for traffic and trade to, from and across the Hawkesbury River, a role augmented in 1874 with the construction of the Windsor Bridge. Many of the buildings surrounding the square remained open as inns and hotels; some of the buildings operated variously as schools and hospitals and the School of Arts building was completed and opened in 1861. In the 1880s efforts were finally made to landscape Thompson Square with the addition of tree plantings, post and rail fencing and a rotunda. This park-like use of the space within Thompson Square has largely continued to the present day, as has its use as a thoroughfare for traffic crossing the Hawkesbury River – a use which has increasingly sat uneasily with the public amenity of Thompson Square ever since the road was diverted to cut through the middle of the Square in 1934.

The square experienced periods of neglect with two periods identified in the historical analysis: the first being during the 1890s where it was considered that Thompson Square had turned into a place that was used "for no other purpose that a resting place for inebriated Aboriginals and tramps" (page 100); the second period of neglect was reported in the 1930s (page 111). It is interesting to note that both of these periods occurred during severe economic depressions so the neglect of the place may be more than simply a shift in focus to other places in Windsor but a shift in economic priorities.

Characteristics of Thompson Square

Thompson Square is a product of over 200 years of activity and this is reflected in the multiple layers which make up the physical fabric and space of this place. The sequence of historic buildings which surround the Square, from the Macquarie period Macquarie Arms Hotel (1815), to the fine Regency style "Doctors House" terrace (1844), to humbler late Victorian cottages, together form a multi-layered historical setting. The bridge, remnants of wharves, remnants of early road alignments, the marks of great floods, all further suggest that Thompson Square is not a relic, frozen in time, of the earliest days of settlement but a canvas upon which Windsor's story is drawn.

The description above of Thompson Square and its historical development highlights key historical themes and features. There is the multilayered history of Thompson Square which is in turn reflected in the physical fabric of the place. There is the transition from an informal centre of public activity to an officially sanctioned one during the ambitious administration of Governor Macquarie. Then, whilst government and commercial activity subsequently expanded to other parts of Windsor, Thompson Square continued to be a thoroughfare for land and river transport and a gateway between Windsor and the farming lands north of the river. This aspect of Thompson Square continues to the present day. Thompson Square is also used for leisure and recreation. The historic character of Thompson Square is central to its public function today and of value to the businesses within the vicinity of the Square.

Characteristics which form the basis of this comparative analysis therefore include:

- A public space established in the early decades of colonial settlement;
- One which was established or formalised by Governor Macquarie;
- One which is still used for the same or similar purposes to when it was established;
- One which retains clear evidence of its historical development over time from the earliest phases to the present; and
- One which retains an historic character

Comparable Places

The following places reflect the above characteristics. They were selected on the basis of the consultants' own knowledge as well as searches on heritage registers using keywords such as:

- Square;
- Park;
- Place;
- Common;
- Parade;
- Precinct;
- Village; and
- The date range 1788 – 1822 (from first settlement to the year Governor Macquarie departed NSW)

The following places were identified and will be discussed in the following analysis:

- Macquarie Place, Sydney, NSW
- Hyde Park and Macquarie Street, Sydney, NSW
- McQuade Park, Windsor, NSW
- Richmond Park, Richmond, NSW
- Wilberforce Park, Richmond, NSW
- Bigge Park, Liverpool, NSW
- Parramatta Park, Parramatta, NSW

Other places were considered but not included in the final analysis because they did not meet each of the characteristics identified above, for example, other public squares or reserves were set aside by Governor Macquarie at Castlereagh, Bathurst, and Newcastle, but these were either never formalised (such as at Castlereagh) or have been largely modified to the point where it is difficult to tell their original function is difficult to read (such as at Bathurst and Newcastle). Bigge Park at Liverpool is one such planned park that has been included in this comparison to demonstrate the significant changes it has undergone, which have affected its setting and significance.

Other places considered but not included in this analysis are Argyle Place at Millers Point, the Kingston and Arthurs Vale Historic Area on Norfolk Island, and Arthurs Circus at Battery Point, Tasmania. Argyle Place, though similar in some ways in character and ambience to Thompson Square, was not established until at least the 1830s. Similarly, Arthurs Circus was not established until the 1840s. On Norfolk Island, a settlement was first established in 1788 but the exceptional early colonial buildings and ruins date to the second settlement established in 1825, the penal and military nature of which contrasts starkly with Thompson Square.

6.7.3 Macquarie Place, Sydney

Macquarie Place (

Plate 87) is situated in Sydney CBD within a block from Circular Quay on the corner of Bridge and Loftus Streets. It is a roughly triangular shaped public space the main features of which are an obelisk erected 1816-1818, remnants of a dwarf stone wall from around the same time plus a series of later civic improvements including a statue to Thomas Sutcliffe Mort (1883), an underground men's toilet (1907), two cannons from HMS *Sirius* (relocated in 1907), and plane trees planted by the Queen and Duke of Edinburgh in 1954. The obelisk, erected by order of Governor Macquarie and designed by Francis Greenway, marked the central point in Sydney from which all road distances were to be measured.

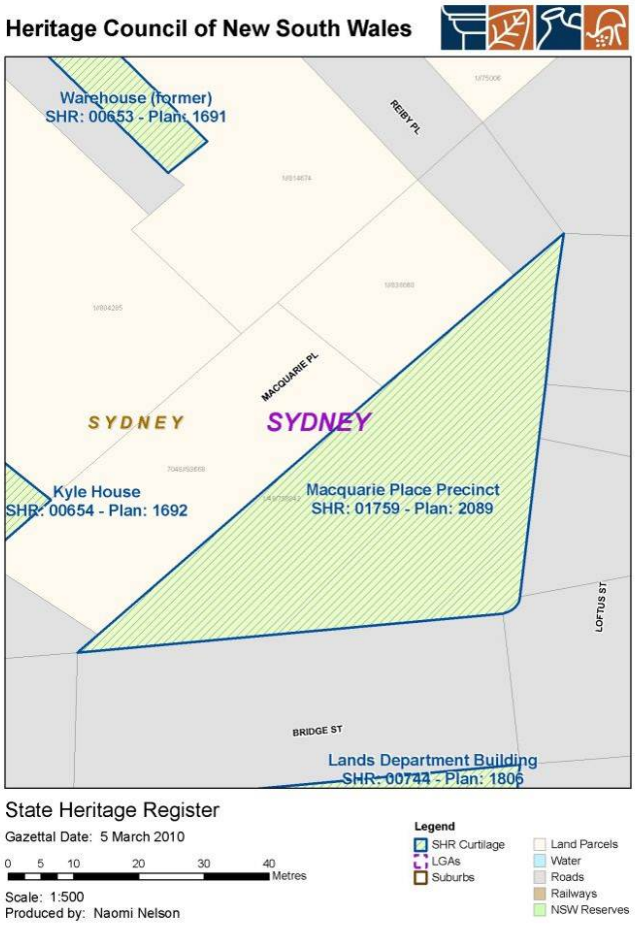

Plate 87: Location and curtilage of the SHR listed Macquarie Place Precinct[508]

[508] SHR Item 01759, Heritage Council of NSW.

Like Thompson Square, Macquarie Place was likely to have had some sort of informal presence as a public thoroughfare and meeting place from as early as the 1790s, even though it was designated as part of a town allotment. The triangular shape of Macquarie Place (subsequently reduced) was formed by the intersection of roads leading to and from First Government House, the Tank Stream, and the foreshore and government wharf at Circular Quay. In 1810 Governor Macquarie formally set aside Macquarie Place as a public square, putting in place a landscaping program and clearing away unregulated buildings. This process is very similar to that which occurred at Thompson Square.

Subsequent changes to Macquarie Place and its environs have been more extensive than those which have taken place at Thomson Square. The construction of Loftus Street in particular considerably reduced the size of Macquarie Place and the obelisk was moved. Furthermore all early colonial buildings which once surrounded Macquarie Place have long disappeared and the setting is dominated by CBD development. The importance of the position Macquarie Place once held in Sydney is now difficult to appreciate.

Macquarie Place, like Thompson Square, is multi-layered and contains tangible links to successive phases in its past. Macquarie Place is a remnant of an important civic space but its context has been largely removed and its aesthetic appeal compromised. Nevertheless, Macquarie Place has significant historical associations, tangible and intangible, which extend to the very earliest years of settlement and it is listed on the State Heritage Register (SHR Item 01759).

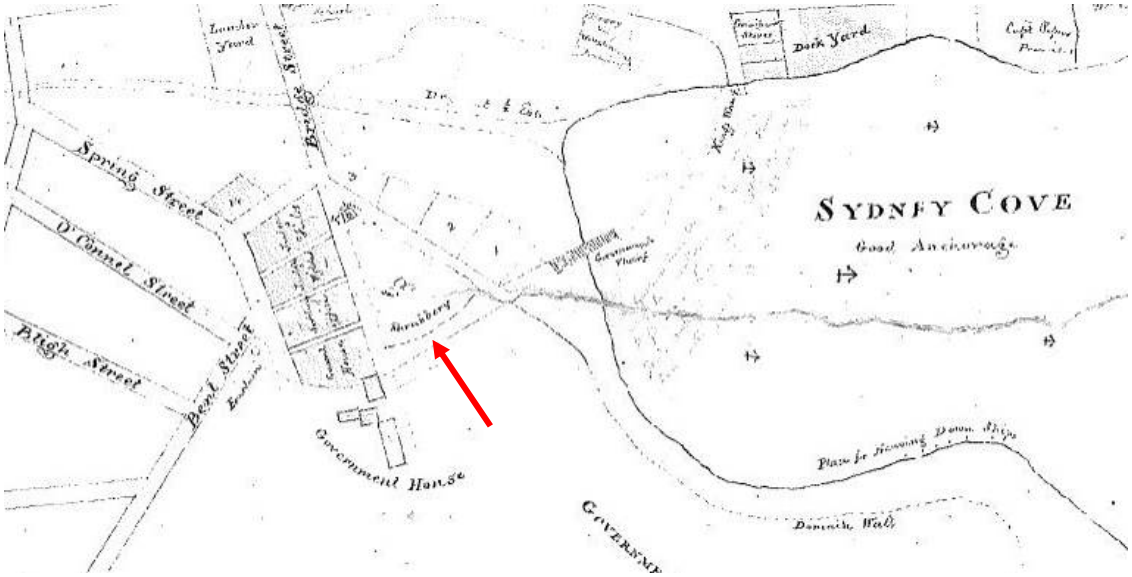

Plate 88: 'A Sketch of the Town of Sydney', c.1821. Macquarie Place indicated by arrow.[509]

6.7.4 Hyde Park and Macquarie Street, Sydney

Hyde Park is situated on the southeast edge of Sydney CBD. It occupies a ridgeline which runs north-south on the east side of the peninsula on which Sydney was founded. Macquarie Street runs along this ridgeline, linking what was once the Governors Domain to the north with Hyde Park.

Hyde Park was situated on the edge of the early settlement at Sydney Cove. In the first two decades of settlement, the area of Hyde Park became known as "The Common". Grazing and timber getting was freely available in contrast to the Governors Domain further north to which access was restricted. The first recorded cricket match in Australia was played at Hyde Park in 1803.

Hyde Park was formally declared and named in 1810 by Governor Macquarie and Australia's first horse race took place here shortly after. The park was fenced and the following year Governor Macquarie moved to restrict grazing and traffic across the park. By the end of Macquarie's term in 1822 Hyde Park and the adjoining Macquarie Street precinct of buildings was starting to take shape. Within Hyde Park the race course had been defined and the park was fenced. The General Hospital (two wings of which survive as The Mint building and Parliament House) and the Hyde Park Barracks had been completed, and St James Church and the Court House (now part of the Supreme Court Complex) were both under construction. The contrast seen in this precinct as it was before Macquarie

[509] SL NSW M4 811.16/1821?/ in, Jack 2010: 144-145

and then at the end of his governorship is clearly seen in plans of Sydney from before and after (Plate 90).

From the 1820s onwards, sports continued to be an important feature of Hyde Park, especially horse races and cricket. Military drills and parades were also held there. In the 1830s Park and Macquarie Streets were extended through Hyde Park and the first major planting scheme commenced (to be followed by many more). The Macquarie Street extension was later closed in 1851.

Over time the active sports aspect of Hyde Park diminished and from the 1850s onwards passive recreation became predominant. Park committees were established and successive plantings schemes implemented. The construction of memorials (statues and fountains) within the park also became a feature. Hyde Park has continued to evolve, reflecting different phases in landscape gardening and city park functions, but its use is consistent with that envisaged by Governor Macquarie when deciding it would no longer be a common but a park for the city's settlers.

While Hyde Park was evolving, so too were the buildings at the south end of Macquarie Street which had been built or erected by Macquarie. St James Church has continued without a change of use, and the old court house is still part of the courts complex, but the Hyde Park Barracks and General Hospital have been adapted to suit different official functions. The space between these buildings has also been modified over time, but it has remained an important thoroughfare and public space framed by Macquarie period buildings on one side and by the open space of Hyde Park on the other.

The scale of Hyde Park and the government precinct at the south end of Macquarie Street is considerably different to Thompson Square at Windsor. The former is at the heart of a colonial capital; the latter within a semi-rural town. But there are underlying characteristics which are shared. Like Thompson Square, Hyde Park was already being used as a public space during the first two decades of European settlement. Both were then identified by Macquarie as officially designated public spaces and improvements to both began under Governor Macquarie's orders. Both are multi-layered and physically demonstrate successive historical phases, whilst retaining evidence of their early foundation. The Macquarie period buildings which frame the public space at the south end of Macquarie Street and north end of Hyde Park can be paralleled, on a reduced scale, to the Macquarie Arms Hotel which frames a corner of Thompson Square. Both precincts demonstrate a remarkable continuity of purpose, and have grown and developed consistent with Macquarie's vision. The significance of Hyde Park and the Macquarie period buildings is reflected in the fact that each is a State significant item listed on the State Heritage Register.

Plate 89: Location of Hyde Park and associated Macquarie period buildings on Macquarie Street overlaid by a conjectural plan of Macquarie's rationalisation of Sydney's town plan. A: Hyde Park north. B: Macquarie Street. C: Hyde Park Barracks. D: St James Church. E: Old Court House.[510]

[510] Jack, 2010: 139.

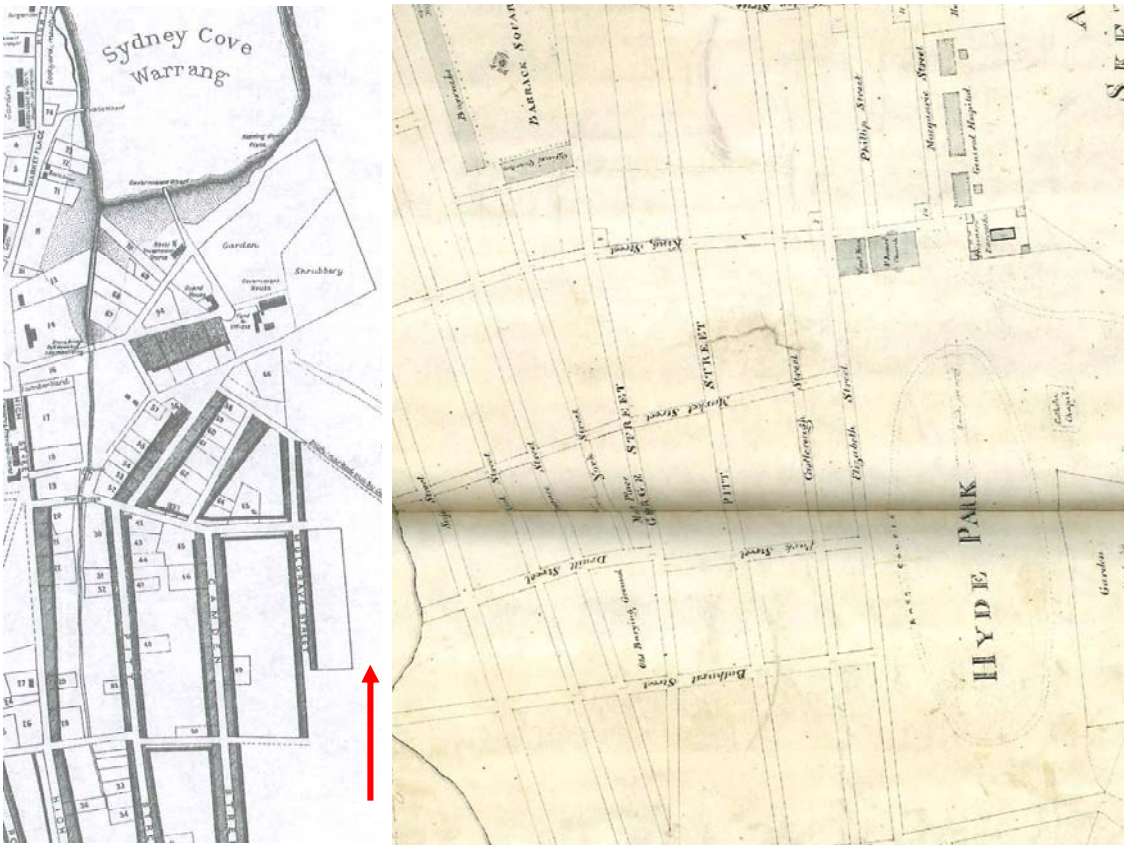

Plate 90: A comparison of Sydney before and then after Governor Macquarie. In the earlier plan from 1807 on the left, the area later to become Hyde Park (indicated by the arrow) and the government precinct along Macquarie Street have not been laid out. In contrast, the plan from around 1821 on the right shows Hyde Park and its race track laid out, and the government buildings (Barracks, St James Church, Court House, and General Hospital) built or under construction.[511]

6.7.5 McQuade Park, Windsor

McQuade Park is situated at the southwest end of Windsor town centre (Plate 91). It lies at the intersection of Windsor's main street (George Street) and the road to Richmond (Richmond Road). Unlike Thompson Square which was adapted from an existing space within the Green Hills village, McQuade Park was part of the new town proposed by Macquarie in 1810 which extended on a grid plan southwest of the existing village. McQuade Park was originally named the Great Square by Governor Macquarie.

McQuade Park in its evolving form has retained its public function. Today it is principally used for leisure, sports, the location for memorials commemorating war service and the history of the area, and home to club buildings (tennis and bowling) and the Country Women's Association. Cricket was being played in the park from as early as the Macquarie period and the use of the park as a sports field has been continuous since then. Unlike some other Macquarie town reserves (such as at Richmond), McQuade Park was not used for markets.

The northeast (Tebbutt Street) and southeast (George Street) edges of McQuade Park run along the original alignments, but the overall shape of the park does not match that proposed in the town plan endorsed by Governor Macquarie in 1812. From early in the history of the park changes were made to accommodate the property rights and interests of existing landowners. The northwest limit of the park reserve was also limited by the building of St Matthew's Church (1817-1820), manse (1822) and cemetery (1810 onwards). The park largely assumed its present shape by 1827. It was fenced in 1872 and in 1874 a significant program of landscaping works commenced. In 1891 the cricket oval was levelled and formed. The built elements (grandstand, club buildings, memorials) are twentieth century additions.

[511] Jack, 2010: 142; 144.

McQuade Park is of recognised State significance and is listed on the State Heritage Register (SHR Item 01851). Like Thompson Square and Macquarie Place, McQuade Park is multi-layered and has many aspects to its significance. The use of the park for leisure and recreation has been remarkably consistent since it was established under Governor Macquarie. The shape of the park partly reflects the original plan but also early changes which were made by 1827. It also provides an important setting for the highly significant Macquarie period buildings of St Matthew's Church and manse. McQuade Park has, like Thompson Square, exhibited remarkable continuity of use.

Plate 91: Location and Curtilage of the SHR listed McQuade Park[512]

[512] SHR Item 01851, Heritage Council of NSW.

Plate 92: Recreation of the town plan endorsed by Macquarie in 1812 overlaid on a current aerial photograph. The planned "Great Square" is indicated by arrow.[513]

6.7.6 Richmond Park, Richmond

Richmond Park is situated in the heart of Richmond town centre (Plate 93). It lies between the two parallel main roads of Windsor Street (the road to and from Windsor) and March Street (the road to the Nepean River and North Richmond). Unlike Windsor which developed from the Green Hills settlement, Richmond was an entirely new town when it was proclaimed by Governor Macquarie in 1810. Unlike Thompson Square and Macquarie Place, Richmond Park (like McQuade Park) was a "greenfield" site in 1810.

Richmond Park still defines the town centre of Richmond and is still the central leisure and sports ground within the town. Identified in 1810 by Macquarie as the site for Richmond's "Great Square", the park was set aside as a government reserve and the location for markets. As early as 1821 the northwest end of the reserve fronting West Market Street was isolated for civic purposes including a watch house and later police station, court house, School of Arts, and public school.

The use of the ground for cricket appears to have commenced very early whilst the importance of the reserve for markets is less clear. Up until the 1860s the park had been cleared of most of its vegetation but little appears to have been done to formalise the park. In the 1860s a landscaping program commenced which included levelling the park, and in 1868 the park was gazetted for the purposes of public recreation. In the 1870s plantings were made using trees supplied by the Royal Botanic Gardens in Sydney and some of these remain today.

Further augmentation of the park with an emphasis on formal landscaping and sports facilities has continued from this time onwards. Key features being the enclosure of the cricket pitch in 1882 and the building of the cricket pavilion 1883-1884. In the twentieth century, war memorials and other memorials have been added.

[513] Jack 2010: 36.

Richmond Park is also of recognised State significance and is listed on the State Heritage Register (SHR Item 01808). Like McQuade Park at Windsor the shape of the park reflects both Macquarie's original endorsed plan as well as changes made in the decade following. The shape of the park and its general function, similar to the function and use of McQuade Park, has remained consistent though evolving since at least the 1820s. Perhaps better than McQuade Park, the shape of Richmond Park strongly reflects the ideal grid layout of Macquarie's planned towns. Like each of the other parks and public spaces examined, Richmond Park is multi-layered. It shares much in common with McQuade Park in terms of its use and evolving recreational function.

Plate 93: Location and curtilage of the SHR listed Richmond Park[514]

[514] SHR Item 01808, Heritage Council of NSW.

Plate 94: Recreation of the original Richmond town plan overlaid on a current aerial photograph. The planned "Great Square" is indicated by the arrow.[515]

6.7.7 Wilberforce Park, Wilberforce

Like Richmond Park, the "Great Square" at Wilberforce occupied a central block at the heart of the new town declared by Governor Macquarie in 1810 and laid out on a grid pattern in the following years. Like Richmond, Wilberforce was an entirely new town, not an extension to an existing settlement and consequently Wilberforce Park was also a "greenfield" site.

Wilberforce Park was sited on sloping ground and therefore was not suitable for sports. Nor was it assigned for market purposes. Wilberforce did not develop into a town in the same manner as Windsor and Richmond, but nor did it share the fate of Castlereagh which failed to develop in the manner intended by Macquarie. The history of Wilberforce Park throughout the nineteenth century is not well documented and it is likely to have been left as partly cleared open ground traversed by tracks to and from houses, the river, and St John's Church, and open to grazing. In 1895 it was declared a recreation ground. Until 1906 there was no local government body responsible for the maintenance of the square.

In 1946 the Colo Shire Council considered either improving the park or selling the land and acquiring land more suitable for sports fields elsewhere. But the park was kept and some effort made at building cricket nets and a tennis court (both no longer present). A toilet block was also built and later removed. War memorials have been constructed since WWII and a children's playground, but on the whole the park has either been kept clear of structures or existing structures removed in order to retain it as an open recreational space.

Wilberforce Park is the most intact of the examples considered here in that is has retained its original size and shape as planned under Governor Macquarie, it is still used for a purpose consistent with its origin, and it is the least encumbered by later landscaping and building works. Unlike the other examples however, its context is very different. The setting of Wilberforce Park is suburban and it has

[515] Jack 2012: 48.

less intensity of activity. While all these sites are multi-layered, Wilberforce Park is relatively less layered, and its origins have been better preserved by way of the fact that Wilberforce did not develop as a town to a similar degree as the other examples in this report.

The significance of Wilberforce Park is reflected in its listing as a State significant site on the State Heritage Register (SHR Item 01868).

Plate 95: Location and curtilage of the SHR listed Wilberforce Park.[516]

[516] SHR Item 01868, Heritage Council of NSW.

Plate 96: Recreation of the original town plan for Wilberforce overlaid on a current aerial photograph. The planned "Great Square" indicated by arrow.[517]

6.7.8 Parramatta Park

Parramatta is the second town in the colony, deliberately chosen by government as a potential food bowl within manageable distance from the centre of the foundling colony. From 1788 Parramatta, originally called "Rose Hill" was a government farm with the associated government domain and military outpost. Governor Macquarie made his mark on Parramatta as just as he did with Sydney and was to do with Green Hills.

Of particular relevance to this analysis, the site of the Government Domain situated on the Parramatta River, with Government House at the end of George Street (intended to be a boulevard). During Macquarie's governorship, improvements were made that were true to his vision and the Government Domain was extended to the east by the removal of deteriorating convict huts. At first glance Parramatta Park is a comparable site at a larger scale but one of the main points of difference, is massive, as Parramatta Park was an intentionally laid out government domain, with landscaping and architecture that amplified the power of government; the site of Old Government House was chosen for its expansive views. It is not a square, nor does it contain a square that can be compared to Thompson Square. It was included in this analysis because it is one of the most obvious examples of a government domain that remains recognisable as such.

Parramatta Park no longer has a government presence but its significance in the development of the colony was officially recognised as a culturally significant site in 1978s when it was listed on the RNE and in 1989 when it had a Permanent Conservation Order placed on it. It was transferred to the SHR in 1999.

It has an exceptional level of significance for its historical and Aboriginal archaeological values that have the potential to yield information about pre-colonial life, landform modifications, early buildings and environmental conditions.

The site of Old Government House and Government Domain, Parramatta is on the National Heritage List (Place ID 105957) in addition to the Parramatta Park and Old Government House listing on the SHR (00596). Old Government House and the Government Domain are acknowledged as being

[517] Jack 2012: 60.

significant to the Nation of Australia for its historical, associative, representative and research (including archaeological) values.

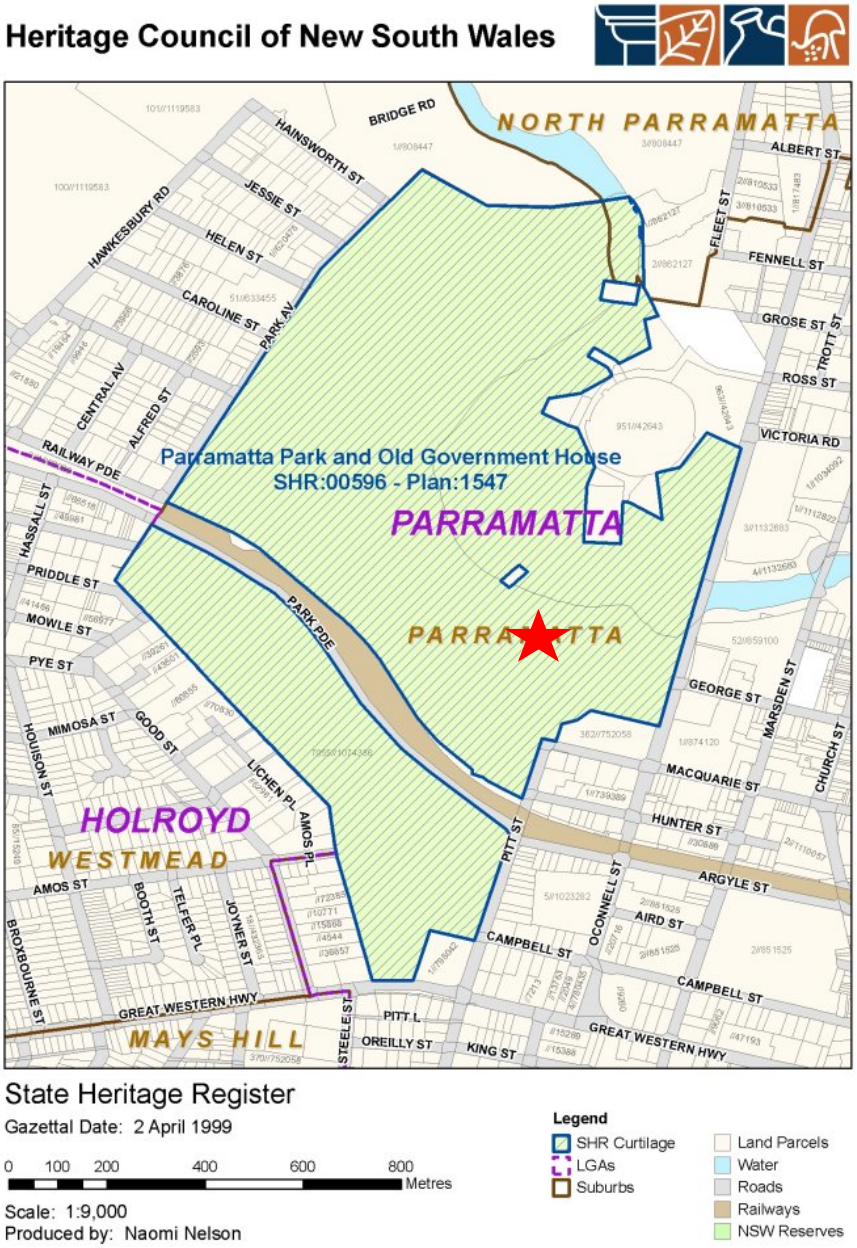

Plate 97: The legal plan of Parramatta Park as shown on the SHR. The approximate location of Old Government House is indicated by the red star.[518]

[518] SHR plan for listing number 00596.

6.7.9 Bigge Park, Liverpool

Liverpool is another place laid out by Governor Macquarie that has similarities with Windsor. Like Windsor, Liverpool had an established presence in the region. Farmers had taken up land to utilise the rich alluvial soils provided by the Georges River and Cabramatta Creek. The Georges River was also an important transport medium as were the Parramatta and Hawkesbury Rivers.

The survey of Liverpool commenced in early November 1810 by Surveyor James Meehan based on instruction given by Macquarie. The town was still being surveyed in 1814 and 1815. Liverpool, as with all of Macquarie's towns, was designed on an ordered street grid, with land for a square, church, burial ground, Parson's house, school and government reserve. A reserve was also laid out by the Georges River and next to that, land for the assistant surgeon (later the hospital). The town was slow to grow despite the early date for planning the town of Liverpool. The final plan was not presented to Macquarie until 1819.[519]

The two main civic spaces were to the west of the planned town and included land that was reserved adjacent to lands put aside for churches and a burial ground. A long square was also laid out by the river next to the wharf, the hospital and the government stores. The square was named after John Thomas Bigge, who arrived in NSW to assess the effectiveness of transportation[520], and who was critical of Macquarie's spending and his policies.

Today, the original reserve and glebe lands have been built over by a large shopping centre, with the burial ground remaining a park (Apex Park). Bigge Square is now Bigge Park and has been reduced considerably in size by the excision of the southern extent of the park for industrial uses and the railway line to the south east. Originally Bigge Square extended to Scott Street in the south, with the hospital grounds to the east, the river to the south east, Elizabeth Street to the north and Bigge Street to the west. The park is now bound to the south by and extension of the old Moore Street and to the east by College Street. The park has a number of playing fields constructed in the south east corner. Opposite Bigge Park on the east side of College Street is the former Liverpool Hospital (now TAFE building), which was begun by Francis Greenway under Governor Macquarie's instructions and built from 1822 to 1829 (plus later additions).

The significance of Bigge Park is recognised in its identification as a heritage item on the *Liverpool Local Environmental Plan 2008* heritage schedule. It has been assessed as being of State significance and it was recommended for SHR nomination in 2005, but it is not listed on the SHR.

Liverpool retains part of one of the original squares of Macquarie's 1810 instructions. The second reserve no longer exists. The description of Bigge Park in the SHI data sheet is of an urban park surrounded by "commercial premises, home units and the South Western Institute of TAFE".[521] In addition to the urban development on three sides, the relationship of the park to the river has been severed by the rail line to Liverpool.

Bigge Park is significant as a surviving open space set out by Governor Macquarie and provides a link to the early town. It has aesthetic and social significance and its continuity as a park in Liverpool is considered to be rare.[522] The situation of a significant 1820s government building, commenced under Macquarie's direction, opposite the park reinforces its early history, a situation comparable to the relationship between Thompson Square and the Macquarie Arms, McQuade Park and St Matthews Church and rectory, or Hyde Park and the Macquarie era buildings in Macquarie Street.

[519] Jack 2010: 19-20.
[520] Dictionary of Biography: Bigge, John Thomas.
[521] State Heritage Inventory Data base no. 1970025.
[522] State Heritage Inventory, Database Number: 1970025; entry from a now superseded LEP. Bigge Park is listed in the *Liverpool LEP 2008* as an individual item (82) and within the "Bigge Park Conservation Area".

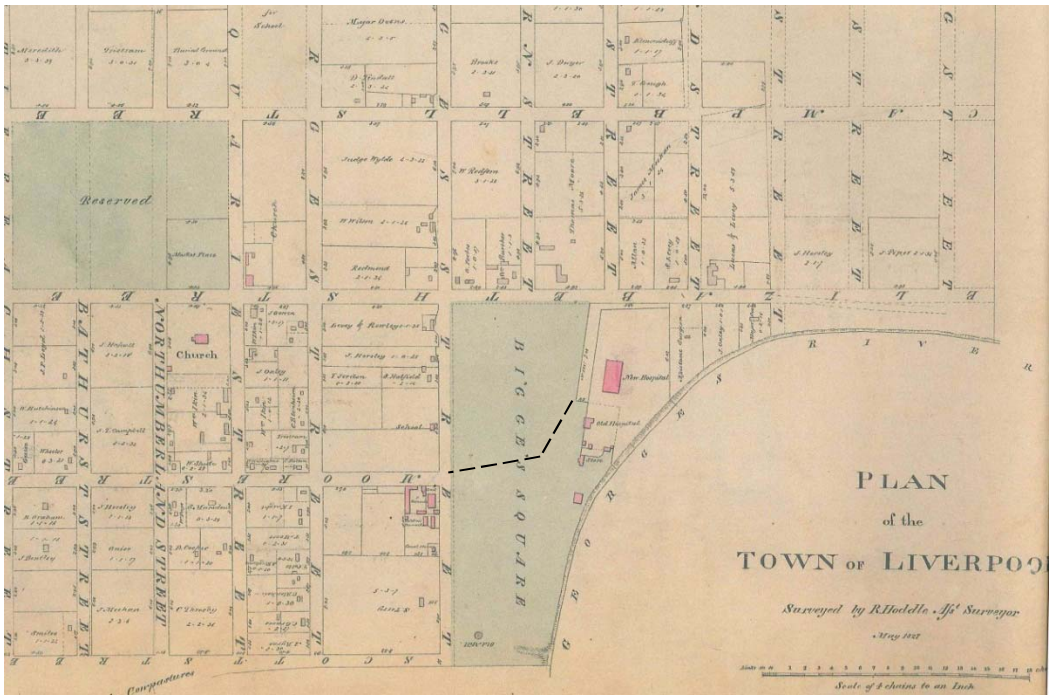

Plate 98: Detail of the Plan of the Town of Liverpool[523] showing the locations of the two open spaces and the extent of Bigge's Square. Compare these squares with a modern aerial photograph of Liverpool today. The black dashed line indicates the approximate extend of Bigge Park today, with the surviving parkland to the north.

Plate 99: Bigge Park is indicated by the red arrow. The early reserve set aside by Macquarie is now the site of a large shopping centre.[524]

[523] Jack 2012: 12.
[524] Aerial source: © Nearmap 2012

6.7.6 Discussion

When compared to other towns which were established or improved during Governor Macquarie's term in office, a distinguishing aspect of Thompson Square is that it was an adaptation of an existing, if informal, public space connected to a functioning settlement and outlying farms. Of the five Macquarie towns on the Hawkesbury-Nepean River, Windsor is the only new town to have incorporated an existing settlement with its civic space. In this sense it shares more in common with places such as Macquarie Place and Hyde Park in Sydney. Macquarie place developed from an informally created public space into an officially sanctioned and improved one. Hyde Park was utilised informally before Macquarie formalised its function, but its use was that of a common rather than a thoroughfare and place for conducting business. This is in contrast to "greenfield" sites such as the squares at Wilberforce and Richmond, McQuade Park at Windsor, and Bigge Park at Liverpool. Pitt Town, which would be an obvious choice to compare as it is also a Macquarie Hawkesbury town, has been omitted from this discussion because, unusually, Macquarie did not plan it with a square.[525] Pitt Town however, does share another similarity with Windsor in that the second and final location of the town is partially over land that was already in use, albeit as private farmland.[526] Pitt Town is also unusual in that Macquarie's first planned location failed and it was moved five years later in 1815.[527] As with all the surrounding agricultural towns, produce from Pitt Town was brought to Thompson Square for transportation to Sydney.

Like Macquarie Place and Hyde Park, Thompson Square also has an earlier phase and complexity which distinguishes it from McQuade Park and the parks at Richmond, Wilberforce and Liverpool. This time depth is shared by few places in NSW, with Sydney and Parramatta being the only settlements on mainland Australia which preceded the settlement at Green Hills. While there has certainly been change to each of these places, sometimes extensive like at Macquarie Place or subtle such as at Wilberforce, most of the places demonstrate a continuity of use for public purposes. In the case of Thompson Square, it has the added function of n a thoroughfare for traffic to, from and across the river since Green Hills was settled; this location was probably selected because it afforded access to the river.

In Parramatta, which has undergone extensive development, Parramatta Park has retained a highly significant landscape that encompasses a wide expanse of green space through which flows the Parramatta River and the oldest government house in the Nation. Although Parramatta Park is slightly reduced from its original size, it retains a strong sense of its original purpose, which was one of the seats of government power in the fledgling colony. The Government Domain in Windsor on the other hand, was considerably reduced in size during the colonial period and none of it survives now.

The most obvious point of difference between the two places is that the Government Domain in Parramatta was originally planned as a seat of power and was designed to reflect that. The visual affectations of power were never as prominent in Windsor as they were in Parramatta. Windsor's official residence was a modest timber cottage overlooking the Hawkesbury River. Unlike Parramatta, Green Hills was established by free settlers not long after Parramatta's status as a thriving town was confirmed. Nevertheless, as important as Windsor was to the colony, it remained a busy, but small, settlement on the edge of the Cumberland Plain, with a government presence to control activity.

Thompson Square also features, among its many layers, tangible physical remains from the Macquarie period in the form of the Macquarie Arms Inn (1815) and the brick wall built wall beside it fronting Thompson Square. McQuade Park too is situated adjacent to St Matthew's Church and rectory, and Macquarie Place in Sydney features Francis Greenway's obelisk (1818) albeit moved from its original position. Bigge Park at Liverpool is situated opposite the former Liverpool Hospital (1822-1829), another Greenway building commenced under Macquarie's instructions. Hyde Park features, within its vicinity, the most significant group of Macquarie period buildings in the form of Hyde Park Barracks, St James Church, the Mint building (formerly hospital) and part of the Supreme Court complex. Bigge Park, Richmond Park and Wilberforce Park however do not feature any Macquarie period buildings within their setting.

Thompson Square has avoided some of the larger scale developments that have occurred in other historic centres in and around Sydney through Windsor's, until recently, location on the outskirts of the Sydney metropolitan area. Even with incremental change Thompson Square remains intact as an

[525] Jack 2010: 75.
[526] Jack 2010: 72.
[527] Jack 2010: 72.

open green space, retaining a connection to the river and the commercial section of town in a rare, historic setting.

Thompson Square is rare, but it also has characteristics that are representative of different historical processes and places. For example, the well preserved buildings around Thompson Square such as the Macquarie Arms Hotel (1815), the Doctors House (1844), the Hawkesbury Museum, which has functioned as an inn (1835), the two storey early villa at 10 Bridge Street (1856), or the 1860s cottage at 6 Bridge Street, are all fine representative examples of buildings of their period and respective styles. It is also representative of places where Macquarie instituted improvements (road making, drainage, landscaping) to existing public spaces.

6.7.10 Conclusion

In each of the places considered in this analysis there is a continuity of use. McQuade Park, Bigge Park, Richmond Park and Wilberforce Park share a similar story in terms of their origins and intended purpose. Hyde Park exhibits a similar story but on a much larger scale and Macquarie Place has had its setting significantly affected by the surrounding urban context. Thompson Square is distinguished by its overlapping role as a thoroughfare and gateway between Windsor, the Hawkesbury River, and the surrounding farmland. This aspect of Thompson Square is exceptional and goes right back to 1795 when the settlement at Green Hills took shape.

Other than Bigge Park, each place considered in this comparative analysis is listed on the State Heritage Register and Thompson Square is clearly of comparable State significance. Parramatta Park is also listed on the National Heritage Register. The values that are demonstrated by each of the examples either individually or in some combination are all expressed in Thompson Square. It has a time depth that goes back to the first decade of the colony; it was integral to the survival of the new colony; it has strong associative significance with Governor Macquarie and his plans to create planning order and it retains a setting that invites visual interpretation of its historic significance. Of the examples considered, only Macquarie Place and Hyde Park in Sydney have a similar time depth and development history to Thompson Square. Thompson Square, though changed and adapted to different needs over the last two hundred years, has suffered less disruption than Macquarie Place and Hyde Park but it also shares a similar history to Hyde Park and Macquarie Place on a different scale: one place was a civic and commercial centre of a distant settlement and the other two examples were in the centre of colonial government.

Parramatta Park does not have strong parallels with Thompson Square because although it retains many of its significant values to a higher degree, Thompson Square evolved from an informally used space with convenient access to the river and the Government Domain was an official government area from the start Even when Macquarie officially made the civic area at Green Hills a "square", it underwent changes that removed structures from the site – improvements were made by making the topography easier to traverse and the wharf and the drain were practical measures necessary to maintain its function. There were no expressions of government power obvious to the local population at Windsor. The pub on the corner is a more substantial building than the government cottage ever was.

The time depth present at Thompson Square is exceptional. Thompson Square has values that in some cases are shared with other sites in NSW but it also has values that are particular to the place. It is a rare survivor in a rapidly growing city, it has an aesthetic that links it to the past and retains an historic setting that has not changed dramatically since the mid-nineteenth century. It has research potential in the form or archaeological and archival resources that have a high potential to yield information about the earliest uses of the place and the expansion of the colony. It is also representative of the entrepreneurial spirit of the early settlers and the importance of the region as a food producing area for Sydney.

Thompson Square is both rare and representative and may surpass the State significant threshold where evidence of Green Hills survives.

6.8 Community Esteem

For the most part, Thompson Square has been a focus of community activities since its inception, but some periods of neglect where it does not appear to be connected to community life also exist. Generally however, it has also been the subject of community concern for quite some time.

The "official" significance of Thompson Square as a physical element of the town's colonial past was recognised first by the National Trust as early as 1975 and was protected by a Permanent Conservation Order under the *Heritage Act 1977* in 1982, which was transferred to the State Heritage Register listing in 1999. The impetus for official recognition was preparation for the town's Bicentennial celebrations, from which funds to improve the appearance of the Square were allocated. The Bicentennial funding assisted with renovations to the precinct to "*enhance this historic part of the town*" (refer to Section 4.14.16). The current feelings towards Thompson Square as a place of historical importance are expressed through the recognised heritage framework and the community's identification with the place.

The SHR listing for Thompson Square Precinct cites only “historical” and “aesthetic” values, and identifies it as “rare” in the overall significance assessment. Social values are not included in the listing (refer Section 3.2.3 for discussion of the listing). When the National Trust classified Thompson Square in 1975, the focus of the listing was on the fabric and aesthetic values of the Square and surrounding buildings. Social significance was not included.

A report commissioned by Hawkesbury City Council found that the cultural heritage of the region, which includes Aboriginal and historical heritage, is held in high esteem by the Hawkesbury community. The *Hawkesbury Cultural Plan 2006 - 2011* adopted by Council 30 May 2006 found that the residents of the region:

> *have a strong interest in conserving the Hawkesbury’s cultural and built heritage. This includes the area’s significant Indigenous heritage as represented by the Darug people, the traditional owners. The area also represents a direct link through history to Australia’s colonial past. The area has a high concentration of families with links to the area’s European settlement. This contributes to historic continuity and enhances the pride expressed by the community in the area’s rich and unique heritage*.
>
> (Hawkesbury City Council May 2006: 14-15).

A number of aspects of the Hawkesbury's natural and cultural setting, including the built reminders of patterns of settlement confirm the Hawkesbury as a "special place whose cultural heritage needs to be respected and valued" (Hawkesbury City Council May 2006: 15).

The *Hawkesbury Cultural Plan 2006 - 2011* does not specifically mention Thompson Square or Windsor Bridge as elements of the area's cultural significance; the report does not mention any specific sites or places. It is, however, logical to conclude that one of the oldest public spaces in Australia, and elements of that space form a direct link to the country's colonial past that the community holds in high esteem.

In 2009, the *Windsor Foreshore Parks Incorporating the Great River Walk Adopted Plan of Management*[528] (River Walk PoM) is specific to the foreshore areas of Windsor included in the Great River Walk. Thompson Square is included as a "well used town centre 'green square'…bordered by historically significant buildings…This square is part of the Thompson Square precinct and is listed as a State & National item of cultural significance [*sic*].

Recently a nomination to list Thompson Square on the National Heritage Register (NHL) was submitted to the Department of Sustainability, Environment, Water, Population and Communities. The NHL was established by the *Environmental Protection and Biodiversity Conservation Act 1999* as the Commonwealth Government’s key environmental legislation. Items that appear on the NHL include natural and cultural sites such as the Sydney Harbour Bridge (NSW), Cascades Female Factory, Tasmania, Brewarrina Aboriginal Fish Traps (Baiames Ggunnhu) (NSW), the Wet Tropics of QLD (also listed on the World Heritage List) and Shark Bay (WA – this is a natural heritage item that is also listed on the World Heritage List) to name a few. The inclusion of sites on the NHL is a rigorous process and difficult to secure as the threshold for listing is exceptionally high. The statement of

[528] Environmental Partnerships (NSW) Pty Ltd, 2009, for Hawkesbury City Council.

significance submitted to nominate Thompson Square for NH listing has been reproduced in Section 8.3.2 of this report.

(Refer http://www.environment.gov.au/heritage/places/national/index.html for government information on National Heritage Listings).

Regardless of the success of the Thompson Square nomination for National Heritage listing, it is in itself is a demonstration of the esteem that the place is held in.

Opposition to the project is clear: Banners hang from balconies overlooking Thompson Square (Plate 100), the local newspaper has published articles on the community's thoughts as well as sought opinion from a scholar who lives in the local area. RMS' "Have your say"[529] e-forum includes a large number of informed comments opposed to the project on heritage grounds. The Heritage Council is unequivocally opposed to the project for the "irrevocable" damage it will do to Windsor and Thompson Square (Letter dated 28/10/2011).

Rather telling of the social response to the project is the action website "Community Action for Windsor" (CAWB) website (http://cawb.weebly.com/). The website is a central location for information related to opposition of the proposed development and reports on RMS and consultant activities. CAWB have created a petition, which at 1 November 2012 had collected 11,200 signatures for the NSW Legislative Assembly and 800 for the Legislative Council. According to the website, by 29 June 2012, the petition for the Legislative Assembly had gathered another 1,800 signatures. The text of the petition is reproduced below:

PETITION

To the Honourable the Speaker and Members of the Legislative Assembly of New South Wales.

The Petition of certain citizens and residents of New South Wales and others bring to the attention of the House that: We are opposed to the approval of State significant infrastructure application SSI-4951, being the replacement of the existing Hawkesbury River Bridge (also known as Windsor Bridge) at Windsor, NSW and the upgrading of adjacent intersections and approach roads ***('the Application').*** *We oppose the Application and any modified version of the Application which involves the construction of a new bridge crossing at the Thompson Square precinct (also known as the Thompson Square Conservation Area) and/or diversion of through traffic into the Windsor town centre or the Thompson Square precinct. We oppose the Application on the grounds that it will have an irreversible, detrimental and unacceptable impact on the heritage, visual aspect and socio-economic nature of the historic Thompson Square precinct. Further, it will not solve the long-term traffic issues that it seeks to address. If approved, the Application will have a significant impact on Local, State and National heritage and tourist interests. The undersigned petitioners therefore ask the Legislative Assembly to question and/or oppose the Application and thoroughly investigate alternatives.*

A rally was organised by CAWB on 3 June 2012, to protest against the project. The rally was advertised as a "Public Rally to Save Thompson Square" and a number of speakers and a band were part of the proceedings. The keynote speaker was Mr Jack Mundey, a significant individual in the Green Bans conservation movement and an influential campaigner on a number of social and industrial issues. Other non-resident participants in the campaign to halt the project are the members of the Federation of Historical Societies Inc. The rally was attended by "hundreds" of people[530] but figures from elsewhere have not been obtained. The NSW (Labor Party) also spoke at the Rally, calling for more community consultation.

Community reaction to the project has been great and has been demonstrated by the displays of opposition through banners, the rally held in June 2012 and the comments on the RMS "Have your say" e-forum. The residents of Windsor and of the communities across the Hawkesbury would be acutely aware of their reliance on secure access across the river, having been blocked by floods on numerous occasions. It would not be accurate to describe opposition to the project solely to the expected agitation to change and development and the "not in my backyard" philosophy. CAWB has

[529] http://haveyoursay.nsw.gov.au/windsorbridge
[530] http://cawb.weebly.com/

proposed an alternative solution to a crossing of the Hawkesbury River (refer http://cawb.weebly.com/), which suggests the seriousness with which the search for a different crossing is viewed (the CAWB alternative has been only noted in this report and not assessed). It is clear that the social significance of the place far exceeds what would be expected in a local context. It is also clear that the local and broader community hold Thompson Square and the Windsor Bridge in high esteem.

The position of the National Trust of NSW is that the bridge should be located outside Thompson Square if possible.

Plate 100: The former Hawkesbury Stores (62-68 George Street) with banners protesting the Project. The photograph was taken in February 2012.