3.5 Barker's Mill, Jetty and Mill Pond 1825 to 1870s

3.5.1 Introduction

Barker's mill was a significant business on the 19th-century Darling Harbour waterfront and one of its biggest employers. The mill played a key role in the development of Sydney's food production and manufacturing industry. Its importance lies not only in being one of the earliest and most successful steam-powered flour mills in New South Wales, but also in its ownership and management by Thomas Barker. The mill was powered by the third imported steam engine in the colony; the first being at Dickson's mill to the south of Barker's, and the second at John Raines Darling Mills in Parramatta. During the late 1820s and 1830s Barker's mill was a successful and lucrative flour mill, processing grains from the hinterland and supplying flour to a rapidly growing Sydney population. Following changing economic conditions in the 1840s, the mill diversified into textile production.[1] Through the later 19th century, the mill complex was developed and adapted in response to both technological changes, business diversification, economy and market needs.

Thomas Barker owned and was closely involved with the mill until his death in the 1870s. Barker was not only a prominent manufacturer and engineer, but also a public figure and philanthropist in 19th-century Sydney. Barker arrived in Sydney in 1813 with his guardian John Dickson.[2] He began his engineering and manufacturing career as an apprentice in Dickson's flour mill. By the late 1820s, Barker had created greater competition in the milling industry with his construction of two windmills and the purchase of the newly built steam-powered flour mill just north of Dickson's. In conjunction with developing his mills, he acquired large acreages of land where he grazed sheep and cattle. In the mid 19th century he became involved and well-known in public affairs. He was one of the early promoters of railways, involved at board level in a number of banking institutions, a member of the Legislative Council, active in the promotion of education and among other appointments, was a council member of the Sydney College and a trustee of the Sydney Grammar School, he was a founder of the Destitute Children's Asylum and also a member of the Sydney Female Refuge Society.[3]

Previous archaeological investigations have recorded remains of Barker's mill. During the major redevelopment of Darling Harbour in the 1980s, a surviving section of the original 1820s stone wall of Barker's mill was dismantled and stored by the Darling Harbour Authority.[4] Excavations in 2004 for the Cross City Tunnel uncovered further buried remains of the mill building.[5] Sandstone footings, stone flagging, a water tank and a mill stone were among the remains recorded during these works.[6]

The site of Barker's mill complex (Area 9) as depicted on the 1865 plan is mostly outside the Darling Quarter site; except for a section of the southern corner of the yard (Figure 3.5.1). The mill complex was initially much larger, and included a mill pond, and a jetty and wharf area that provided access to the harbour (Figure 3.5.2). The Darling Quarter excavation uncovered archaeological remains of these early 19th-century components of the mill complex. The southern section of the mill yard and pond was excavated as two separate areas; Area 9 Mill Yard and Area 9 Mill Pond.[7] A section of the former jetty and wharf area was within the site, and was excavated as part of Area 6.[8]

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[1] Casey & Lowe 2006 Appendix 4: 9, History of Barker's Mill written by Rosemary Annable.

[2] Walsh 1966a.

[3] Walsh 1966a.

[4] Johnson & Parris 2008: 24.

[5] Undertaken by Casey & Lowe in 2004.

[6] Casey & Lowe 2006.

[7] Trench Reports by Harrop for Area 9 Mill Yard (Vol 2, Section 7.6) and Cryerhall for Area 9 Mill Pond (Vol 2, Section 7.7).

[8] See Area 6 Trench Report by Cryerhall et al (Vol 2, Section 7.2).

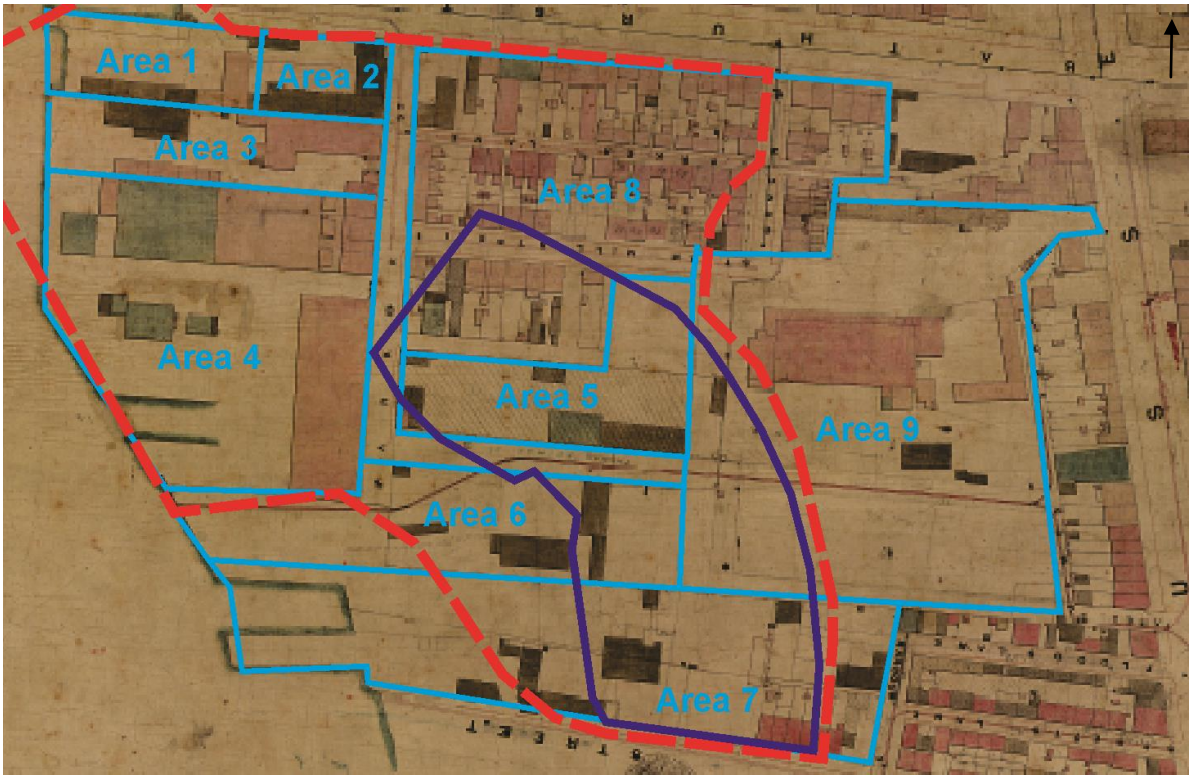

Figure 3.5.1: Barker's mill (Area 9) as illustrated on the 1865 plan. The mill and yard is mostly located outside the site (dashed red) and basement excavation (purple). City of Sydney Archives, C&L additions.

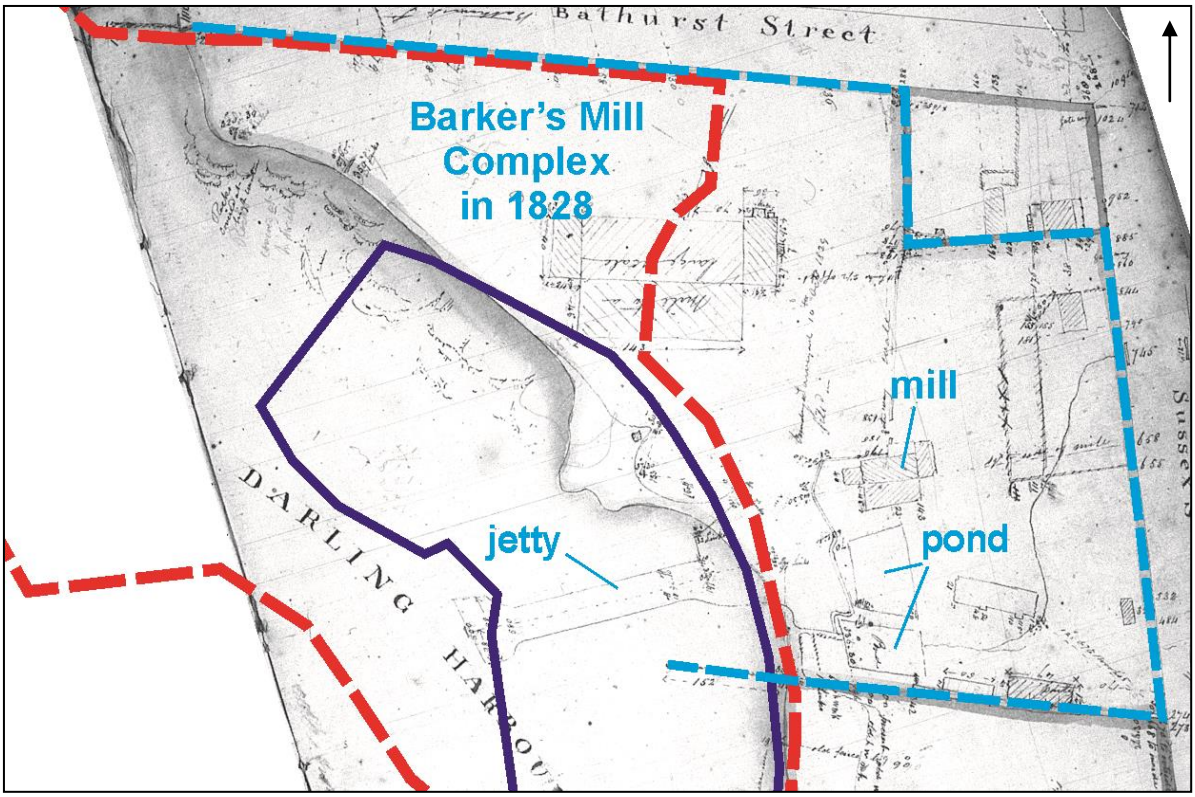

Figure 3.5.2: Barker's mill complex at the time of his purchase illustrated on Hallen's 1828 sketch. The sketch shows the locations of the mill building, ponds and jetty. The property boundary is indicated with the dashed blue line. The site is outlined in red and the basement excavation in purple. SRNSW Reel 2628, C&L additions.

Archaeological evidence of mid to late 19th-century changes to the mill complex was also recorded. In the 1840s, saltwater was drawn to the mill engines via a brick drain. Barker reclaimed land to the west and northwest of the mill, and as it was sold-off, a new boundary wall was constructed to delineate the mill yard from the adjoining developments. Also around the 1840s, measures were taken to manage excess water from the mill pond with the construction of an overflow drain and other flood management features. The mill pond did eventually become redundant and was backfilled by the 1860s as reticulated water became more widely available in the 1850s.[9]

The archaeological results associated with Barker's mill, jetty and mill pond are described in detail in the Area 9 Mill Yard Trench Report, Area 9 Mill Pond Trench Report and Area 6 Trench Report (Vol 2, Sections 7.6, 7.7 and 7.2 respectively). The detailed site plans for these areas are Plans 10.7 to 10.16, 10.38 to 10.44, 10.61 and 10.62 (Vol 4, Section 10).

3.5.2 1825 Mill Development by Cooper & Levey

Thomas Barker did not undertake the initial development and construction of the mill complex. The construction of the main mill building, mill pond, and associated wharf and jetty was undertaken as a joint venture by business partners Daniel Cooper and Solomon Levey. In 1825 Cooper & Levey purchased the large parcel of land between Brooks' allotment to the south and George Ramsay's to the north. Most of this original land grant (Area 9) is located to the east of the site (Figure 3.5.3). Within the site was a stretch of the original shoreline (part Area 9 and part Area 5) and associated intertidal sand flats (part Area 5 and part Area 6).

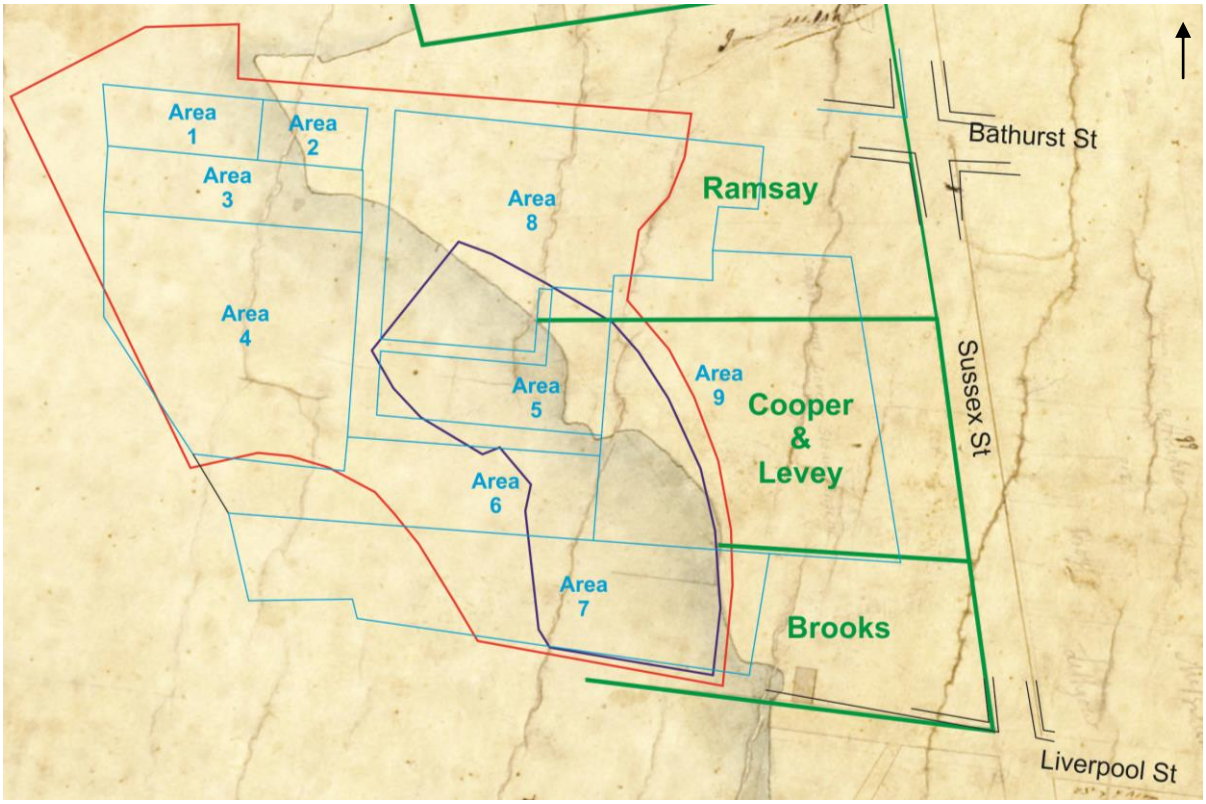

Figure 3.5.3: Cooper & Levey's original land acquisition in 1825 (green boundary) as recorded on Harper's 1822 plan with the site area divisions (blue lines) and the basement outline (purple) and site boundary (red). SRNSW with C&L additions.

[9] Aird 1961: 5-6.

Cooper & Levey were the first of the site's early grant holders to undertake extensive development of their waterfront allotment. To the east of the site and on *terra firma*, Cooper & Levey constructed the large five-storey sandstone mill building, and imported a steam engine to power the mill. A mill pond, or water reservoir, was constructed in the southern corner of the mill complex, close to the original shoreline (Figure 3.5.2, Figure 3.5.4). At the same time, the foreshore was transformed to provide wharfage and a jetty for the mill complex. The construction of the mill pond and the jetty involved substantial earthworks consisting of excavation for the mill pond and reclamation for the wharf leading to the jetty. This development appears to have been completed by mid 1827 when Thomas Barker purchased the mill and lands from Cooper & Levey.

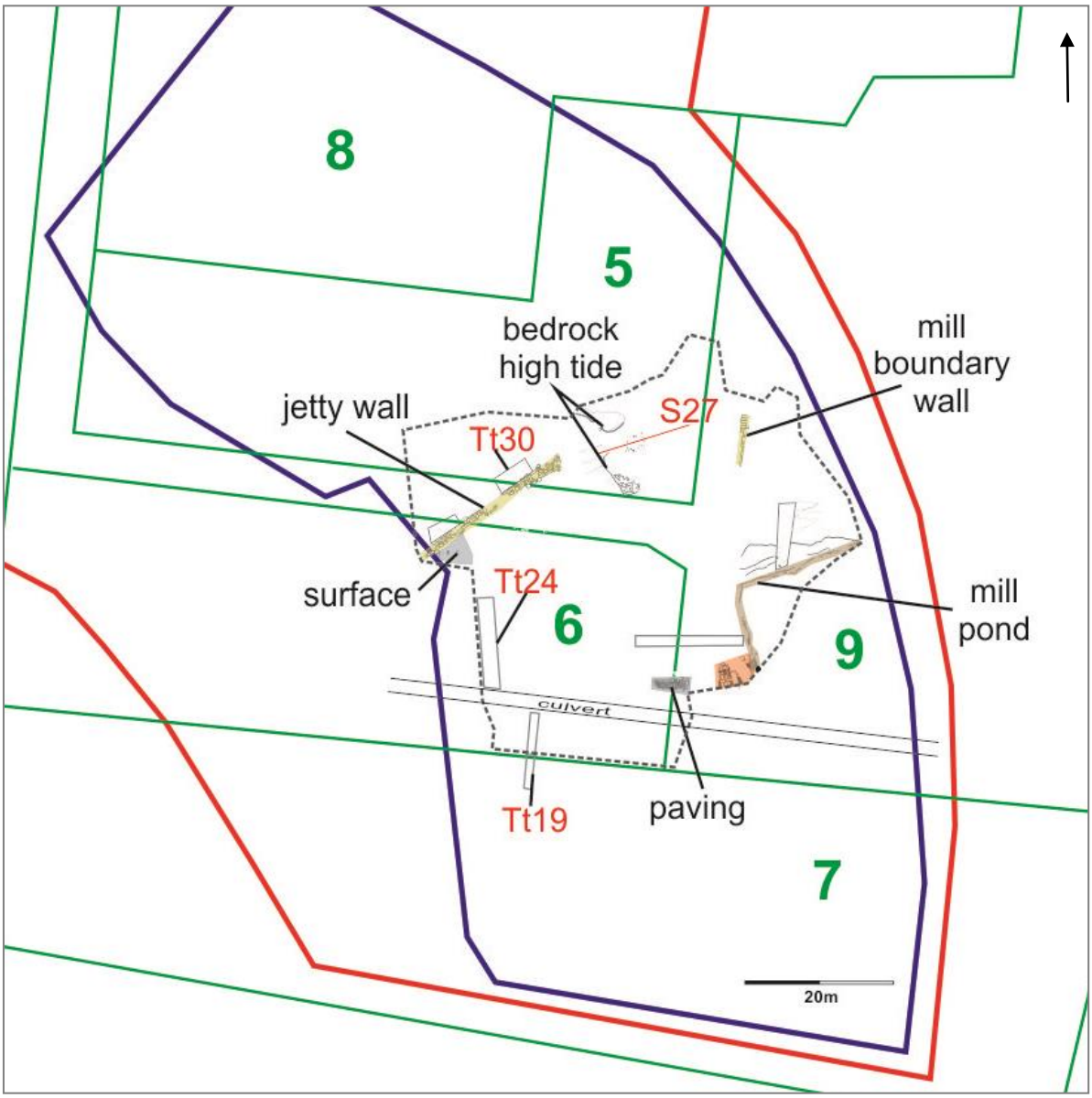

Figure 3.5.4: Graphic showing the general location of the archaeological remains of the northeast jetty wall, surfacing and mill pond remains within the basement (purple outline). Also depicted is the modern culvert cutting through the southern part of Area 6 and 9, excavation areas (green), bedrock at high tide and a number of key test trenches. Extract from Cryerhall, Plan 9.5 (Vol 4).

Archaeological remains of the northeast part of the jetty structure were excavated and recorded (Figure 3.5.4). The jetty remains consisted of timber formwork for sandstone walling, bulk fills and partial surfacing. These were located within Area 6 and Area 9 (Vol 4: Plan 10.8, 10.11 to 10.15, 10.38 to 10.41, 10.60). The remains within the site represented the junction of the jetty with the original shoreline, and the made-ground that formed the associated wharf or yard area. The jetty extended west from the original shoreline and beyond the basement excavation area and therefore was not investigated as part of this project (Figure 3.5.8). It is likely the jetty structure projecting into the harbour consisted of timber piles and decking. The southern side or extent of the jetty from historic plan overlays was once located between the boundary of Area 6 and Area 7. However there were no archaeological remains, as the area was truncated by a large and deep modern culvert (Figure 3.5.8).

Archaeological remains of the southwest part of the mill pond were within the basement excavation area (Figure 3.5.4, Figure 3.5.9). These consisted extensive earthworks in the form of a clay bank, a substantial timber revetment and sediments within the pond. The remains of the jetty, with associated reclamation and surfacing, and the mill pond were recorded and described in the various trench reports and other documents as Phase 4 (mid 1820s to 1830s). The mill complex is also referred to in these reports as Barker's mill (including the jetty and mill pond), even though Cooper & Levey were responsible for its initial development and construction. Thomas Barker purchased the newly constructed mill in 1827 and was involved in its operations until his death in 1873.

3.5.3 Cooper & Levey Background[10]

Cooper & Levey's business partnership was by the late 1820s one of the largest and most successful in New South Wales, and so its origins deserve some brief comments. Daniel Cooper and Solomon Levey both arrived in New South Wales as convicts, in 1816 and 1815 respectively, and begun to establish themselves as successful merchants in their own right by 1820.[11] The earliest reference to 'Cooper and Levey' appears in November 1820, when George Ison was found guilty of 'embezzling various articles, the property of Mess[rs] Cooper and Levy of Sydney'.[12] However, the corresponding report in the *Sydney Gazette* does not refer to Levey, and identifies Robert Cooper as the victim of the crime, which occurred from the brig *Campbell Macquarie*, on which Ison was employed in June 1820.[13] Yet this apparent discrepancy is resolved when it is realised that Robert Cooper, Daniel Cooper and Solomon Levey were all co-owners of the *Campbell Macquarie*, at least by 1822, if not earlier.[14] It seems quite possible that at this time 'Cooper and Levey' referred to a partnership between Robert Cooper, Daniel Cooper and Solomon Levey.

Further references to 'Cooper and Levey' occurred over the next few years, suggesting that this partnership continued. Between April and August 1821, Cooper & Levey pursued a writ of *fieri facias* against Thomas Clarkson,[15] implying that he had incurred unpaid debts against them. In October 1823, Solomon Levey refuted claims that Cooper & Levey were diluting gin sold to FE Forbes, possibly from the ship *Actaean*.[16] Cooper & Levey may also have had business interests in Van Diemen's Land at this time, as they pursued a writ of *fieri facias* in December 1823 against Espie & Clark, on property at Bagdad, north of Hobart.[17] Again in December 1823, FE Forbes

[10] This section has been written by Nick Pitt, Archaeologist, Casey & Lowe.

[11] Bergman 1964, 1967 and 1968; Davidson 1966.

[12] SRNSW Colonial Sec. Papers, Reel 6023, X820, p 19.

[13] *Sydney Gazette* 25 November 1820, p 2(3).

[14] Knight 1966; Bergman 1964: 403, citing Bigge Appendix, vol. 129, pp. 62712-4. The *Campbell Macquarie* had been advertised for sale by Joseph Underwood in *Sydney Gazette* 19 June 1819, p 2(3).

[15] *Sydney Gazette* 14 April 1821, p 2(2), 2 June 1821, p 1(1), 9 June 1821, p 1(2), 23 June 1821, p 2(1), 14 July 1821, p 1(2), 21 July 1821, p 2(3), 4 August 1821, p 2(3).

[16] *Sydney Gazette* 30 October 1823, p 2(3).

[17] *Hobart Town Gazette* 20 December 1823, p 1(3).

claimed to have lent 'Robert Cooper and Levy' £372.[18] According to Solomon Levey, defending himself against allegations of smuggling, Daniel Cooper, Robert Cooper and Levey in partnership bought 375 rolls of tobacco worth £9000 from Aspinall, Brown and Co. in May 1824. They then proceeded to sell this tobacco to individuals and traders in amounts ranging from 1 to 228 rolls.[19] From these scant references, it appears that Cooper & Levey were involved in a range of general trading at this period, importing goods, or buying them wholesale and selling them on to settlers and traders. This picture is supported by a ledger of Cooper & Levey, covering 1823 to 1825, partially published in the 1960s.[20] This ledger lists accounts for a large number of individuals prominent in the colony at the time, mostly buying a range of goods, from paint and iron, to striped shirts, to rice and salt.[21]

However, Cooper & Levey became particularly prominent after Daniel Cooper and Solomon Levey purchased the Lachlan and Waterloo Company in 1825, also known as the Lachlan and Waterloo Mills or the Waterloo Warehouse. This acquisition was announced in February 1826, with the contract finalised on 28 June 1825, with Cooper & Levey paying £4700 in Spanish Dollars at 5/- each.[22] As part of the process of Cooper & Levey acquiring the Waterloo Warehouse, both merchants ceased to do business on their own, at their own premises, instead moving their concerns to the Waterloo Warehouse premises on George Street, Sydney.[23] On 5 May 1826, Daniel Cooper and Solomon Levey finally signed a formal deed of co-partnership, each bringing £30,000 of joint stock into the concern.[24]

Daniel Cooper had been a co-owner of the Waterloo Company, a water flour mill named the 'Waterloo Mills' by Governor Macquarie, since it was constructed in 1820 by a partnership consisting of William Hutchinson, George Williams, William Leverton and Daniel Cooper himself.[25] By April 1821, this partnership had grown to also include Samuel Terry and Thomas William Winder.[26] Although this same advertisement strenuously asserted that the concerns of the Lachlan and Waterloo Flour Mills did 'not extend to any other Branch of Trade or Merchandize whatsoever',[27] by May 1821 the company's warehouse moved from the corner of George and King Streets to the corner of George and Market Streets, and the first mention was made of their promissory notes.[28] By December of that year, the company was seeking tenders from stonemasons and bricklayers to erect substantial warehouses on their George Street premises.[29] In June 1822, the Waterloo Company began issuing notes in dollar amounts,[30] which were being

[18] *Sydney Gazette* 1 January 1824, p 4(1).

[19] *The Australian* 23 December 1824, p 4(1).

[20] McCredie 196?; Note that Bergman 1964: 407 and the editor of McCredie 196? considered this ledger to be of the Waterloo Company, which was bought by Cooper and Levey in 1825. However this judgement seems influenced by a belief that the partnership of Cooper and Levey only formed in 1825 (Bergman 1964: 406), and although the words 'the waterloo here commenced the firm of Cooper and Levey' appear on folio 77 of the ledger (McCredie 196?: 24), a definite judgement does not appear possible without re-examining the original ledger, which could not presently be located in major archives.

[21] See reproduced ledger pages in McCredie 196?.

[22] *Sydney Gazette* 24 February 1825, p 4(3) and *The Australian* 24 February 1825, p 1(3); Bergman 1964: 406, citing Wentworth Papers Miscellaneous, p 160 (Mitchell Library).

[23] *The Australian* 7 April 1825, p 4(4), 13 June 1825, p 4(4); *Sydney Gazette* 28 April 1825, p 1(5).

[24] Solomon Levey estate papers A 5541, No. 1, Deed of copartnership betwen Daniel Cooper and Solomon Levey, Merchants, 5 May 1826, W. C. Wentworth (Mitchell Library). (Transcript available at http://www.sl.nsw.gov.au/discover_collections/society_art/jewish/business/levey/index.html (accessed 27/02/2012).

[25] *Sydney Gazette* 30 September 1820, p 3(2).

[26] *Sydney Gazette* 7 April 1821, p 4(1).

[27] *Sydney Gazette* 7 April 1821, p 4(1).

[28] *Sydney Gazette* 26 May 1821, p 1(2).

[29] *Sydney Gazette* 15 December 1821, p 4(3).

[30] Butlin 2002 [1968]: 158; *Sydney Gazette* 23 August 1822, p 2(2).

forged by the following August.[31] The Waterloo Company continued trade with diversified milling, banking and general trading interests after it was purchased by Cooper & Levey.

Cooper & Levey were clearly associated with their allotment at Cockle Bay from July 1825, when their steam engine arrived from Liverpool, by the ship *Lalla Rookh* and it was reported that the engine 'is to be put into motion in Cockle-bay, below the old burial-ground, with as little delay as possible'.[32] However, the importation of this steam engine appears to have been a well planned affair. An engineer, William Lowe, came out with his wife and two children on a five-year contract, accompanying the steam engine.[33] The steam engine itself appears to have been imported by Warham Jemmett Browne following the order of Daniel Cooper,[34] and as Browne had left in July 1824, before returning on the *Lalla Rookh*,[35] it seems likely that Cooper had ordered the steam engine a little over a year in advance. This suggests that Daniel Cooper alone, the Waterloo Company, or Cooper & Levey acting together, may have had an association with the allotment before July 1825.

In any case, Cooper & Levey quickly built a mill to utilise the engine. In July 1825, Daniel Cooper requested 'One Miller, One Carpenter, One Blacksmith, One Stone Mason or Bricklayer, Twelve Strong Bodied Labourers' to help erect the steam engine.[36] Construction was well under way by October 1825, when a new building on Cockle Bay belonging to Cooper & Levey was described as 'conspicuous' by the *Sydney Gazette*.[37] The mill became operational in December 1825.[38] In September 1826, *The Monitor* printed a detailed description of Cooper & Levey's Cockle Bay premises:

> Our reporter gives us the following description of Messrs. Cooper and Levey's new stores and steam engine, recently erected in Cockle Bay. —"The building which is of stone, is raised to the height of five floors or stories, each capable of containing two and three thousand bushels of grain with convenience, leaving ample room for working, &c. The engine while it performs the operation of grinding and dressing at the same time, and smutting when required, conveys the water from a spacious newly-cut reservoir into the boiler, by means of a spindle and wheels, which is constructed to work as high as the roof of the building. Manual labour is thus saved in the conveyance of the wheat to and from the hopper. A circular chain with additional links attached at intervals, passed from the ground to the top, through a trap-door in each story; this being in continual motion, similar to the chain of a smoke-jack, either draws up the wheat or lowers it, or both at the same time if necessary. With one pair of stones, one thousand bushels of wheat can be ground, but the engine is capable of turning three pair. A commodious wharf is about being constructed at the back of the building, for which the locality of the situation offers many advantages".[39]

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[31] *Sydney Gazette* 23 August 1822, p 2(2).

[32] *Sydney Gazette* 7 July 1825, p 2(3); cf *The Australian* 7 July 1825, p 4(4), which also located the prospective site of the engine as being Cockle Bay.

[33] *Sydney Gazette* 7 July 1825, p 2(1), 2(3); *The Australian* 7 July 1825, p 4(4); 1828 Census, National Archives Copy, HO 10/25, p 140; Casey & Lowe 2002: 6-7.

[34] *Sydney Gazette* 31 October 1825, p 4(1), 7 July 1825, p 2(1), 27 October 1825, p 2(4).

[35] *Sydney Gazette* 10 June 1824, p 3(2), 17 June 1824, p 1(2); 15 July 1824, p 2(1), 7 July 1825, p 2(1).

[36] SRNSW Colonial Sec. Papers, Reel 6062, Item 4/1782, p 73.

[37] *Sydney Gazette* 6 October 1825, p 3(4); cf Solomon Levey's memorial dated 21 October 1825, which also mentions the building under construction, SRNSW Colonial Sec. Papers, Reel 6062, 4/1782, p 107.

[38] *Sydney Gazette* 19 December 1825, p 1(4); *The Australian* 29 December 1825, p 3(2).

[39] *The Monitor* 15 September 1826, p 6(3).

A jetty associated with Cooper & Levey's mill appears in historical plans from around 1828-30.[40] The 'wharf' referred to in *The Monitor* report would have been useful for Cooper & Levey, as it would allow grain to be brought for milling by water. It would have also been useful in providing wharf facilities for vessels owned by Cooper & Levey in partnership or individually. Solomon Levey had interests in several ships in the 1820s, including the schooner *Mary*, the brig *Campbell Macquarie*, a former government sloop *HMS Snapper* and a locally built schooner *Elizabeth* which was active in sealing expeditions.[41]

Cooper & Levey sold their Cockle Bay mill to Thomas Barker in mid-1827. Thomas Barker had arrived in Sydney in 1813 as an apprentice to John Dickson, who constructed the first steam flour mill in Sydney.[42] In 1824, Barker requested a town allotment in a memorial, and received the reply that he could have any vacant allotment of his choice.[43] He appears to have chosen a corner block on the southwest corner of Sussex and Bathurst Streets, adjoining the allotment where Cooper & Levey established their mill. In any case, Barker was based at this location by September 1826, when advertised that he would buy wheat or sell flour 'at his Residence in Sussex-street, next to Messrs. COOPER and LEVEY's Steam Engine'.[44] A reported robbery in December 1826 also confirms that Thomas Barker was 'living near the Steam Engine' at the time.[45] By 1826, Barker had also begun to develop his own milling interests, with the completion of a windmill at Darlinghurst.[46] The first report of Cooper & Levey selling their mill to Barker was in May 1827, when *The Australian* reported the sale for £5000.[47] The actual conveyance in the old system land records was dated 16 June 1827,[48] while a schedule of deeds in Thomas Barker's legal papers lists Barker taking out a mortgage from Cooper & Levey for £5000 plus interest on 18 June 1827.

Before the sale of Cooper & Levey's mill and steam engine was finalised, Daniel Cooper received a formal grant of the land where it was situated, in which it was described as:

> All that Piece of Parcel of Land, lying and situate on the West Side of Sussex Street, in the Town of Sydney containing by Admeasurement 482 Rods, Bounded on the North by Raine & Ramsays Allotment to the South boundary of Barkers Allotment. And by that Allotment to the Street in the East by Sussex Street 575 links, on the South by Brook's Allotment to the water and on the West by the Water of Cockle Bay.[49]

Soon after Barker received a formal lease for the 76 perches of land at the southwest corner of Sussex and Bathurst Streets, which he was already occupying. A parish map of the Parish of St Andrew (Figure 3.5.5) shows Daniel Cooper's grant, as well as property boundaries for surrounding allotments. This map has no date, but it is likely to have been annotated between mid-1826, when Darling Harbour was named,[50] and mid-1831, when the land was granted again to Thomas Barker.[51]

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[40] SRNSW Surveyors' Field Books No. 347, A Hallen, 2/5195, Reel 2628.

[41] Bergman 1964: 403-404.

[42] Walsh 1966a.

[43] SRNSW Colonial Sec. Papers Fiche 3076, Item 4/1836A, No.32, pp.151-152; Reel 6012, Item 4/3510, p 656.

[44] *The Monitor* 15 September 1826, p 1(1).

[45] *The Australian* 6 December 1826, p 3(4).

[46] Walsh 1966a; SRNSW Colonial Sec. Papers, Fiche 3119, Item 4/1840B, No.30, pp. 189-96; Fiche 3269, Item 9/2740 p.4; *Sydney Gazette* 24 June 1826, p 3(4); *The Monitor* 15 September 1826, p 1(1); SRNSW NRS 13836; Item 7-449, Reel 2561.

[47] *The Australian* 16 May 1827, p 3(2).

[48] Casey & Lowe 2002: 5, citing Bk 11 No 420 Conveyance dated 16 June 1827 (Land & Property Information).

[49] SRNSW NRS 13836; Item 7/482, Reel 2704, grant dated 1 June 1827.

[50] *Sydney Gazette* 24 May 1826, p 2(2), 14 June 1826, p 2(3); *The Monitor* 16 June 1826, p 5(2).

[51] *Sydney Gazette* 31 May 1831, p 1(2); *Sydney Gazette* 12 April 1832, p 2(2); Attested copy of 1831 land grant, dated 19 October 1831, in Barker papers A 5398/3, No. 29, Abstract of title of Thomas Barker Esq to Land in Bathurst and other Streets Sydney (1847). (Mitchell Library); Register of Land Grants and Leases, SRNSW NRS 13836, Item 7-473, Reel 2700.

Figure 3.5.5: Detail of Map of the Parish of St Andrew, AO Map 272. No date, but likely to have been annotated between mid-1826 and mid-1831. NSW LPI Historical Land Records Viewer

3.5.4 The Jetty

An article on Cooper & Levey's mill dated to September 1826 refers to the 'commodious wharf' that was in the process of being constructed.[52] The jetty structure was first illustrated on Ambrose Hallen's sketch dated between 1828 and 1830 (Figure 3.5.6). It is also recorded on the 1833 city survey (Figure 3.5.7). The jetty stretched from the original shoreline westward into the harbour. Hallen's sketch includes the measurements of the jetty and a later sketch plan of the area, dated to 1853 though likely drawn earlier, records the length of the jetty as 5.40 chains (356.4 feet or 108.6m).[53] The remains of the northeast junction jetty where it met the rocky shoreline were found within Area 6 (Figure 3.5.8, Figure 3.5.9, Vol 4: Plan 9.6, Plan 10.8, Plan 10.60). This part of the jetty was constructed with sandstone walling within timber formwork (Figure 3.5.10, Figure 3.5.11). Behind the walling, bulk sand and clay-rich fills were used to raise the ground level and create an intermediate area between the land and the timber jetty that projected far into the harbour. This area was essentially a wharf, and aimed to provide stable, level, open yard space for stockpiled goods, either off-loaded from or awaiting loading onto ships berthed at the jetty. Patchy remains of the surfacing of this large reclaimed area were recorded in Area 6 and Area 9.

[52] *The Monitor* 15 September 1826, p 6(3).

[53] Sketch plan showing southern end of Darling Harbour and adjacent streets, 1853, Dixsons Map Collection, Cb 85/14.

Figure 3.5.6: Ambrose Hallen's sketch of the mill complex including the jetty dated to 1828-1830, when the mill was owned by Thomas Barker. The sketch notes survey details about the jetty and the mill buildings. Note that the building illustrated to the north of the jetty is an enlarged version of the mill that is actually located directly east of the jetty. The inset shows a detail of the jetty sketch. A Hallen 1828-1830 FB 347 Reel 2628 SRNSW.

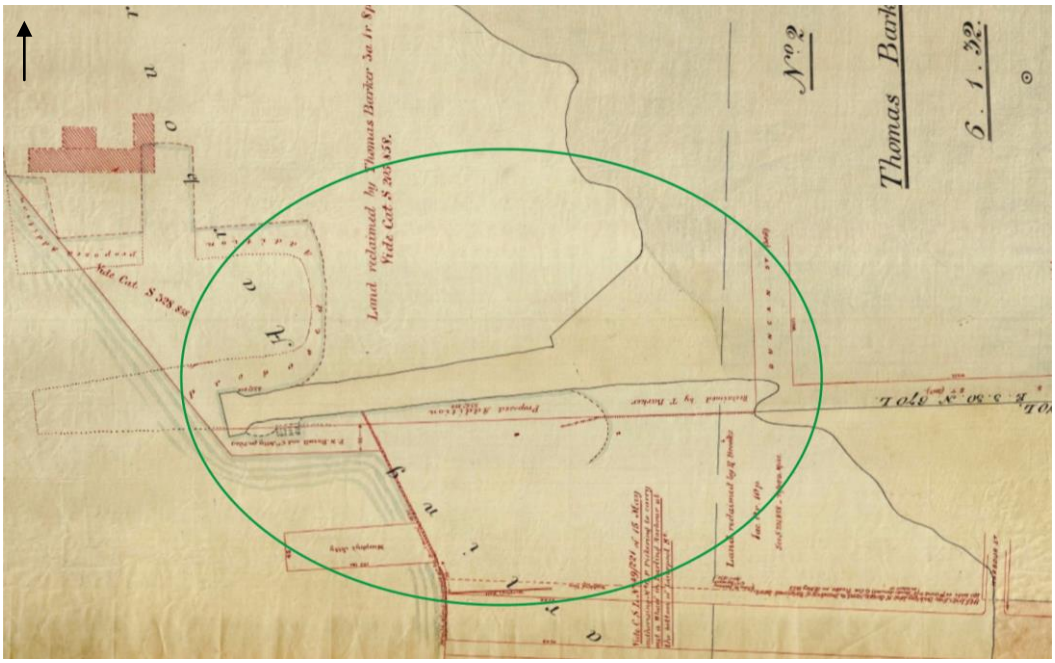

Figure 3.5.7: Detail from the 1833 survey showing the jetty and how it connected to the original shoreline. This survey also contains later additions (written and drawn in red in the 1880s). Thomas Barker owned the mill and lands by this time. . Historical Atlas of Sydney, City of Sydney Archives.

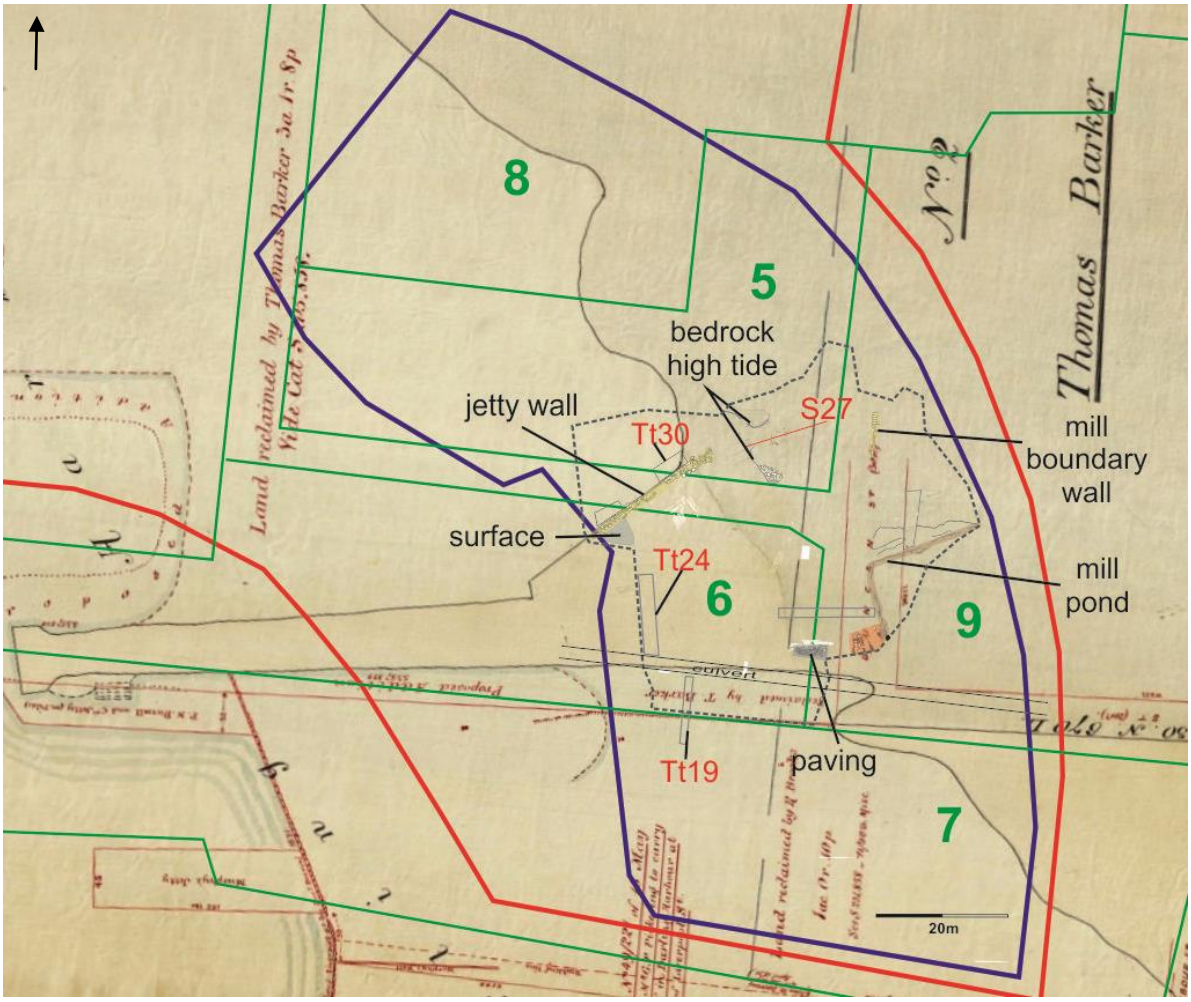

Figure 3.5.8: Location of the archaeological remains of the northeast part of the jetty and mill pond overlaid on the 1833 survey showing the full extent of the jetty. The basement is outlined in purple and the site boundary is in red. Tumbalong Park is now located over the western end of the jetty. City of Sydney Archives. Extract from Cryerhall, Plan 9.6 (Vol 4).

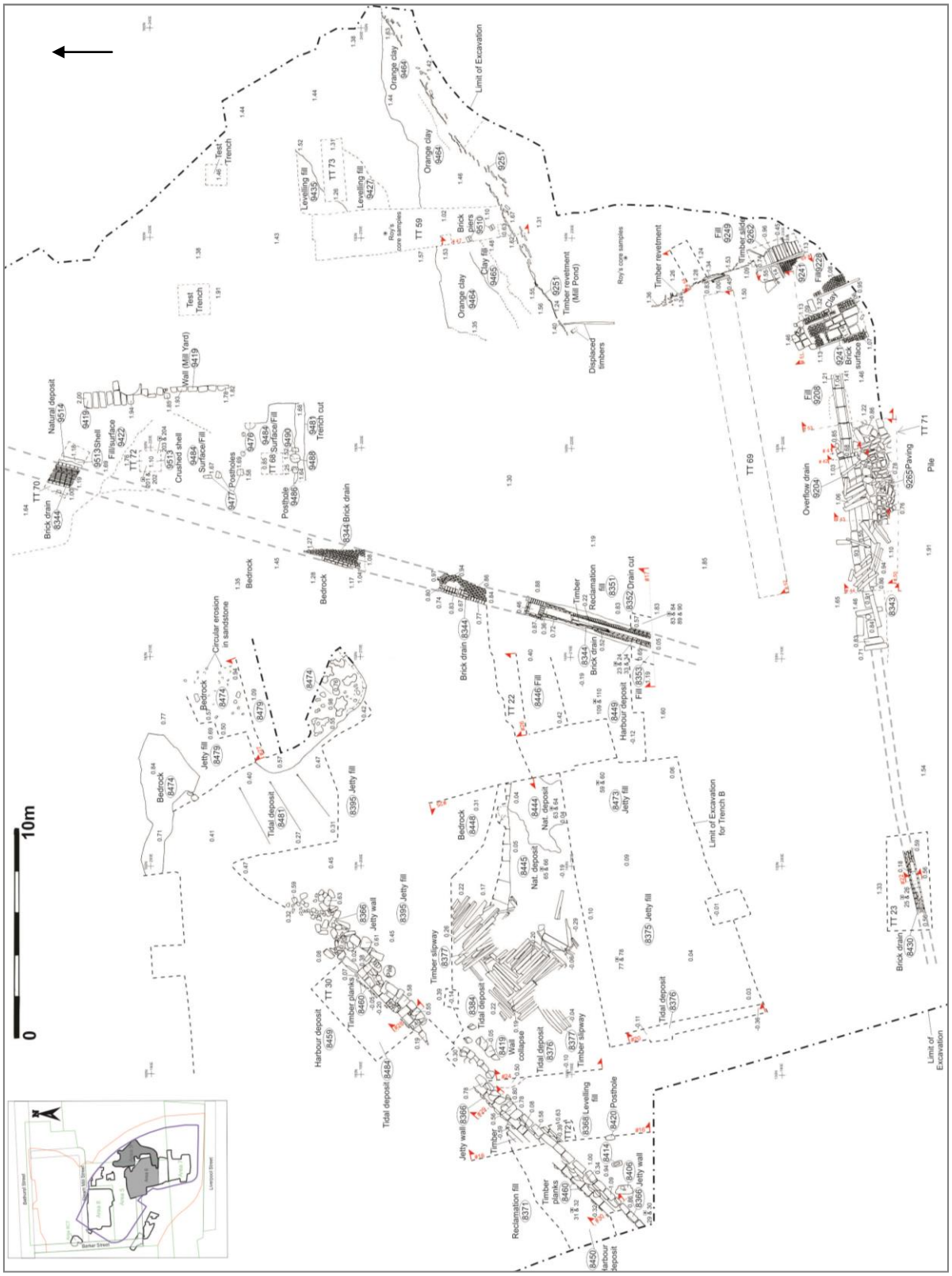

Figure 3.5.9: Extract from the detailed excavation plan of Area 6 and Area 9 Phases 1 to 4. This shows the location of the jetty wall, the mill pond and the test trenches and sections that record the surfacing and jetty infill. It also shows the location of the earlier boat ramp that was buried by the jetty fill during its construction in the mid 1820s. Extract from Plan 10.60 (Vol 4).

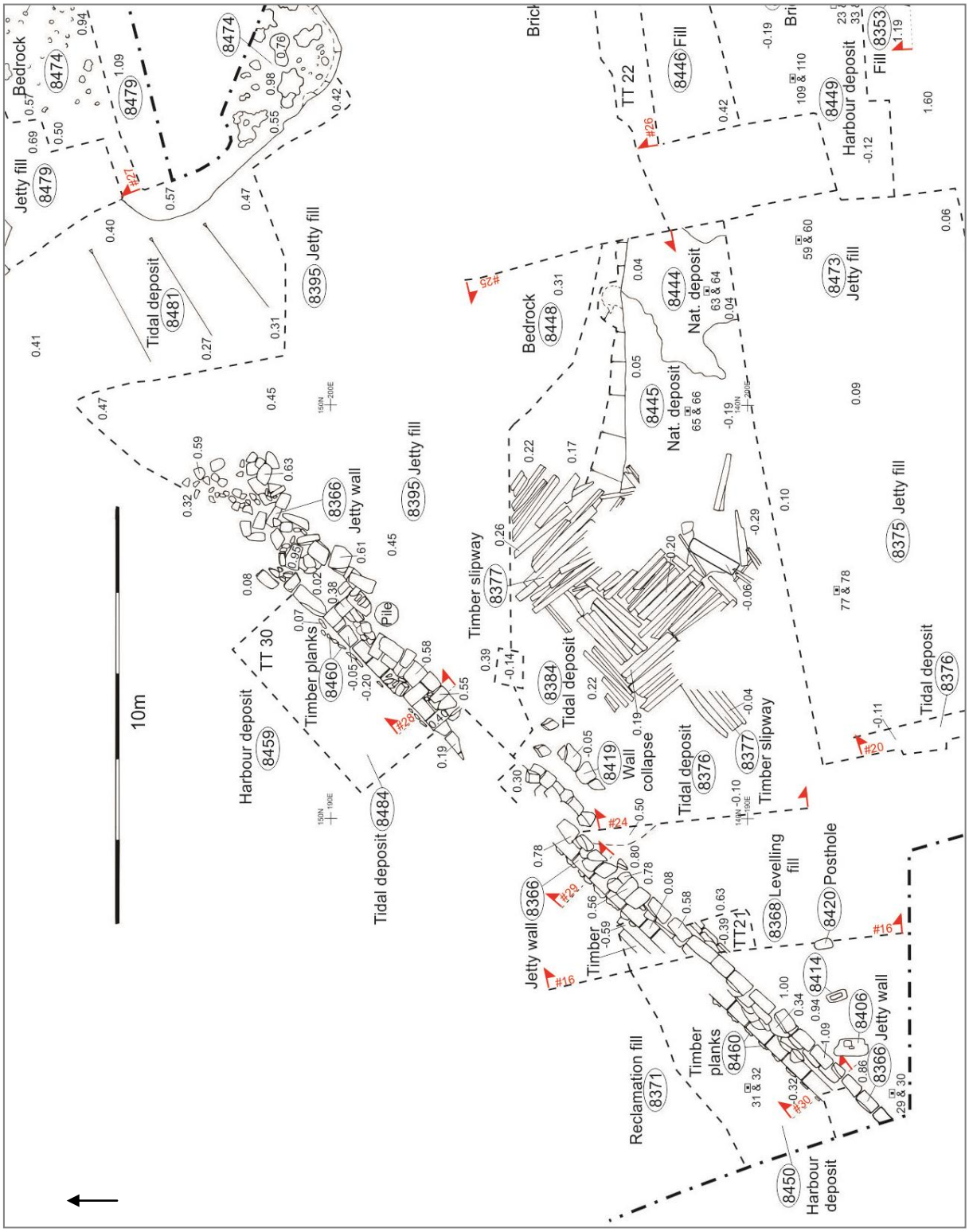

Figure 3.5.10: Extract of the detailed plan of Area 6 showing the jetty wall, formwork, jetty fills and the wall's relationship with the bedrock above high tide level. The red arrows and numbers indicate the location of section and profile drawings. Vol 4: Plan 10.8.

Figure 3.5.11: View of the jetty wall remains from the shore with remains of the jetty in-fill and surfacing. The timber slipway was revealed below the jetty fill. The harbour floor is to the right with reclamation (Phase 5) overlying. View to west. Scale 1m.

3.5.4.1 Formwork

Timber formwork (context 8460) was used in the construction of the northern sandstone wall of the jetty (Figure 3.5.12, Figure 3.5.13 and Vol 4: Plans 10.8, 10.12). Almost 20m of formwork was recorded in plan, and exposed in more detail in three test trenches (TTs 28, 29 and 30) along the northern side of the jetty wall (Locations of TTs in Vol 4: Plan 10.8). The formwork consisted of closely placed timber planks driven into the harbour sands (Figure 3.5.14). The planks were roughly formed by longitudinally-split logs up to 1.5m in length. Bark had been removed but otherwise the logs were not milled, and in section they were either rectangular or triangular. The base end of each piece of timber was roughly hewn and shaped to a point (Figure 3.5.16). Generally, the timbers were driven into the sand with the cut side facing towards the water. In TT28 there was evidence for horizontal brace timbers on the external face of the shoring (Figure 3.5.15).

Figure 3.5.12: Exposed timber formwork (context 8460) with the sandstone jetty wall (context 8366) beyond. View to the south. Scale 1m

Three timber samples were sent for species identification.[54] Two of these (#162 and #166) were identified as *Eucalyptus pilularis,* or blackbutt. This hardwood was abundantly available in the early years of settlement, and is likely to have grown within one kilometre of the site.[55] The availability of this species at the time of the jetty construction suggests that locally sourced timbers are likely to have been used.[56] Also identified as part of the formwork was *Eucalyptus oblique* (#165), commonly known as messmate or messmate stringybark. Like blackbutt, messmate is a hardwood which is used today in construction and flooring.[57] Messmate does not naturally grow in the Sydney area, but is endemic to the Tablelands districts of New South Wales.[58]

The top of the formwork was located within the tidal range, between RL 0.07m and -0.32m. In general, the tops of the timbers were just above the upper layer of harbour sand. However in TT30 for example, several layers of sands and silts were deposited over the timbers during the lifespan of the jetty (these are discussed below). At the eastern end of the jetty, closest to the shore, the top of the jetty wall would have been about 800mm above the top of the formwork, and at the western limit of excavation, the wall would have been about 1.3m above. The timber formwork enabled the sandstone wall of this part of the jetty to be built from below the water table. A construction trench though harbour sands and below high and into low tide levels would require a retention system to avoid trench wall collapse. It would appear that the timbers were driven into the sand first, and then the trench for the sandstone wall excavated. The timber formwork provided a stable trench and also restricted the amount of tidal water entering during the construction process.

[54] Identification by Dr Jugo Ilic, KnowYourWood. Vol 3, Section 8.8.

[55] Benson & Howell 1990: 42-44.

[56] Kuiters 2010: 9, Vol 3, Section 8.8.

[57] Bootle 2005: 287, 310.

[58] Bootle 2005: 310.

Figure 3.5.13: Detail of the top of the formwork (8460) and the stone wall behind. The right of the frame shows the amount of harbour deposits and accumulation against the wall. View to the south. Scale 1m.

Figure 3.5.14: View of the harbour-side of the jetty wall with the top of the timber formwork exposed. The oyster shells adhering to the stone just above the top of the formwork indicate that the high tide water levels rose to cover the formwork. View to southeast. Scale 1m.

Figure 3.5.15: Horizontal timbers used as extra bracing on the outside of the formwork. These were revealed below some harbour sand in TT28. View to the south. Scale 1m.

Figure 3.5.16: Group photo of the timber samples from context 8460 retrieved during bulk excavation. Note the pointed ends which would have aided the timbers to be driven into the sand. From left to right: sample #163 (24B), #162 (24E), #165 (24A), #164 (24F), #159 (24C) and #166 (24D). Scale 1m.

3.5.4.2 Sandstone Jetty Wall

The north jetty wall, or seawall, (context 8366) was constructed within timber formwork from below the water table (Figure 3.5.17, Figure 3.5.18). About 20m of the wall was within the basement excavation area (Vol 4: Plan 10.8). The remains began 6.5m west of the shoreline (bedrock 8474) and were located at around the high tide level (RL 0.5m). The easternmost point of the wall did not survive well, and consisted of just a linear arrangement of rubble sandstone. The collapse and damage of the shoreward part of the wall had occurred during the 19th century, and likely during the reclamation of this area in the late 1830s. The underlying geology meant that the foreshore sand deposits in this area were quite stable and firm, and this meant the landward end of the wall had been built directly onto the sand deposits.

As the jetty wall extended further into the intertidal zone, towards deeper harbour waters, it became more substantial (Figure 3.5.19). The timber formwork and more formal walling began about 10m southwest from shore and at about the median tide height (RL 0m). From this point the wall was constructed using a combination of neatly cut and faced rectangular sandstone blocks, rubble and roughly cut blocks (Figure 3.5.20, Figure 3.5.21). The neatly cut and finished sandstone was arranged in formal courses and formed the wall-face on the harbour side. The rubble and roughly cut sandstone was not formally coursed and acted as reinforcement on the interior side of the wall. In cross-section, the wall had a wider base with a narrower top (Figure 3.5.17). This form gave the wall strength to retain the bulk fills deposited behind it to create the working surface for the large wharf area attached to the jetty (Figure 3.5.22, Figure 3.5.23).

A machine-excavated trench centrally located within the wall revealed that the lower course was constructed with neatly dressed blocks aligned in a single row on the northern side. Every third stone was oriented perpendicular to the orientation of the jetty wall, creating a saw-toothed face on the southern side. The southern side was then packed with roughly-cut blocks, at least doubling the width of the wall. This method was reproduced in the upper courses, with smaller elements used on the southern side. The jetty wall was at least three courses deep at the shoreward end and is likely to have been considerably deeper as the wall extended into the harbour (Figure 3.5.23). The junction between the wall and the timber part of the jetty was not within the excavation area but it may have extended a further 10m to the west, corresponding to the junction illustrated on the 1833 survey and the 1828 sketch (Figure 3.5.24, Figure 3.5.25). This junction is likely to represent the point where it was no longer possible to construct sandstone walling due to the greater depth of the water.

Though the foreshore sloped westward towards the harbour the wall coursing remained level and horizontal. Above the low water mark the dressed sandstone blocks had been removed, probably salvaged for recycling prior to the later 1830s reclamation works. With the surviving courses there was no apparent bonding agent, and the same was the case for the internal rubble buttress walling. Tool marks created a pleasant pattern and texture on the face of the dressed stones. Within the tidal range, at around RL -0.3m, or just above low tide levels, was a line of rock oysters adhered to the wall (Figure 3.5.21). The typical habitat of Rock oyster is within this tidal range, and their presence on the sandstone wall further demonstrates this species adaptability to the changing natural environment.

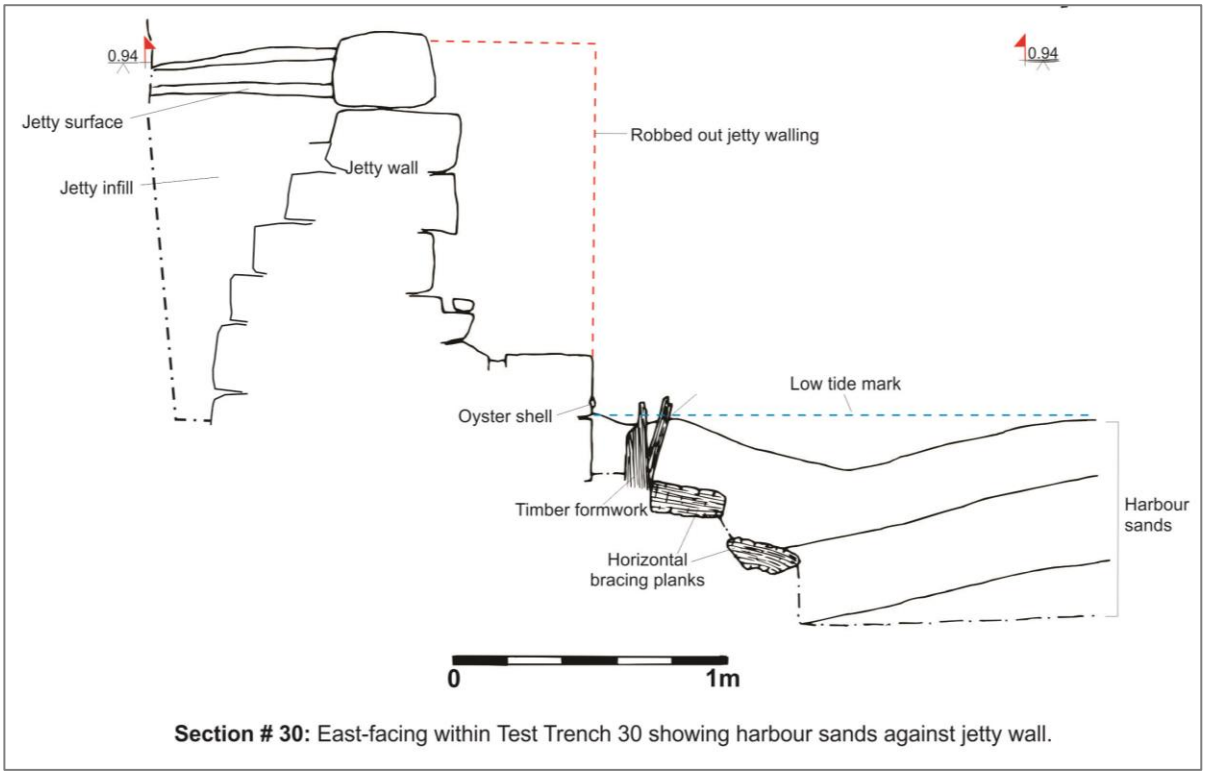

Figure 3.5.17: East-facing section (Section #30) through the sandstone jetty wall constructed within timber formwork. It shows how the stone face of the jetty wall was previously removed. Also illustrated are the harbour sands, low tide mark and the infill and surface level of the jetty. Extract from Vol 4: Plan 10.12.

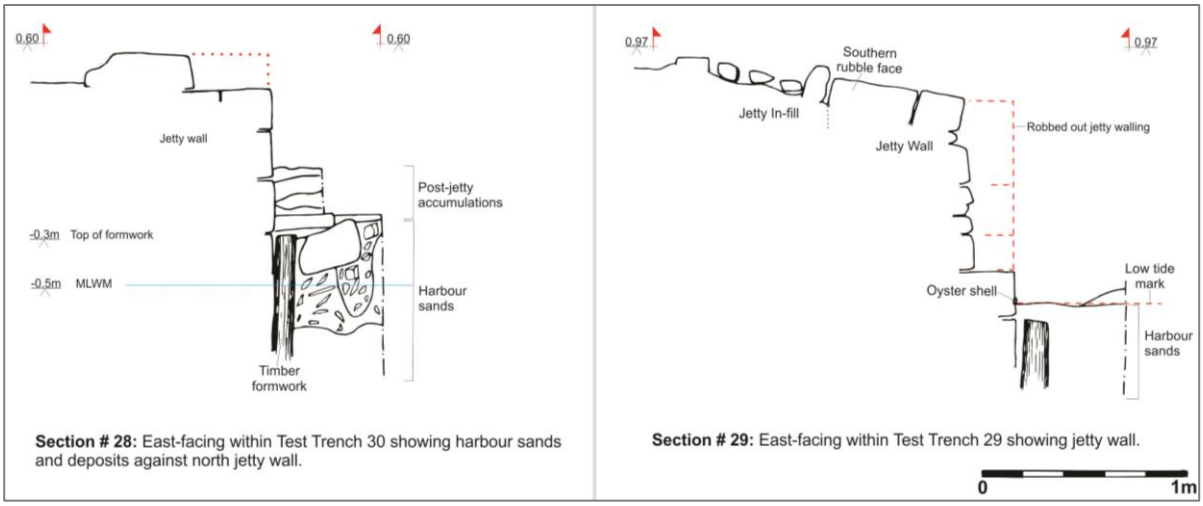

Figure 3.5.18: East-facing sections (Section #28 and 29) through the sandstone jetty wall, showing also the timber formwork and harbour sands. Extract from Vol 4: Plan 10.12.

Figure 3.5.19: Remains of the northern jetty wall with ashlar stone construction on the harbour-face and rubble sandstone on the interior, visible in the background. View to west. Scale 1m.

Figure 3.5.20: Detail showing the stones facing the harbour neatly cut and with chisel mark surfacing on the face. View to south. Scale 1m.

Figure 3.5.21: The jetty wall consisted of ashlar blocks on the harbour face. These were robbed-out before the wall was covered by the reclamation fills in the 1830s. On the internal side of the wall were large rough-cut sandstone blocks. View to the south. Scale 1m.

Figure 3.5.22: The remains of the jetty wall showing the rough-cut sandstone used in the interior abutted by the black occupation deposit over the jetty surface. The harbour-facing stones were robbed-out before being covered with the later reclamation fills, as seen in the section where orange clays cover the wall remains, behind the scale. View to east. Scale 1m.

Figure 3.5.23: Recording the jetty remains. The jetty wall was solid sandstone with wooden timber formwork along the harbour side. Grey coarse sands formed the deposits on the harbour-side of the wall. This photo also illustrates the deepening wall courses further into the harbour zone. View to west.

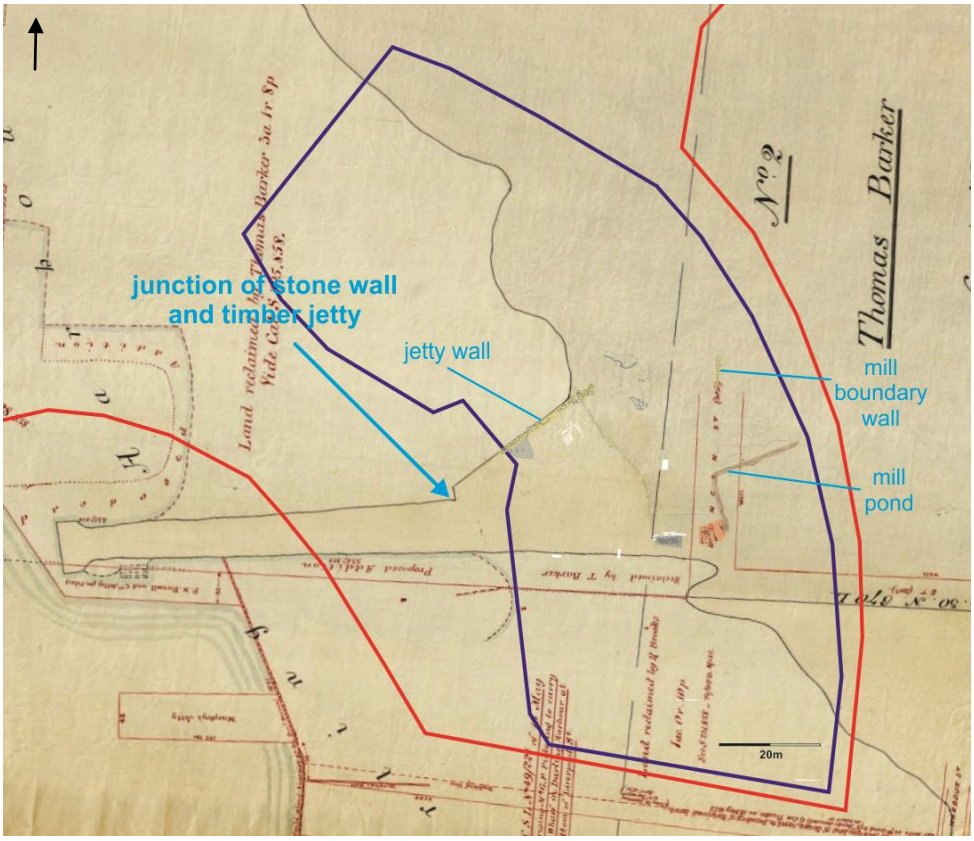

Figure 3.5.24: The junction of the stone wall and the timber part of the jetty is indicated with the blue arrow and is located outside the basement excavation area (purple). 1833 plan with Cryerhall additions

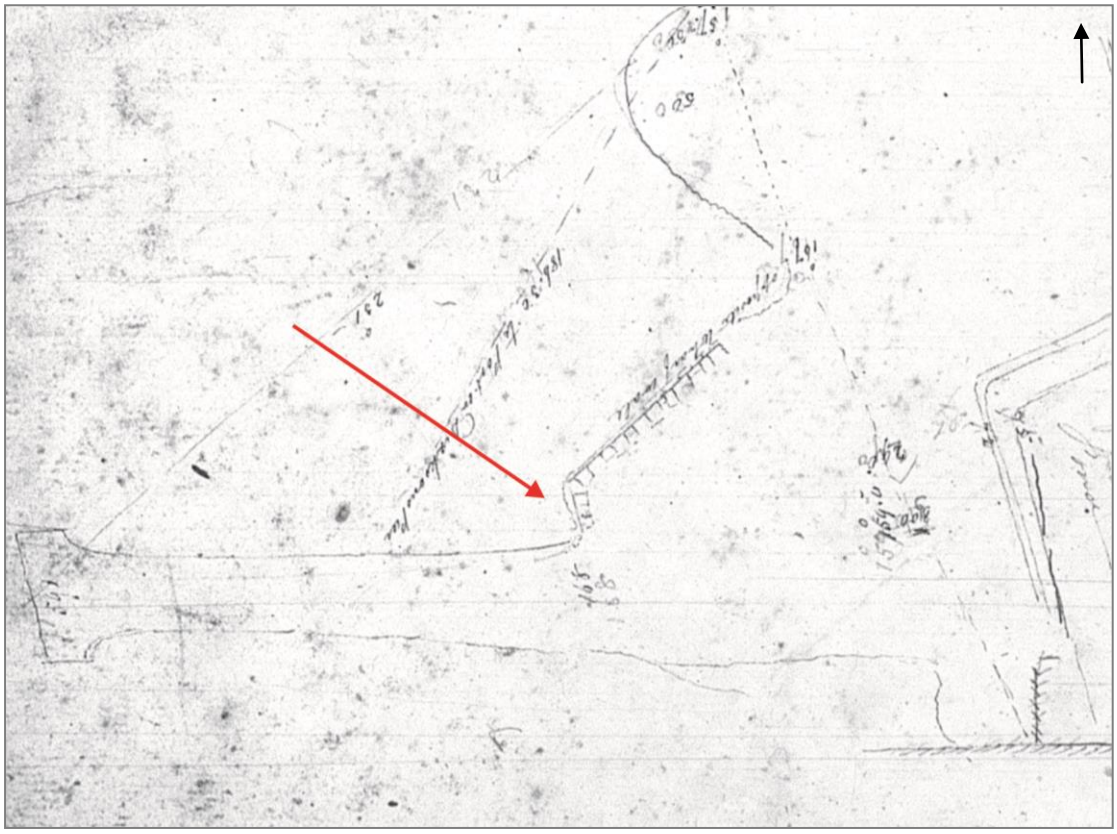

Figure 3.5.25: Hallen's c.1828 sketch of the jetty illustrates the stone seawall part of the jetty attached to the timber structure projecting into the harbour (arrow points to the junction). North is at the top. SRNSW.

3.5.4.3 Jetty Infill[59]

A large amount of fill was used to reclaim and build up a surface level behind the jetty wall (to the south). These fills also sealed the remains of the timber boat ramp discussed in the previous section (Section 3.4.4.2). These bulk fills were sampled and recorded mostly in test trenches and in sections throughout the northern part of Area 6 (Vol 4: Plans 10.8, 10.13, 10.14. 10.15). Around 100 separate and distinguishable dumps of fill were identified within the test trenches and sampled areas. The majority of these were not assigned context numbers but were described in detail in the field on the sections drawings (see also plans in Vol 4, Section 10). A small number of fills and groups of fills were assigned context numbers (Table 3.5.1). The individually recorded jetty fills within the test trenches and sections have been described in detail in the Area 6 Trench Report (Vol 2, Section 7.2).

Table 3.5.1: Summary of report illustrations and site plan references with associated context for the jetty infill material.

Detailed Plan Vol 4: Section 10	Site Plan Reference	Contexts
Plan 10.13	Section 23	None assigned. Section codes only
	Section 25	8426, 8395, 8396
	Section 27	8479, 8480, 8477
Plan 10.14	Section 20	8491
	Section 24	8372, 8373, 8374, 8385
Plan 10.15	Section 16	None assigned. Section codes only
	Section 21	None assigned. Section codes only
Not report graphic	Section 26	8487, 8486, 8466, 8465, 8464, 8463, 8462
No report graphic	Near TT22	8470, 8488, 8351, 8472, 8473

[59] The infilling of the jetty to create the jetty for the mill was also the first phase of reclamation at the Darling Quarter site. This and the artefacts from the fill material are also discussed in the next section - Section 3.6.

The material used to raise the ground level behind the jetty wall was predominantly sand of various colours and consistencies, but mostly grey and pale brown medium to coarse-grained (Figure 3.5.27, Figure 3.5.28). Many fills were also mottled with silty material, clay chunks, differing colours of sand such as white or buff, with inclusions of twigs and other organic matter (Figure 3.5.26). Rubble sandstone of all sizes was also present in some cases. A typical example of a one of these jetty fills is context 8375 recorded in Section 24 (Vol 4: Plan 10.14) and sampled (sample #77) for pollen analysis. This context represented several bands of sands ranging from pale to dark grey and some with inclusions of blackish silty sand (Figure 3.5.27). Context 8375 displayed tip lines from south to north and was located just to the south of the jetty wall. The tip lines are also illustrated in Figure 3.5.29.

All the sandy fills appeared to be redeposited natural sands, and very likely had been dredged or excavated from the surrounding harbour foreshore. Pollen analysis from context 8375 appears to confirm this.[60] The sample consisted of 39% casaurina, 30% raspwort (native herb) and 11% eucalypt. Also within the sample was evidence of swamp selaginella and fern, species common to damp organic rich soils such as swamp environments. The microflora lacks definite exotic pollen taxa such as cereal.[61] The presence of two large flour mills, first Dickson's in 1815 and then Barker's from the mid 1820s, in the immediate vicinity of the site has resulted in cereal pollens being present in all the post-1800 sampled contexts but context 8375. The absence of the cereal pollens in this instance can be explained by this context being a redeposited natural (pre-1788), dredged or excavated from the harbour floor and used within the 1825 construction of the jetty.

Other types of material used included crushed and rubble sandstone, and dense yellow to orange clays. The local sandstone bedrock gives rise to dense orange and yellow clays, and these too were redeposited as fills for the jetty construction. A typical example of a clay fill is context 8462 in TT22 and Section 36 (Figure 3.5.30). This east-to-west tipped fill consisted of bands of yellow and reddish orange clay with frequent inclusions of decaying ironstone (forming reddish colour) and lenses of pale grey sands. Context 8395 serves to represent the crushed sandstone type fills. This context was recorded in Section 25 and was located directly above the bedrock platform 8448 (Figure 3.5.31). It consisted of yellowish brown coarse sand with crushed sandstone fragments.

There was a notable absence of artefacts from the test trenches through the jetty fills. Overlaying the bedrock 8448 and the timber ramp were two buff-coloured sand and crushed sandstone fills; contexts 8395 and 8426. A small number of ceramic and glass fragments were retrieved from both fills. The glass (2 MIC) and ceramic (2) from contexts 8395 are consistent with the mid 1820s construction date for the jetty.[62] The ceramic from context 8426 consisted of a fragment of a fine earthenware blue transfer-printed poe and breakfast cup also dating from c.1830.[63] This is a slightly later date than the construction of the jetty, and it is likely do to mixing of later reclamation fills during the mechanical excavation of the fill. The lack of artefacts is not surprising considering the origin of the fills as redeposited natural material from the surrounding harbour foreshore and terrestrial locations; both relatively undeveloped and sparsely occupied at this time.

The fills were deposited over the intertidal sandstone platform and sand flat. From the areas tested and sectioned, the fills were deposited from the south and tipped northward toward the jetty wall (see Figure 3.5.29). Also noted were tip lines from east-to-west (Figure 3.5.30). Testing in the southern part of the jetty was not possible as this area contained a large diesel tank and required extensive remediation of the surrounding contaminated soils. Therefore it was not possible to gain

[60] See Macphail 2010 pollen analysis report in Vol 3, Section 8.6.

[61] Macphail 2010: 20, Vol 3, Section 8.6.

[62] Casey & Lowe artefact database.

[63] Ward 2011: 24, Vol 3, Section 8.1.

any information about how this part of the jetty was reclaimed. The fill created a large flat yard area that attached the land to the timber part of the jetty projecting into deeper harbour waters. In the east area the depth of the fill was as little as 200mm over the bedrock, and this increased to about 1.2m in depth at the western limit of the basement excavation. The surface of the jetty is discussed in the next section (Section 3.5.4.4)

Figure 3.5.26: Detail of the east-facing section of TT21 (Section #21) showing the bands of sand mottled with decayed clay that formed the infill behind the jetty wall. The red arrow points to a band of crushed whitish yellow sandstone and shale (context 8439) that formed the raised surface of the jetty. View to west. Scale 1m.

Figure 3.5.27: Section #24 through the redeposited grey harbour or foreshore sands used to fill-in behind the jetty wall and raise the ground level above the high water level. View to southwest. Scale 1m.

Figure 3.5.28: Southern end of Section #20 showing the grey sands and crushed sandstone fills used to raise the ground level within the jetty. The base of the section and in the foreground is the top of the naturally deposited sands of the foreshore just above the mean tide level (around 0.1m) and the yellow arrow points to the material that formed the jetty surface about 1.2m above. View to west. Scale 1m.

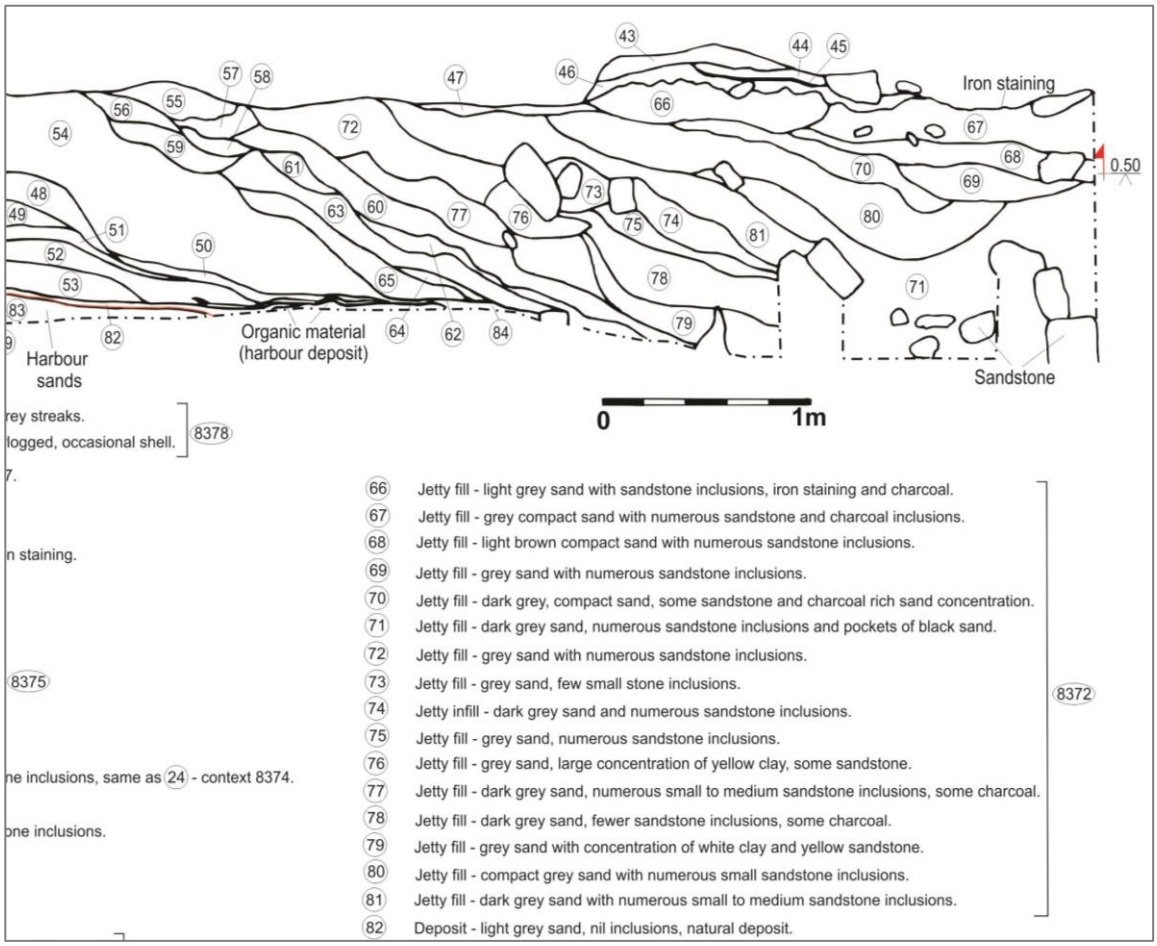

Figure 3.5.29: Extract from combined section #20 and #24 drawing to illustrate the tip lines of the individual fills and a detailed description of each. East-facing section. Extract from Plan 10.14 (Vol 4).

Figure 3.5.30: North-facing section (Section #36) of an east-west test trench (TT22) through the jetty infill showing orange clay-rich fills as well as grey sands. These fills were tipped from east to west. View to southeast. Scale 1m.

Figure 3.5.31: Crushed sandstone and coarse yellow sand was also used as jetty infill. Section #25, west-facing, with bedrock and naturally deposited foreshore sands below the jetty fill. View to east. Scale 1m.

3.5.4.4 Jetty Surface

A large area of land was reclaimed from the foreshore during the construction of the jetty (Vol 4: Plans 10.8, 10.38, 10.60). The reclamation for the jetty created a yard area between the main mill complex and the jetty projecting into the harbour. To make this new land more usable as a wharf, and protected it from weathering and erosion, it was capped with semi-formal surfacing. This surface material was recorded in a number of test trenches and sections across Area 6. It was also exposed in plan in a small area on the western edge of excavation, and another small area on the southern boundary with Area 7. The surface appeared in Section #s 16, 20, 21 and 27 (Vol 4: Plans 10.13. 10.15).

Over most of the Area 6 (north, west and east), the surface was recorded with two context numbers; context 8439 (including context 8440) and context 8478. These numbers represent the majority of the surfacing evidence. Most of the surfacing consisted of a layer of very compact crushed white sandstone within a white clay matrix (Figure 3.5.26, Figure 3.5.32, Figure 3.5.33). It was also recorded as being formed with crushed pink sandstone (context 8435 in section #20, Figure 3.5.34). The surfacing material varied in thickness from 10mm to 210mm. The level of the surface at its eastern limit (context 8478) was RL 1.38m (highest recorded level) where it existed over fill that overlay bedrock. At the western limit of the excavation, further into the harbour zone, it was at RL 0.88m (lowest recorded level). These levels demonstrate that the jetty surface had a gradual slope from the shore westwards into the harbour.

Truncated by numerous 20th-century services and piles was a small patch of dark brown silty material (context 8339) over the surface of compacted stone and fill. This was identified as an accumulated deposit over the jetty surface. It contained frequent inclusions of wood chips and what appeared to be sawdust. It was located toward the western extent of the jetty remains within Area 6 and represents the accumulation of material over the jetty surface between the late 1820s and late 1830s, prior to Barker's extensive reclamation works. Within this deposit was a British halfpenny, George IV, dated between 1825 and 1827 (cat #80445).[64] The coin was very worn and it may have been lost quite soon after the jetty construction (c.1827) and been subject to continuous trample from the wharf traffic to and from the mill.

Located to the southeast of the jetty wall remains, was a small patch of paving (context 9265) that once formed part of the initial jetty surface (Figure 3.5.35). It was recorded during the excavation of Area 9 (Vol 4: Plans 10.38, 10.60). The paving was a much more formalised surface material than recorded in Area 6. Though it was not physically linked to the other surface material, the pavers were laid directly over the bulk sand fills used to reclaim the land. The paving was also cut by a later drain (context 9204) that was dated to the 1840s and Barker's ownership of the mill. The pavers were small flat and irregular-shaped pieces of sandstone. The surface level was at RL 0.88m, a similar level to that recorded further to the northwest in Section 16. The paving did not exist to the north and it was not clear if it ever did. During the excavation, this area was extremely soft and 'boggy' at this level, creating great difficulty in using the machine in this area. It appeared that the bulk sand fills had not been consolidated to any great extent prior to further land filling in the 1830s and 1840s by Barker. It may be that if more formal surfacing, such as pavers, had existed here, they may have been removed during later 19th-century development works.

Accumulated over the pavers was a thin wash of dark brown silt material (context 9266). One interesting artefact from this material was a lead token or counter with a pelleted starburst relief design on the single die-struck obverse (cat #80334).[65] Similar lead tokens or counters have been found in small numbers on many pre-1840s sites in Sydney and Parramatta. Their exact date of

[64] Casey & Lowe artefact database. See also Vol 3, Section 8.2, Miscellaneous Report.

[65] Casey & Lowe artefact database. See also Vol 3, Section 8.2, Miscellaneous Report.

manufacture is not known. These items always have a limited range of simple poorly-rendered designs, many of which are variants of a spoked wheel. Their purpose is not fully understood and it is thought that they may have (also?) been used as work jettons given each day and then exchanged for real wages perhaps at the end of the week.[66] It is likely this token was dropped by a worker at Barker's mill.

Figure 3.5.32: Compacted crushed white sandstone surface 8478 (red arrow) in Section 27. This was located on the eastern side of Area 6 where it joined with Area 9. In the foreground is the gentle sloping weather-eroded sandstone shore 8474. The sand and crushed sandstone fills below were deposited to 'fill in' behind the jetty wall and raise the levels above the high water mark. View to south. Scale 1m.

Figure 3.5.33: Section of the jetty surface excavated in plan. The compacted crushed white sandstone and clay deposit (context 8439) that formed the surface (arrowed) overlay the jetty infill 8440 that also formed part of the surface (below the scale). Black silt accumulated over this surface (top of photo). The jetty wall is on the left of the photo. View to northeast. Scale 1m.

[66] Stocks 2013, Vol 3, Section 8.2.

Figure 3.5.34: Section #20 showing a compacted layer of crushed pinkish sandstone (blue arrow), context 8435, that formed part of the surfacing of the jetty. It overlies deep sand and sandstone fills that 'filled in' the jetty and raised the surface above the harbour floor (foreground and base of section) and above the water. View to west. Scale 1m.

Figure 3.5.35: To the south of Area 6, near the boundary with Area 7, was a small area of rough sandstone paving 9265. This surface was located above redeposited sands, similar to the jetty fills recorded in the north of the Area associated with the jetty wall. It was cut by the mill pond overflow drain (1840s?) and sealed by levelling fills that were introduced to the area after reclamation works in the 1840s. View to east. Scale 1m.

3.5.5 The Mill Pond

A large mill pond was created as part of Cooper & Levey's mill development in the southwest of the complex (Figure 3.5.6). It was located above the high tide mark and is at its closest to the harbour shoreline in the southeast corner. Its southwest corner was excavated through naturally deposited sand and silts, and bulk fills appeared to have been used to reclaim land behind the jetty wall. The construction of the mill pond in this part of the mill complex was largely determined by the location of the creek mouth. Also, the natural attributes of this general location had previously facilitated the formation of a lagoon that at one time filled with freshwater from the creek. The archaeological evidence for such a landscape feature is discussed in Section 3.2.5.5. It was not possible to fully investigate the mill pond structure or its relationship with the surround natural landform due to the presence of potential acid sulphate soils (PASS).

The mill pond is first recorded on Hallen's 1828-1830 sketch of the area, but is not included on the 1833 survey (compare Figure 3.5.6 and Figure 3.5.7). On Hallen's sketch the pond is located in the southwest of the mill complex, just to the east of the jetty, and above the high tide level (Figure 3.5.36). The sketch also illustrates the pond as two separate structures located to the southwest of the mill building and it is fed by a stream from the east and to the west, and perhaps a watercourse or drain is depicted exiting into the harbour. There is also a channel or path drawn on the plan from the western side of the lower pond heading north toward the western side of the mill building. No information is given regarding the mill-pond structure apart from dimensions. The sides of the pond are drawn with straight edges.

Figure 3.5.36: Hallen's field book from 1828-1830 showing two separate mill ponds (red arrows) fed by a stream from the east (blue arrow) and perhaps with an exit channel to the west and maybe a path or a drain/channel to the mill building. SRNSW.

The northwest corner of the southern pond, as illustrated in Hallen's sketch, was within the excavation area and was included as part of the excavation of Area 9 (Figure 3.5.37; Vol 4: Plan 10.38). The archaeological evidence from the site provided further detail about how the pond was constructed and what it may have looked like. The construction of the mill pond and the jetty both required large-scale earthworks and it would appear from the archaeological evidence that they were undertaken concurrently. The western edge of the mill pond was built into the bulk sand fills used to create the raised jetty surface. A timber revetment, consisting of long timber planks driven into the jetty fill and natural foreshore sands, formed the northern and western pond edge. Surrounding this revetment was a clay bank. This provided extra support to the exterior of the pond. The western edge was further consolidated and protected from the tidal influence by a deep and narrow clay-filled cut that would have acted as an impermeable barrier to the tidal fluctuations. Located at the southern extent of the excavation area, and part of the mill pond structure, was a brick and timber structure that may have served as a base for a pumping system, such as the one referred to in the 1826 description of Cooper & Levey's mill.[67]

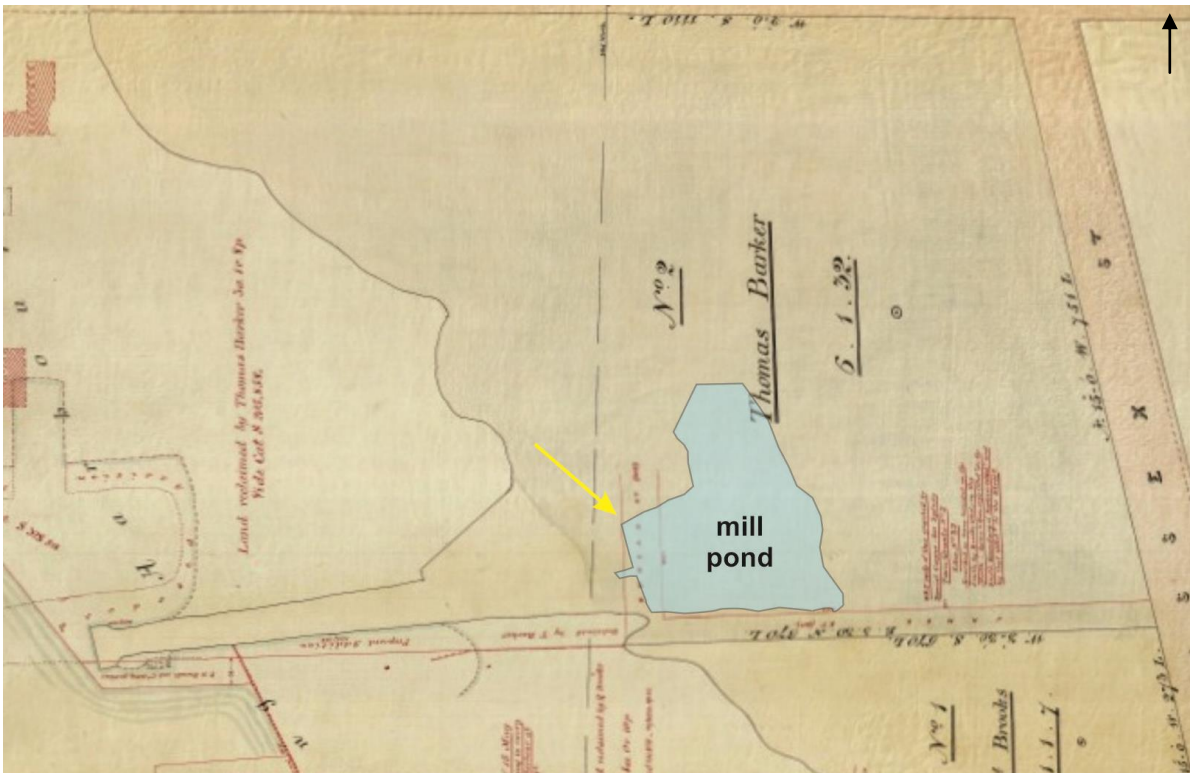

Figure 3.5.37: Approximate location of the mill pond taken from the 1855 survey and overlaid onto the 1833 survey to show its relationship with the jetty. The yellow arrow points to the part of the mill pond that was within the excavation of Area 9. Much of the mill pond should survive to the east, beneath Harbour Street. City of Sydney Archives with additions by Cryerhall.

[67] *The Monitor* 15 September 1826, p 6(3). See also Section 3.5.3.

3.5.5.1 Timber Revetment

The main structure of the mill pond consisted of timber walling (context 9251) (Figure 3.5.38, Figure 3.5.39). It was constructed with of a series of individual timber planks driven into the ground, as demonstrated in TT59 to the north (Vol 4: Plans 10.38, 10.39, 10.60). On the western side in TT69, it appeared that the timber planks were placed within a clay-lined cut (Vol 4: Plans 10.38, 10.40, 10.60). The timbers were placed quite closely together and were between 40mm and 60mm apart. The planks were between 1m and 2m in length and on average 200mm in width, and 100mm in breadth. The top of the timber walling was exposed between RL 1.4m and 1.6m, level with or about 200mm above the surrounding ground level. In TT69 the base of the timbers were recorded at around RL -0.7m.

The secondary row found on the interior of the northern wall may be evidence of repair or consolidation work (Figure 3.5.40, Figure 3.5.41, Figure 3.5.41). Between the double row was a fine grey silty clay packing (context 9260) that may have acted as a waterproofing agent. The mill pond was constructed through ground that was created during the reclamation works for the jetty construction, and as such consisted of bulk fill material of varied stability; sands, crushed sandstone and clays. The timber walling therefore formed a revetment around the exterior of the pond that prevented the sides from collapsing

Analysis of three samples taken from the timber revetment identified the wood used as *Eucalyptus saligna* (sample #134), *Eucalyptus siderophloia* (sample #147) and *Eucalyptus pilularis* (sample #171) (Figure 3.5.43). All tree species are hardwood eucalypts endemic to the Sydney region. *Eucalyptus saligna* or Sydney blue gum is common along the coast of New South Wales, as well as parts of Queensland.[68] It grew naturally in the Sydney area and was particularly heavily forested in the north western suburbs now known as Pennant Hills, Epping and Ryde from the first few years of European settlement, and by 1823 was being obtained from as far out as Annangrove and Kenthurst.[69] *Eucalyptus siderophloia* (grey ironbark) and *Eucalyptus pilularis* (Blackbutt) were also readily available in the Sydney area at the time of the mill pond's construction, and were particularly abundant in the Turpentine-Ironbark Forest, which is likely to have extended to within 1km of the site.[70]

All three tree species were identified as suitable for construction soon after British settlement and continue to be used for similar purposes today.[71] Blue gum timber was historically used in flooring, construction, and ship building, and grey ironbark was recognised as suitable for naval purposes.[72] The lining of the mill pond was therefore made of timber which was likely to have been obtained relatively locally, and which was typically used for such purposes. This is consistent with the use of both blackbutt and grey ironbark in the earlier timber-built boat ramp (context 8377), and the contemporary the use of blackbutt as formwork (context 8460) for the jetty wall (context 8366).[73]

[68] Boland *et al* 2006: 294.

[69] Hudson & Henningham 1986: 3, 10.

[70] Benson & Howell 1990: 42-44.

[71] Hudson & Henningham 1986: 5; Bootle 2005: 252, 278, 287.

[72] Hudson & Henningham 1986: 5, 8.

[73] Kuiters 2010: 14, Vol 3, Section 8.8.

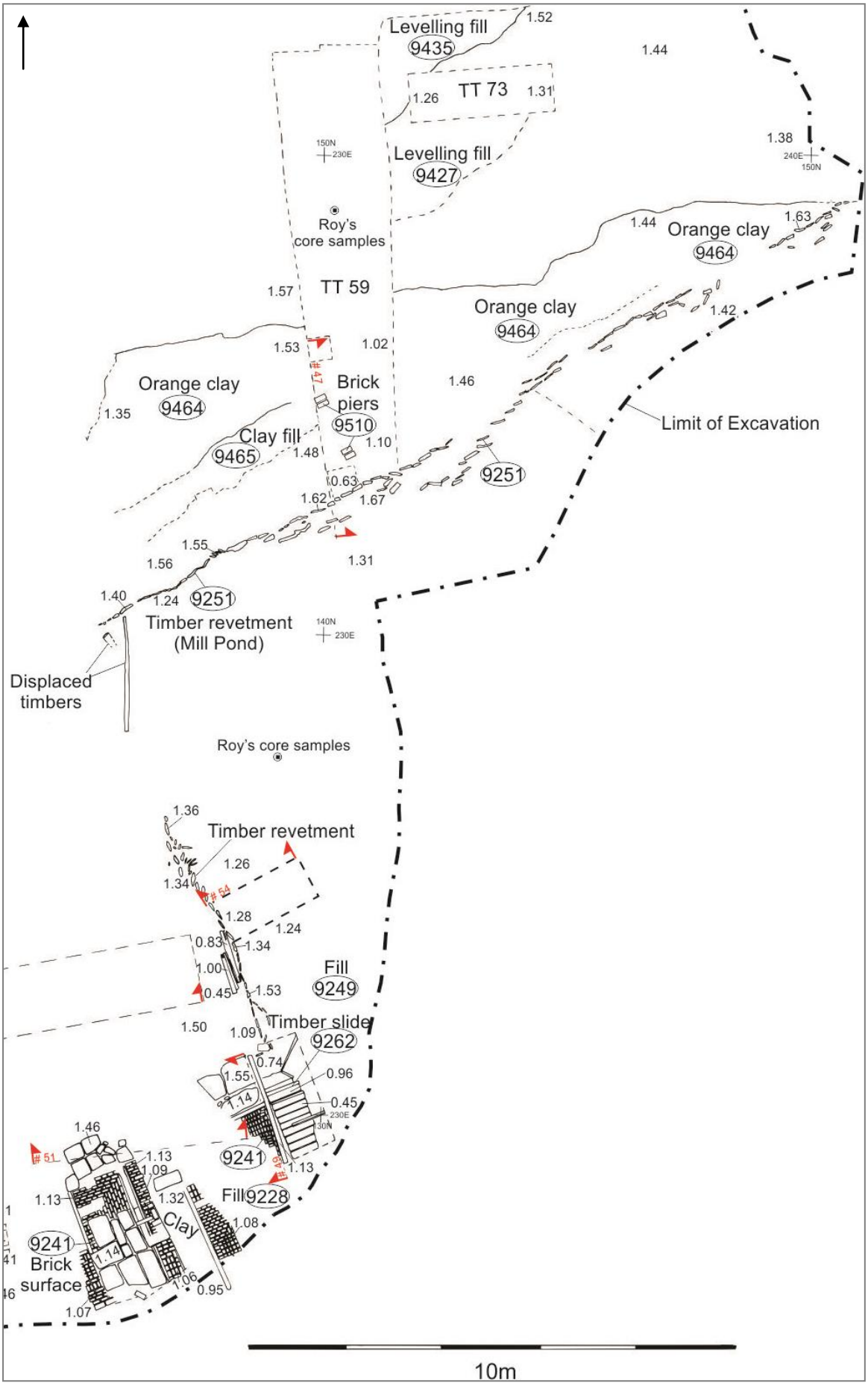

Figure 3.5.38: Extract from the detailed plan of Area 9 showing the mill pond remains. Vol 4: Plan 10.38

Figure 3.5.39: The timbers formed a revetment on the northwest corner of the mill pond, the red arrow indicates the north wall and the blue the west wall. View to west. Scale 1m.

Figure 3.5.40: The timbers forming the northern part of the mill pond revetment looking towards the yard area of the mill. There was a double row of timbers along this section. View to northwest.

Figure 3.5.41: Detail of timbers within the northern wall showing the mix of cut and un-worked tops. View to north from within the pond. Scale 1m.

Figure 3.5.42: The row of timbers on the northern wall which had collapsed into the pond. View to west. Scale 1m.

Figure 3.5.43: Timber samples from the mill pond revetment 9251. Note the pointed ends but otherwise unworked. These samples were identified as Blackbutt. Scale 1m.

3.5.5.2 Clay Lining and Clay Bank

The timber revetment on the western side of the pond was constructed within a cut that was clay-lined, as demonstrated at the eastern end of TT69 (Figure 3.5.44, Figure 3.5.45; Vol 4: Plans 9.7, 10.40). The ground on the eastern side was excavated, or cut to create the mill pond. The cut was at least 1m in depth and was through the surrounding sandy reclamation fills and natural foreshore sands. The side of the cut was then lined with grey and greenish-coloured clays with sand inclusions (contexts 9290 and 9296). The use of clay and clay-like material to line channels and reservoirs to make them watertight is known as 'puddling'. 'Puddled clay' is usually made by mixing heavy clay with some water to make it more malleable. Sand or grit can also be added to this mix. The puddled clay is then used to line the interior of the structure. The mill pond was excavated through ground that consisted of sandy reclamation fills with foreshore sand flat deposits below, and the clay lining recorded in TT69 illustrates this process of puddling.

There was no evidence for a clay-lining on the northern side. However in TT59, the natural sand flat level was sealed by an extensive deposit of dense greenish clay, context 9466 (Figure 3.5.46). This clay would have functioned in the same way and was likely to have been deposited as part of the puddling process.

Surrounding the outside of the timber revetment was a clay bank or bund (Figure 3.5.47, Figure 3.5.48). The top of the bank material was located between RL 1.35m and 1.6m; around the same as the surrounding ground level. The bank was made from several bulk fills of mostly dense plastic orangish and pinkish clays recorded as contexts 9464 and 9465 on the northern side, and as 9289, 9288 and 9237 on the western side. It survived best on the northern side where it was up to 3.5m in width. In TT59, the depth of the bank material was recorded as being up to 600mm. It was formed over a general bulk fill clay-rich layer context 9466 that sealed the natural ground, located at 1.2m below the top of the bank. On the western side not much of the bank survived as it had been truncated by modern services (Figure 3.5.49, Figure 3.5.50). It was recorded in TT69 as being at least 6m in width and up to 750mm in depth.

The materials used to form the bank consisted of the heavy and dense natural clays that are found in association with sandstone bedrock, and therefore could have been easily sourced locally. Such clays are highly impervious to water and may have been used to enclose the mill pond as part of the puddling process, while also providing further stability and buttressing to the structure. The clays appeared mixed and had a sand content and they may have been processed prior to being used in the same way as the puddling clay lining of the mill pond.

Figure 3.5.44: Machine-excavated test pit at the eastern end of TT69 to investigate the construction of the mill pond. Outside the timber planks forming the mill pond revetment wall was a clay-lined cut, indicated by the dashed yellow line. View to southeast.

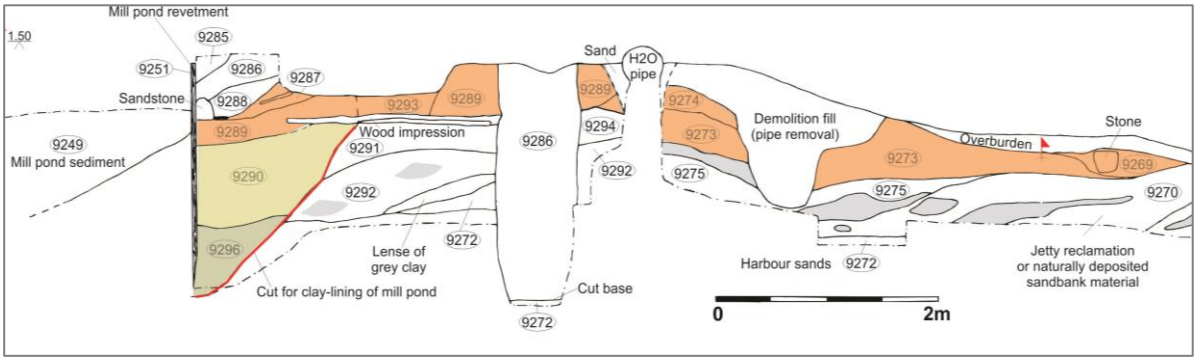

Figure 3.5.45: North-facing section of TT69 showing the clay-lined cut and the timber revetment. Highlighted in orange are the clay fills that formed the external clay bank. These were deposited over mixed natural harbour sands that were either the remains of a naturally deposited sandbank or fills associated with the jetty reclamation process. Extract of Cryerhall, Plan 9.7, Plan 10.40 (Vol 4).

Figure 3.5.46: Detail of the east-facing section of TT59 located on the north side of the mill pond (left of picture). The arrows indicate the dense clay fill, context 9466, located above the natural harbour sands on this side of the pond. This material was an extensive deposit rather than the lining or fill of cut as seen in TT69 on the western side of the mill. This clay fill appeared to have been a temporary surface level, as indicated by the sandstock brick pads used prior to the formation of the clay bank (orange and pink clay above). View to west. Scale 1m.

Figure 3.5.47: Clay fills forming a bank around the northern side of the mill pond. The line of the clay is indicated by the yellow dashed line and the mill pond with a blue dashed line. View to west. Scale 1m.

Figure 3.5.48: Clay bank on the northern side of the mill pond during excavation. This photo shows the surviving height of the bank, in the section on the left and right of the photo. View to north. Scale 1m.

Figure 3.5.49: Photo of the western side of the mill pond and the remains of the clay bank truncated by modern services such as the yellow pipe and the brick junction pit. The extent of the clay bank is indicated with the dashed red line. View to west. Scale 1m.

Figure 3.5.50: Eastern end of TT69 showing the clay fills 9289, 9287, 9288 and 9237 (yellow lines) that formed the bank overlying the clay lining 9290 (blue line) and abutting the timber revetment 9251. The bank is cut by a later clay filled feature 9286. View to south. Scale 1m.

3.5.5.3 Brick and Timber Structure

Connected to western side of the mill pond were the truncated remains of a timber and brick structure (context 9241) (Figure 3.5.51, Figure 3.5.52; Vol 4: Plan 10.38, 10.41). Contemporary with the mill pond construction, it has been interpreted as perhaps being a foundation pad for a pump that brought water from the mill pond to the boilers. Overall, the structure measured 4.5m east-west by a minimum of 2.75m north-south (Figure 3.5.53). It was built into the clay bank material and consisted of a timber-frame inlaid with sandstock bricks to form a pad or foundation-type structure.

The frame consisted of north-south and east-west timbers creating almost square sections. The individual timbers were mostly planed square and ranged in size. The north-south timbers were laid on top of the east-west and nailed or bolted where they joined. The east-west timbers were cut at the point of intersection to allow the level placement of the north-south timbers. As the structure was truncated, it was difficult to determine the original overall plan, layout and dimensions, or that of the individual elements. Enough survived to indicate that it consisted of possibly six north-south timbers laid on possibly four or five east-west timbers, thus creating five columns (north-south) with three rows, each compartment 1.25m by 1m and in total 5.5m east-west by c.3m.

Figure 3.5.51: Structure 9241 (surviving extent indicated with dashed red lines) was located on the western edge of the mill pond revetment. It was constructed with a timber frame inlaid with sandstock bricks. This photo shows it buried beneath a modern brick structure. View to the west. Scale 1m.

Figure 3.5.52: View of timber and brick floor structure 9241 from the south. It was truncated by a modern service pipe and brick-built culvert, and later sandstone structure 9240 was built over it. Photo taken looking north, the mill pond is located just to the right (arrow). Scale 1m.

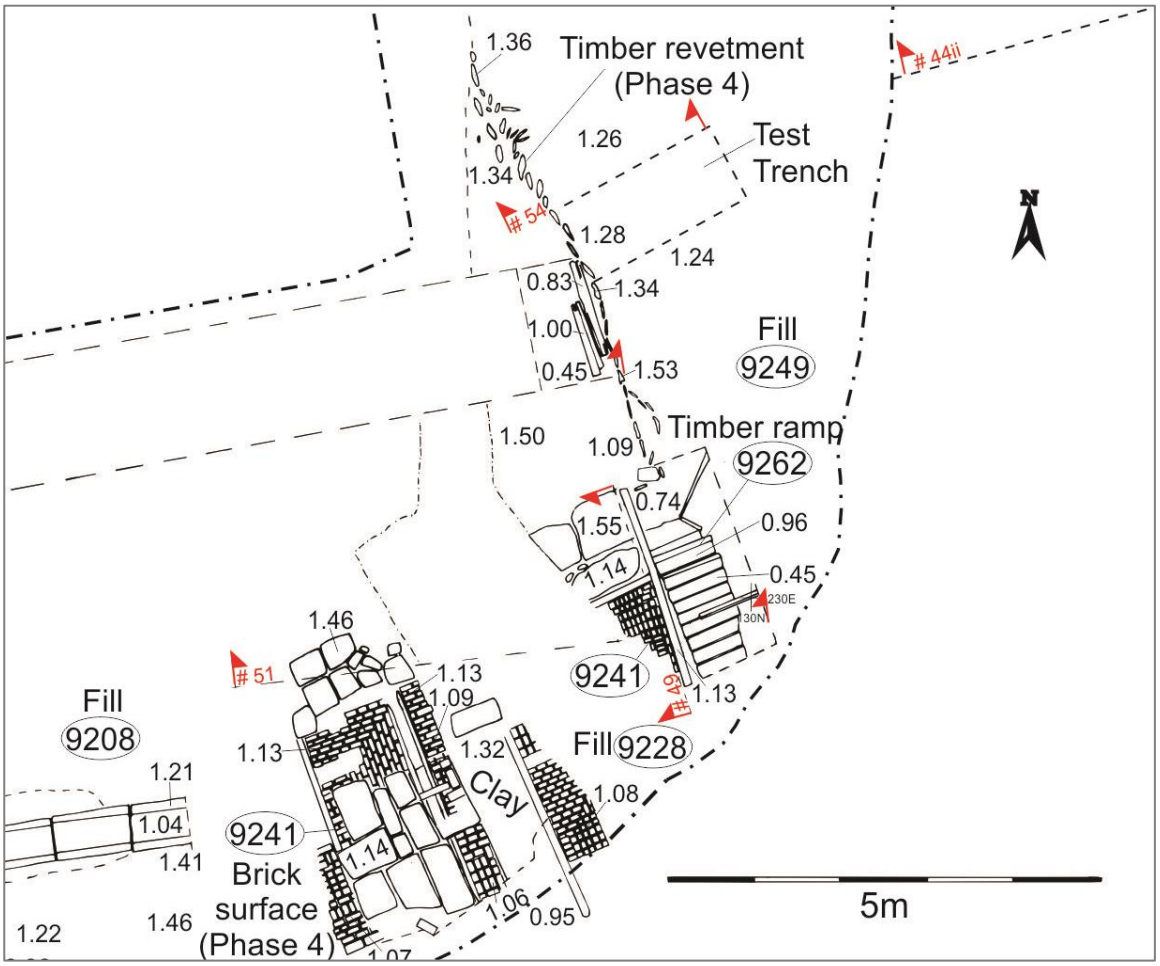

Figure 3.5.53: Extract from the detailed site plan of the mill pond showing the timber and brick flooring context 9241 adjoining the western side of the pond. Vol 4: Plan 10.38.

Each compartment was inlaid with sandstock bricks tightly set on their ends (Figure 3.5.54). There was no overall pattern to the layout as some were placed in rows side-to-side and some face-to-face. The gaps between the bricks were packed with a greyish brown 'mud mortar', consisting of silty clay with inclusions of grit and sand. The surface created by the bricks was worn in places, reflecting variations in the quality of the bricks. Three samples of bricks were taken from 9241 (sample #s 140, 141, 142) and are dated between 1800, perhaps earlier, to the 1850s (Robyn Stocks pers. comm.). This date range fits nicely with the mill pond construction date in the late 1820s.

The structure was attached to the western revetment wall of the mill pond and associated with two other structural elements; a sandstone wall (context 9250) and a timber ramp (context 9262) (Figure 3.5.55). Structure 9241 was located 9.5m south of the northwest corner of the pond where there was a break in the revetment. A sandstone wall abutted both the brick pad structure and the timber revetment (Figure 3.5.56). At a height of two courses over a footing, the top of the wall was at a similar height to the revetment. It only survived for a stretch of 1.2m heading west as it was truncated by a 20th-century brick-built culvert. The wall was on the same alignment at the timber frame of 9241 and formed a 90º angle with the pond revetment 9251.

Attached to the eastern end of structure 9241 and projecting into the mill pond was a timber 'ramp' 9262 (Figure 3.5.57). This was constructed using 10 timber planks laid side-by-side. The northern edge had a timber on its side forming an edge. The planks formed a ramp-like structure into the mill pond and it was at least 1m in length (Figure 3.5.58). It was set at a 45º angle and was nailed or

bolted to the timber frame of the floor 9241 (Figure 3.5.59). Behind the ramp was the clay lining, context 9263, a pale yellow and grey sandy clay. Mill pond sediment 9249 accumulated against the ramp.

Structure 9241 was clearly associated with the mill pond. It's method of construction created a solid and durable structure that would have been capable of supporting a heavy weight, such as a piece of machinery. The mill pond acted as a reservoir and supplied the boilers with fresh water to convert to steam to power the mill engine. This water needed to be transported to the boilers and the structure 9241 may have been associated with a pumping system by providing a strong base for a large pump.

Figure 3.5.54: Detail of the sandstock brick surface inlaid within the timber frame. These were tightly set and placed on their ends with 'mud mortar' filling the gaps. Scale 1m.

Figure 3.5.55: Two further structural elements, sandstone wall 9250 and timber ramp 9262, were associated with floor structure 9241 and these were located at the point where it joined with the mill pond revetment (yellow dashed line).

Figure 3.5.56: Detail of the internal face of sandstone walling 9250 and its junction with the timber revetment 9251. View to the north. Scale 1m.

Figure 3.5.57: Timber ramp 9262 attached to the eastern element of the timber frame of 9241. Note the timber forming the northern edge (arrow). The ramp rested on packing clay 9263 and mill pond sediment had accumulated around it. View to the northwest.

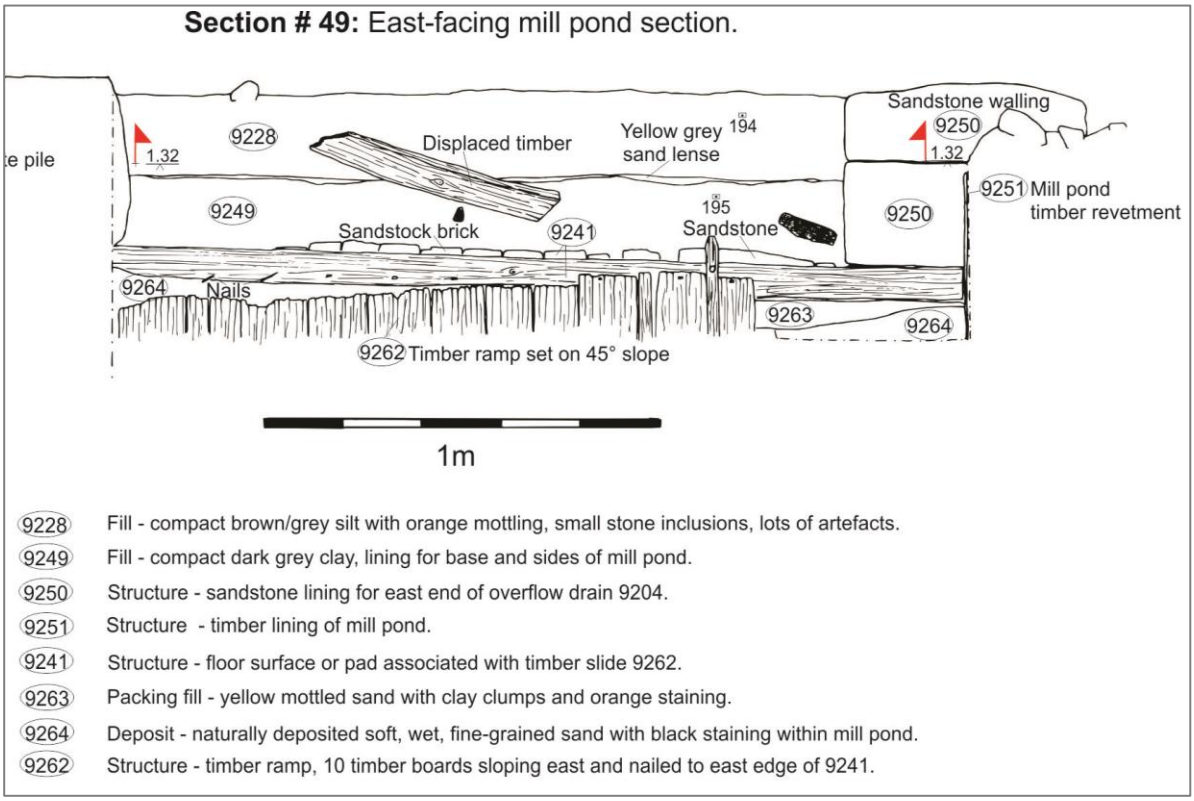

Figure 3.5.58: East-facing section of the mill pond and timber ramp, also showing the relationship with sandstone walling and the brick and timber flooring. Extract from Vol 4: Plan 10.41.

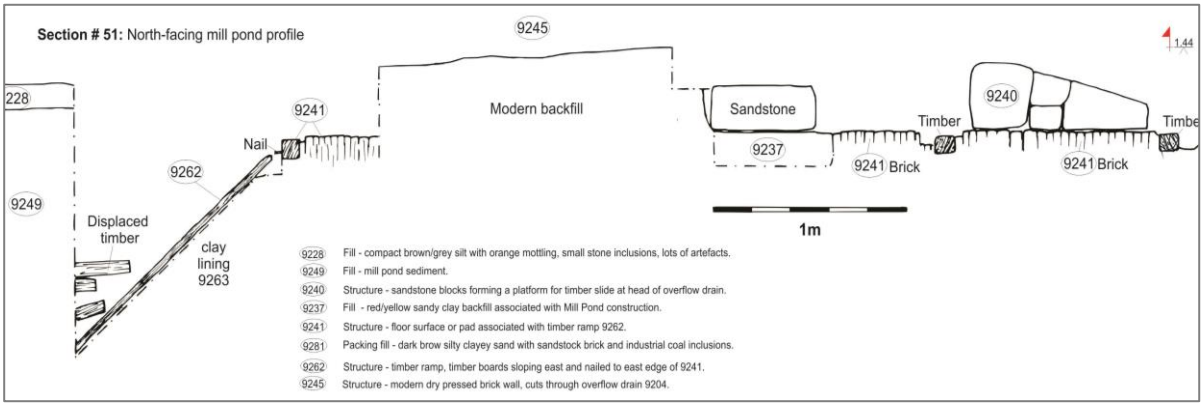

Figure 3.5.59: North-facing section through the brick and timber floor 9241 and the timber ramp 9262. Extract from Vol 4: Plan 10.41.

3.5.6 Cooper & Levey's Mill Yard

As part of the mill complex development, Cooper & Levey also built a large five-storey sandstone mill building, and imported and erected a steam engine to power the mill. The mill building was located to the north of the mill pond, on the original property boundary with Ramsay's land to the north. Hallen's 1828-1830 sketch records two annexes on either side of the main building (Figure 3.5.2). The western annex is later recorded on an 1847 as 'the boiler and engine house' (Figure 3.5.62). The sketch also records a long building to the east of the mill pond that is identified as a 'smithy and dye house' on the 1847 plan. It is not known whether Cooper & Levey were responsible for the construction of the eastern annex or the structure to the east of the mill pond, or whether these were some early additions by Thomas Barker following his purchase of the mill in 1827. Remains of the mill building were recorded during two previous archaeological investigations. In 1986, substantial remains of the southwest corner were exposed and recorded