

The Excavation of a Brick Barrel-drain at Parramatta, N.S.W.

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One of the most important contributions that can be made by historical archaeology is to throw light on aspects of the past neglected by most historians. Drains, for instance, have tended to be ignored by traditional scholarship. Yet the development of drainage systems of one sort or another was extremely important to the occupants of Australia's towns and cities during the 19th century. In the following paper Edward Higginbotham, a consultant archaeologist in Sydney, discusses his excavation of a part of what must be one of Australia's earliest drains: a brick stormwater drain built under Parramatta during the 1820s. As he explains in his paper, this drain must have played a very important part in the development of Parramatta, the centre of which had poor natural drainage. Indeed, the drain continues to function along most of its course and it is particularly encouraging to learn that a section of the excavated part is to be preserved on display to the public.

Excavations on the course of an early colonial brick barrel-drain were undertaken in June 1981 at 126-138 George Street, Parramatta, prior to the development of the site with the construction of an office building.

The significance of the drainage system became known to the Heritage Council in 1980, when a short section to the north of Phillip Street was exposed during construction work. Its appearance and alignment towards the Lancer Barracks and the Convict Barracks suggested that it might have been constructed in the 1820s during Macquarie's Governorship.¹ Subsequently, plans obtained from Parramatta City Council indicated that the barrel-drain was still in use along most of its course, but did not serve the sites originally occupied by the two Barracks.² The development on George Street provided an important opportunity to solve some of the problems raised and to study an aspect of early town planning often ignored.

Apart from its upper reaches, the whole course of the drainage system was shown on the plan provided by Parramatta City Council. It commenced near the junction of Argyle and Church Streets, and crossed Macquarie, Smith, George and Phillip Streets before it emptied into Parramatta River (Fig.1). Its original source may have been obscured by the construction of the railway embankment in the 1850s, but thorough research has indicated that the drain did not reach beyond the junction of Church and Argyle Streets.³ The purpose of the drainage system is closely related to the topography and street plan of Parramatta (Fig. 1). The site of the town at the head of navigation on Parramatta River was originally chosen by Governor Phillip in 1790 to develop and service the growing farming community.⁴ It was also the first point at which the River was bridged, allowing easy access to all the surrounding districts. The site however did have various disadvantages; it was located within a shallow river valley between low rounded hills, partly on a shoulder of land, between 8 and 12m above sea level, which approached the river bank itself.⁵ As land grants were made surrounding the town, expansion

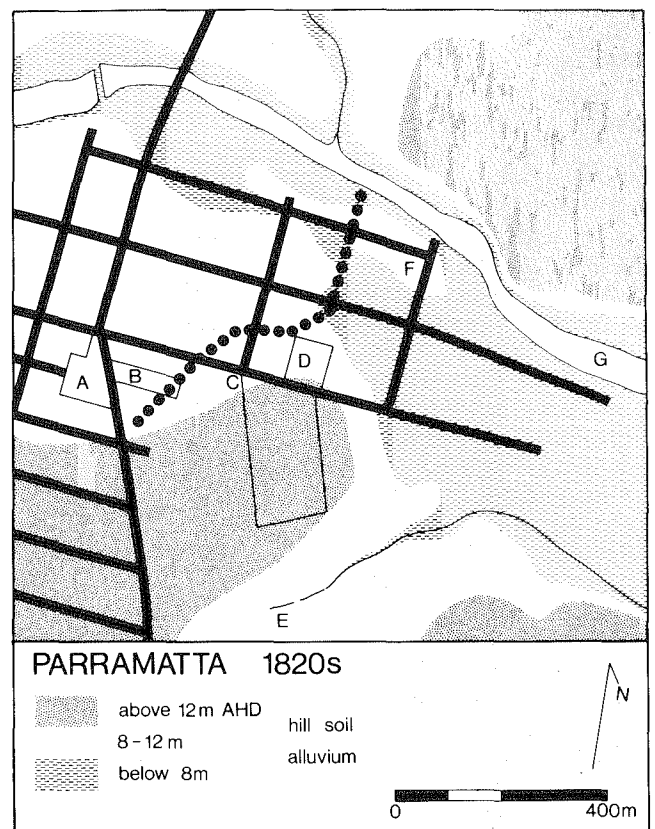


Fig. 1: Plan of Parramatta in the 1820s showing street layout and other topographic details. The course of the brick barrel-drain is shown (dotted). The E-W streets from the top are Phillip, George, Macquarie, Hunter, Argyle and other streets. The main cross-streets from left to right are Marsden, Church, Smith and Charles. Other features are as follows: A-Church; B-Market and Pound; C-Lancer Barracks; D-Convict Barracks; E-Clay Cliff Creek; F-Terrace along south bank surviving above 8m AHD; G-Parramatta River.

was forced in some circumstances onto lower land, even below 8m, which was subject to periodic flooding and remained poorly drained.

Detailed studies of the original drainage patterns and catchment areas around Parramatta have been undertaken by the N.S.W. Department of Agriculture.⁶ These have indicated that not only the low lying river flats but also the main part of the town would have been poorly drained. The base of the hills on the south side of the township would have accumulated rainwater runoff from the hill-slopes, so that in bad weather Church Street would have been nearly impassable at this point. Any drainage from this area would have percolated down the shallow gully across Macquarie Street, between Church and Smith Streets and eventually settled on the river flats at the eastern end of George Street. James Meehan's *Plan of the Town of Parramatta*, dated to 1810, shows two features which may be identified as swamps or ponds north of George Street, between Smith and Charles Streets. Except in very bad weather this catchment formed a closed system with no outflow into the River. The only natural outlet in times of flood was to the south of Charles Street into Clay Cliff Creek. Water could not flow directly into the River since it was impeded along the south bank by a river terrace or levée, part of which survives near Phillip Street to above 8m (Fig. 1). Thus the two main streets of the growing town, Church and George Streets, and the settlement in the vicinity would have continuously suffered from poor drainage. There can have been little incentive for the free settlers or emancipated convicts to improve such undesirable land.

The effect of the brick barrel-drain on this particular catchment area was dramatic. It followed the shallow gully down across Macquarie Street and on one map dated to 1855 grates are shown where the street was carried across the drain.⁷ As the river flats were reached, the barrel-drain changed course and headed directly for the River through the terrace that had previously impeded drainage. Thus the stormwater from Church Street would have been rapidly carried away and the neighbouring land improved; the site of the Market and Pound would have received substantial benefit from the new facility. Furthermore the swamps and ponds indicated on Meehan's map of 1810 may have been thoroughly drained or at least the flow into them minimised.⁸ The lower part of George Street was thus provided with better stormwater drainage, as were all the other streets under which the drain passed.

Contrary to expectation the barrel-drain did not directly serve the Convict Barracks or the Lancer Barracks.⁹ It is possible that supplementary drains from the Barracks fed into the main drain but none were located. That other small drains did exist in the vicinity was indicated when a short section of drain constructed of rough-hewn sandstone blocks was uncovered in 1971 during construction works east of Smith Street. No dating material was available and it can only be assumed that it fed into the brick barrel-drain.¹⁰

Along its whole course the drain was constructed of a cylinder of brickwork, two courses of c.200mm brick, with an internal diameter ranging from 1200 to 1300mm. The courses of sandstock brick, bonded with lime mortar, were laid parallel with the length of the drain, the sides of the bricks facing the interior of the cylinder. It is clear that the lower half would have been constructed first, and the upper half then completed

with the use of wooden centring. It is either this construction method or the final appearance of the structure which led to the term 'brick barrel-drain'.

For most of its course the drain was laid just below the ground surface: on the north side of George Street its top was flush with the modern pavement. At this point and also to the south of Phillip Street straight joints appear in the brickwork possibly indicating that sections were built separately, especially across the main streets.

Excavations were undertaken between George and Phillip Streets and four trenches, the longest 18m long, were excavated by machine through modern deposits to the top of the drain, and the remaining archaeological deposits investigated by hand.

For the first 80m to the north of George Street the drain crossed a low-lying area which would have originally been a marsh, as shown on J. Meehan's map of 1810.¹¹ In the northern half of this marsh the original surface dropped away so that for approximately 30m the drain had to be raised up. To lend the structure some stability sand and clay were dumped around the drain as it was being constructed (Fig. 2). However, by the 1930s this section had collapsed but was repaired by capping the lower half of the drain with reinforced concrete slabs.¹² Within another 20 years this section had been bypassed with cement piping to divert the drain around a newly constructed warehouse. The old section was either allowed to collapse or its concrete capping was deliberately pushed into the drain and infilled. For this reason the fill of the drain is very modern and only in restricted areas were there any silt deposits that had not been scoured away by stormwater.

It has been suggested that only the lower half of the drain, or in other words an open drain, was originally constructed across this marshy area. However, this situation is unlikely since the concrete capping not only covers the drain at this point but also towards Phillip Street where it was buried in the river terrace. Under this terrace construction of the complete cylinder would have been expected, thus the capping may best be interpreted as repair after collapse rather than closing in an open drain.

To the north of the marsh and before it emptied into Parramatta River, the drain is deeply buried in the river terrace, up to 3m below the present surface. The stability of the clay subsoil has allowed the brick barrel-drain to remain intact and well preserved for about 50m in the vicinity of Phillip Street (Fig. 3).

Because of the scarcity of historical documentation for early drainage works, it has been necessary to rely upon construction materials and other artifactual remains for dating. Three types of sandstock brick used in the construction of the drain have been identified, the first with an oval depression or frog was restricted to the drain north of Phillip Street,¹³ and the remaining two types were recovered from the excavations in 1981. Between George and Phillip Streets most of the brickwork consisted of sandstock brick with arrow frogs, but a small proportion was made up of re-used brick from the Convict Barracks. (This latter brick was roughly made, coarsely pugged and had no frog. Traces of the original bonding material remained in addition to the shell lime mortar of the drain.) The primitive nature of all these bricks, with coarsely mixed clay and the addition of a few cinders, suggests an early date

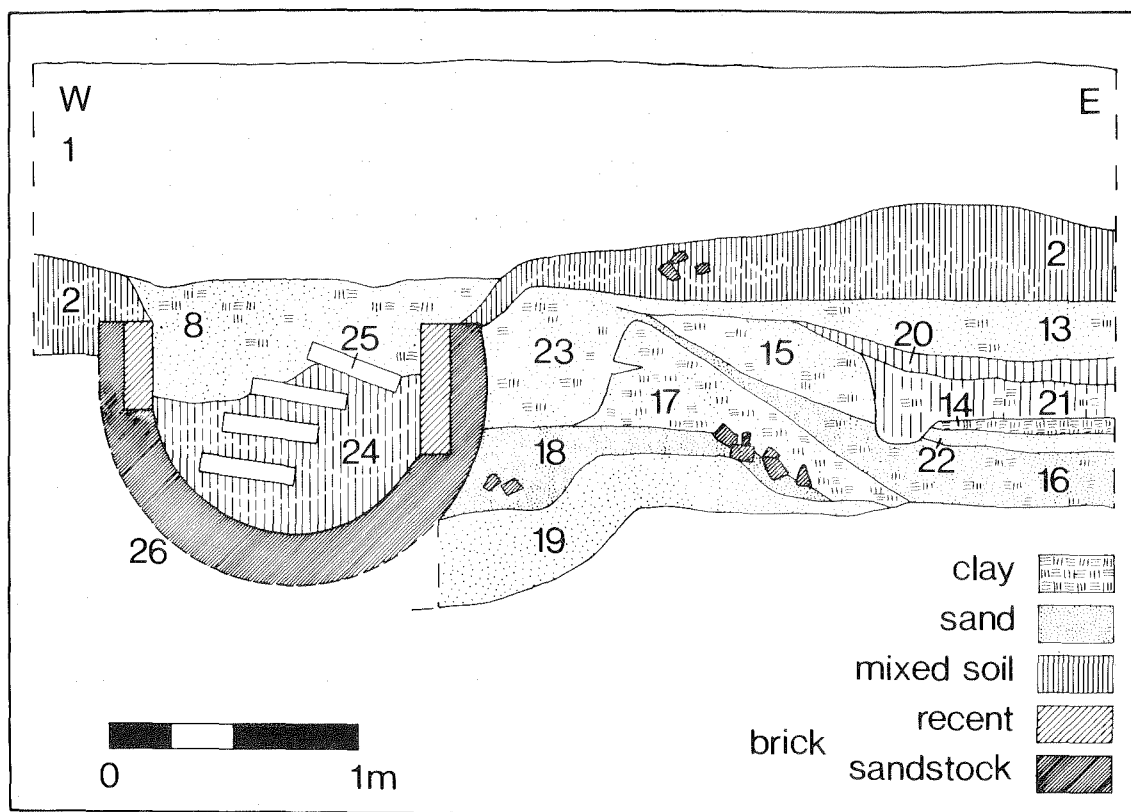


Fig. 2: Trench 1, Section 1. Section of the brick barrel-drain with 20th century modifications. The natural subsoil at this point is alluvial sand. The drain (context 26) is slightly cut into this surface and supported by dumps of sand and clay (contexts 15-19, 23) to form an embankment. Some occupation is indicated by various deposits (contexts 13, 14, 20-22?). A well mixed but disturbed top soil (context 2) was developed or deposited after construction, but was partly removed in the 1930s when the drain was repaired with a capping of concrete slabs (context 25). In the 1950s the drain was deliberately filled in, the concrete slabs broken up and pushed into the drain with surrounding top soil and fill (contexts 24, 8). Directly afterwards the whole area was raised up with dumped debris and soil (context 1). The invert level of the drain is 5.245m AHD.

prior to the 1840s. This is confirmed by the use of shell lime mortar, as lime from limestone was scarce until well into the 19th century. The arrow is very instructive, since in Sydney arrow frogs are restricted to 1815-1832,¹⁴ and furthermore it indicated that the bricks were crown property and supplied for public works. That a variety of brick types were used in the drain may imply that the remainders of various job lots were used up and additional bricks 'scavenged' from various sources. The re-used bricks from the Convict Barracks in the original structure of the drain indicates a construction date contemporary with or later than the former, that is post 1820-1822.¹⁵

Very little artifactual material was found in deposits contemporary with the construction of the drain, most were found scattered in the humic soil that was deposited afterwards. Ceramics and glass from construction layers, although only a small sample, provided a consistent date bracket of 1810-1830/40. The humic soil overlying the drain provided a date range from 1840 onwards, but the majority of datable artifacts fell into the 1840-1880 bracket.¹⁶

Thus from building materials and artifactual remains a date range for construction of 1820/1822-1832 can be concluded and with the use of one series of historical documents this bracket can be further narrowed. The *Blue Books* or *Returns of the Colony* were completed on behalf of the Colonial Secretary for the years 1822-1857.¹⁷ From 1828 onwards each report has a list of public works undertaken during the year, and specific reference is made to drainage systems. In 1828 there is a reference to the repair of streets and drains in Parramatta, in 1828 and 1829 the drains at the Female Factory were constructed, as also those in Argyle Street in 1838. No other reference is made to any drainage works in Parramatta until after 1840, and it can be assumed that none took place even under contract. It is interesting to note that in 1828 drains were repaired and must have been in existence prior to that date. From the above evidence it can be concluded that the brick barrel-drain was constructed between 1820/1822 and 1827 inclusive.

A construction date in the early 1820s fits in very well with the known development of Parramatta. Since the beginning of Macquarie's governorship in 1810 a general building programme had been instituted, and much effort had been directed into improving the condition and standard of existing buildings and new construction. In some cases strict building regulations were a condition of land grants and leases.¹⁸ Such improvements continued even after Governor Macquarie, and it is in this context that the construction of the brick barrel-drain must be viewed. The effect of the new drainage system in improving the main streets and neighbouring town land in Parramatta was substantial.¹⁹ In addition other efforts were made to improve the township, for example in May 1823 the following article appeared in the *Sydney Gazette*:



Fig. 3: A section of the complete brick barrel-drain, about 1200mm in diameter, in the vicinity of Phillip Street, Parramatta.

whereas the allotments, with few exceptions, in the town of Parramatta, are held by naked possession without any shadow of right, and it would be desirable that individuals wishing to undertake improvements should enjoy a secure title, the Governor has been pleased to direct that those inhabitants who can show no better claim to the portions they now occupy than mere sufferance, do apply for formal leases within 3 weeks from the present date at the office of the Surveyor General'.

In this way attempts were made to diminish 'permissive occupancy' and give more incentive to improving property. All these measures eventually were effective so that in 1834 it could be reported that 'the Town of Parramatta, we are glad to observe, is following close after Sydney, in the work of public improvements. Now buildings of very respectable appearance are springing up in various quarters'.²⁰

The excavations were funded by the Government Insurance Office of N.S.W., and undertaken on behalf of the Heritage Council of N.S.W. A section of the drain is to be preserved and on display to the general public, and a small permanent exhibition will be mounted in the main entrance of the new office building when completed. The action of the Government Insurance Office in preserving an important aspect of our heritage is applauded, and it is hoped that other organisations and individuals will have a similar responsible attitude in future.

A full description of the excavation is available as a report to the Heritage Council, and full publication is forthcoming.²¹

NOTES

1. Personal communication, Helen Temple.
2. Engineering Department, Parramatta City Council, part plan no. 7943.
3. Investigations were made on the ground, using historic maps and documentation, and also consulting modern drainage plans.
4. J. Jervis, 1935. The development of settlement in the town of Parramatta, *Journal of the Parramatta and District Historical Society* 4: 64-65. Also J. M. Freeland, 1972. *Architecture in Australia*, Penguin, Harmondsworth, 18-19.
5. Roy Lawrie, 'Geology and Topography', N.S.W. Department of Agriculture, Land Use Assessment, Parramatta, in Higginbotham, E., 1981. *The excavation of a brick-barrel drain at Parramatta, N.S.W.*, Report commissioned by the G.I.O. and presented to the Heritage Council of N.S.W.
6. Lawrie, op. cit.
7. Anon., *Survey of all the streets in the Town of Parramatta South for the purpose of aligning the same, 1855.* (Parramatta City Library).

8. James Meehan, 1810. *Plan of the Town of Parramatta*. Confirmation of the identification of the two features as swamps or ponds was obtained by soil analysis on site by Roy Lawrie, N.S.W. Department of Agriculture, and also by contractors, R. P. Jeffery and D. Katauskas, 1981. *Report to Morrison Whitton Nicey Pty. Ltd. on foundation investigation for proposed GIO development, corner Charles and George Streets, Parramatta*, Report no. 1397.
9. During the development of the site of the Convict Barracks for a gymnasium for Arthur Phillip High School no drains were located. Had the brick barrel-drain continued on a N-S alignment it would definitely have been located during construction. Personal communication Jenny van Proctor. Also J. van Proctor, 1979. *Archaeological work carried out at Arthur Phillip High School, Parramatta*, Department of Works. A plan of Perth House, just to the south of George Street sketches the course of the brick barrel-drain and confirms that it changes its course directly to the south of George Street (FP 81169, Registrar General).
10. *Current in Prospect*, Oct 1971, p.9. Staff Journal of Prospect County Council.
11. Meehan, op. cit.
12. These reinforced concrete slabs may be closely dated to the 1930s: personal communication, Dr. George Gibbon and Colin Crisp, Technical Advisory Committee on materials conservation, Heritage Council of N.S.W.
13. This brick type was recovered during construction work in 1980.
14. Dr. George Gibbon, 'Building materials', Department of Geology, N.S.W. Institute of Technology, for Insearch Ltd., in Higginbotham op. cit.
15. N.S.W. Planning and Environment Commission and Parramatta City Council, 1974. *Historic buildings and sites, Parramatta*, an introduction by Helen Proudfoot. Also Freeland, op. cit., 41.
16. Lisa Newell, 1981. 'Ceramics', and Warren Wickman, 'Glass', in Higginbotham op. cit.
17. Colonial Secretary, 1822-1857. *Returns of the colony (Blue Books)*, State Archives, Reels 1ff.
18. Freeland, op. cit., 30-31.
19. Only the use of the drain for disposing of stormwater has been considered. It was certainly never a sewer, but may have served several purposes throughout the 19th century. Limited analysis of silts from the base of the drain by the Department of Soil Sciences, University of Sydney, tended to confirm stormwater drainage but did not discount small amounts of sewage disposal consistent with the drainage of streets or pasture.
20. *Sydney Gazette*, November 1834.
21. The complete archival report to the Heritage Council is available for consultation at the following institutions: the Heritage Council Library; the Mitchell Library, Sydney; Fisher Library, University of Sydney; and at the Heritage Commission.