THE TOWER MILL: AN ARCHAEOLOGICAL EXCAVATION OF QUEENSLAND'S OLDEST EXTANT BUILDING

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The Tower Mill, Brisbane's oldest extant building, was excavated by the University of Queensland to determine for the Brisbane City Council the heritage potential of surrounding subsurface deposits. Following the employment of GPR, excavation revealed interesting stratifications, features and artefacts. Analysis permits an explanation for these deposits which augment an already fascinating history of the site's use over the past 170 years or so.

Introduction

Brisbane's Tower Mill is the oldest extant building in Queensland, having been built in 1828 under the direction of Commandant Logan. It is located in Observatory Park on the southern side of Wickham Terrace and is a major landmark of the City of Brisbane (Fig. 1). In 1990 the Heritage Section of the Brisbane City Council granted funds to The University of Queensland Archaeological Services Unit (U.Q.A.S.U.) for the Tower Mill Archaeological Project (TMAP90) which sought to investigate for the B.C.C. the possibility that materials of heritage value lay beneath the soil. The project was directed by Jay Hall, who conducted preliminary non-invasive subsurface probing in January 1990 (see Hall 1991, Hall and Yelf 1993). Excavation was carried out in April 1990 under the field supervision of Bruno David and the subsequent analysis of recovered material was undertaken by Jon Prangnell as part of his BA Honours research. This paper reports primarily on the excavation and subsequent artefact analysis of this important historical site. It also presents a preliminary model to explain the depositional sequence as well as a chronology of the site based upon that sequence and its cultural content (see also Prangnell 1991). A more detailed analysis of this site, set within the theoretical framework of Australian historical archaeology, is to be published elsewhere.

Figure 1. The Tower Mill.

The Site and its Historical Setting

The Tower Mill is one of only two Brisbane buildings remaining from the convict era (the other is the Commissariat Store built in 1829). It has the longest historical record of any building in Queensland and this history mirrors the cultural development of the city from convict backwater to state capital. As a backdrop to the TMAP90 research an historical outline is presented below (refer Figure 2 for graphic historic representation). For a more detailed account the reader is referred to Heap (1983), Hogan (1978) and Prangnell (1991).

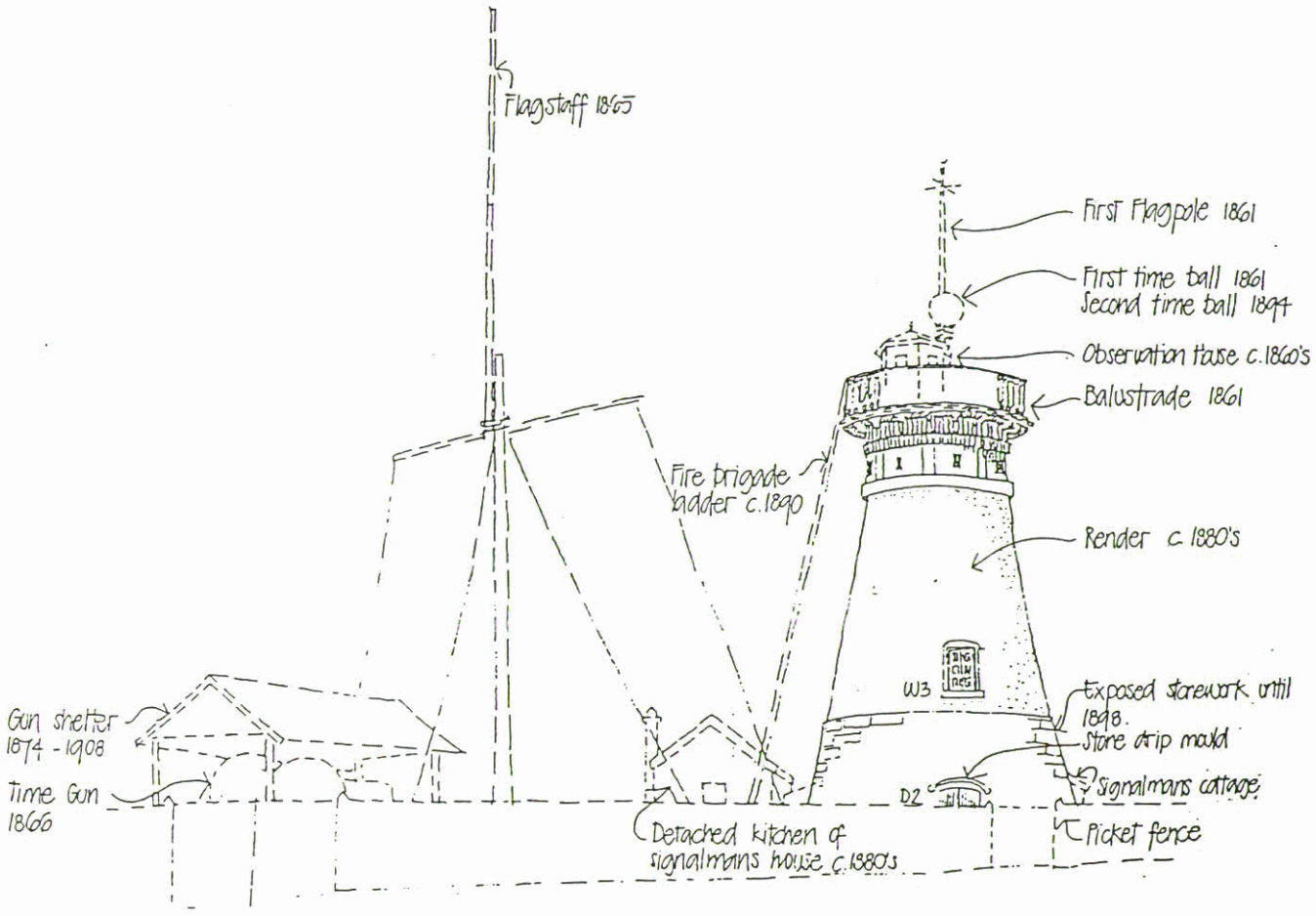

Figure 2. Changes to the fabric of the Tower Mill and Reserve (from Allom Lovell Marquis-Kyle 1988: Illustration 2).

The convict settlement at Moreton Bay was one of the recommendations stemming from Commissioner Bigge's Inquiry into the State of the Colony of New South Wales (Bigge, 1822). Consequently, in 1824 a settlement under the control of Lieutenant Miller was established at Redcliffe but in May 1825 it was moved to the present location of Brisbane (Johnston, 1988:18) and officially proclaimed a Penal Settlement on 15th August, 1826 (O'Keefe, 1974:1). Captain Patrick Logan of the 57th Regiment of Foot became the third commandant of the Moreton Bay Colony on 17th March, 1826 (Hogan, 1978:8).

Brisbane's Tower Mill was built "in the name of punishment ... [and] towards this end ... a sandstone and brick windmill was erected on the hill overlooking the settlement, with a treadmill from Sydney installed later" (Johnston 1988:30). It was constructed of sandstone quarried at Oxley (Gibbens, 1956 in Steele, 1975:68). Charles Frazer, the Colonial Botanist, reports a "freestone quarry" in that area (Steele, 1975:351), and Hogan (1978:214) indicates that the bricks were made from local clay at York's Hollow and that the "hewn stone blocks [were] obtained from Oxley".

Peter Beauclerk Spicer, the Superintendent of Convicts at Brisbane Town, kept a diary of the labour performed by convicts in the construction of public buildings for a 12-month period beginning February, 1828. According to Spicer's Diary and the journal kept by the explorer, Allan Cunningham, the original ground clearing in preparation for the construction of the Tower Mill commenced on July 25, 1828 and it was operational by late October, 1828 (Hogan, 1978:14-17).

The 1829 population of Moreton Bay consisted of 958 prisoners plus 190 military personnel and their families (Johnston, 1988:61). To feed this population 150 acres were put under wheat cultivation by May 1828 and Logan predicted that 1000 acres would be prepared by 1829 (Bateson 1966:112). However, the windmill did not prove very effective as a sail-driven device and a treadmill was considered as an alternative. According to Johnston (1988:60) Logan requested the treadmill be sent from Sydney as "effective control was difficult to secure without the threat of such punishment". The first documentary evidence of its use comes with the death of a prisoner, Michael Collins, on September 10, 1829, whilst working the treadmill. During the 1830s the Tower Mill was often reported in need of replacement parts from Sydney and in a continual state of disrepair. On February 20, 1836 it was struck by lightening which completely disabled it until May 1837. By February 5,

1838 it was again reported as "being out of repair" (Hogan, 1978:192).

On the evidence and advice of Governor Sir Richard Bourke to the Select Committee on Transportation the Moreton Bay Settlement was recommended to be closed and by November 1839 only 29 prisoners remained. In preparation for the opening of Brisbane for free settlement the New South Wales Government surveyed the area of Brisbane Town and used the Tower Mill as a trigonometrical station. At some point between 1839 and 1842 the Tower Mill was the scene of the execution of two Aboriginals, Merridio and Nengavil, who were convicted of the murder of surveyor Granville Staplyton and his convict assistant William Tuck (Heap, 1983:8). The order proclaiming Moreton Bay a penal settlement was rescinded on 11 February, 1842 (O'Keefe, 1974:8) and the area was made available for free settlement. In November 1849 the Tower Mill was sold (for £30) by the Government to The Deputy Assistant Commissary General, Edmonds Walker. The mill building was again offered for sale in 1850 but the sale was "not consummated" (Heap 1983:9). The sails, the original dome and the treadmill were most probably removed at this time. At an unknown date between 1849 and 1853 the Tower Mill reverted to Government control and the Government subsequently attempted to sell parts of the mill machinery.

In 1861 the Tower Mill building was renovated to become a signal station for shipping in the Brisbane River and between 1861 and 1922 it underwent four major changes: (i) renovation to a signal station (1861), (ii) the erection of a signalman's cottage (1881) and subsequent extensions and repairs (1883, 1894, 1898, 1899, 1904, 1905, 1908 and 1911), (iii) renovations and use by the fire brigade (1893-1922), and (iv) building of the water reservoirs (1871 and 1881). The signal station was used to alert the Brisbane populace to the arrival of shipping and it served to maintain and signal the correct time by the use of a time ball and later a time gun. From 1881 a two-room cottage was supplied for the signalman and this structure underwent numerous changes over the next 40 years. The Fire Brigade used the facility as a watchtower, maintaining a watch during the hours of darkness and at weekends. Two water reservoirs were built on Water Works land adjacent to the Tower Mill and these supplied most of Brisbane's water needs (Cameron, 1989:93).

The Tower Mill also served as a museum of natural history from 1862 to 1868 (Hogan, 1978:114). Heap (1983:11) records the dates of museum occupancy as 1855 to 1871. The time gun superseded the time ball in 1866 and a shed was built over the gun in 1873. This cast iron gun was replaced in 1883 with a bronze howitzer and the gun shed was moved and converted into a laundry and wash house in 1908.

In June 1922 the Tower Mill and its surrounding reserve became the Observatory Park by an Order of the Governor in Council and control of the park was transferred to the Brisbane City Council as trustees. In 1923 the Queensland Institute of Radio Engineers began using the site for experiments in radio transmission which continued until 1926. From 1926 the lessees were Dr V. McDowell and Thomas Elliot who successfully engaged in radio experimentation throughout the late 1920s and the 1930s as well as the first television experiments in Queensland. A demonstration of TV was conducted before Federal and state officials and the media on May 6th, 1934. There is some suggestion that they continued to use the building to store equipment until 1949 (Hogan, 1978:161).

In May 1945 the Brisbane City Council decided to preserve the historic value of the Tower Mill and in 1950 major restoration work was carried out and the park was landscaped in 1951. A 1962 report detailed the poor condition of the structure. In 1967 the council decided to floodlight the Tower Mill with amber lighting for the Warana parade. In 1973 the University of Queensland gained permission for changes to the park boundaries so that an access road could be built to its Dental Hospital, located at the rear of the reserve.

There is a gap in the record until 1988 when the Brisbane City Council, with the financial assistance of the Central Plaza Project Team, undertook large-scale repair and renovation works which included the erection of a replacement flagpole (the original was removed in 1949) and the removal and replacement of all the cement render on the tower. A small-scale excavation was undertaken at this time to verify the positioning of the flagpole (Alfredson, 1989). Also in 1989 Whitmore used techniques of industrial archaeology to investigate the extant structure of the tower and to assess it in terms of its history. Among other things, this study produced a reconstruction and outline design of the mill which included the mill workings and the five levels included in the 1861 renovations (for detail see Whitmore 1989).

Finally, in October 1989, UQASU was approached by the Brisbane City Council to conduct further archaeological research on the site. Under pressure to develop the site (proposals included a restaurant and art gallery) the B.C.C. wished to ascertain whether or not materials of heritage value lay beneath the soil in the immediate vicinity of the mill and, if so, wished to mitigate damage by including their location(s) in development plans. Our work included both a non-invasive subsurface assessment and a pilot excavation, the results of which form the basis of this paper.

Pre-excavation Non-invasive Survey

Prior to excavation we decided to employ non-invasive survey techniques to ascertain the possible location and extent of subsurface cultural material. This decision was taken mainly as a cost-effective measure as it was expected to save considerable time (and funds) usually taken up with the search for archaeological features via excavation. However, we also thought that this site might provide an excellent test of such methods. Both magnetometric and ground-penetrating radar techniques were employed and this paper presents only an overview of methods and results (for details see Cattach 1990, Yelf 1990, Hall and Yelf 1993).

In January 1990, the Geophyisical Research Institute (Armidale, NSW) was engaged to conduct a high definition magnetic survey with its TM-3 Caesium Vapour magnetometer. The object was to measure the remnant magnetism of the site, to detect magnetic anomalies and to interpret these in relation to possible subsurface archaeological features. At the Tower Mill site a local grid was established and magnetic measurements were taken at 0.25m intervals along north-south oriented survey lines spaced 1m apart (Cattach 1990:2). The ability to interpret subsurface magnetic anomalies is conditioned by the amplitude of the anomaly relative to the level of background noise. Unfortunately the Tower Mill site exhibited a great deal of background noise caused by cultural magnetic interference (various power lines, iron roofs etc). Nevertheless, 17 magnetic anomalies were interpreted as warranting further investigation, especially since they were detected despite the high background noise level, (Cattach 1990:3). For the pilot excavation only anomalies 1, 2, and 3 (see Fig. 3) were targeted for study; however, in view of contingencies arising out of subsequent GPR work these were shelved for future investigation.

Ground Penetrating Radar (GPR) has seen significant developments since it was applied from the air in the 1960's to assess the thickness of sea ice for landing strips (Cook 1960). Since then GPR has been applied to a variety of subsurface studies and although it has been quite successfully used in archaeology prior to this study, its application had been limited to a few North American studies in (e.g. Bevan *et al.* 1984; Dolphin *et al.* 1975, Greber 1984; Tuck and Grenier 1981, Vaughn 1986; Vickers *et al.* 1976; Weymouth 1986). Thus, to our knowledge, the TMAP90 study represents the first Australian use of this facility.

The Tower Mill GPR work was conducted by Richard Yelf of Georadar Research who employed an OYO Georadar system (Yelf 1990). In brief, GPR involves transmitting a short high-frequency (30-300 MHz) pulse into the ground which generates a wave front that responds to contrasts in the dielectric properties of sub-surface strata and their inclusions (Yelf 1990). At the interfaces of sufficiently contrasting strata the waves are reflected and th reflected signal received at a measured delay time, amplified, digitised, and field-printed. The transmission-reception process continues as the equipment is moved along surface transects, resulting in a subsurface cross-sectional image or radargram. Isolated features or buried objects typically appear on the radar-gram as hyperbolic signatures (Yelf 1990). Numerous transects were surveyed at the Tower Mill site (see Fig. 3) to approximately 2m in depth.

Several subsurface anomalies were interpreted from the radargrams (Yelf 1990) and these were largely concentrated between the tower and the flagpole. One in particular, an anomalous subsurface depression or pit (ca. 90cm), was interpreted as a cultural feature and worthy of targeting for further archaeological investigation (see radargram in Fig. 4.). Numerous other inhomogeneities were observed in the radargrams which may be related to trenches or individual rocks but these await future investigation (for a detailed account of this work see Yelf [1990].

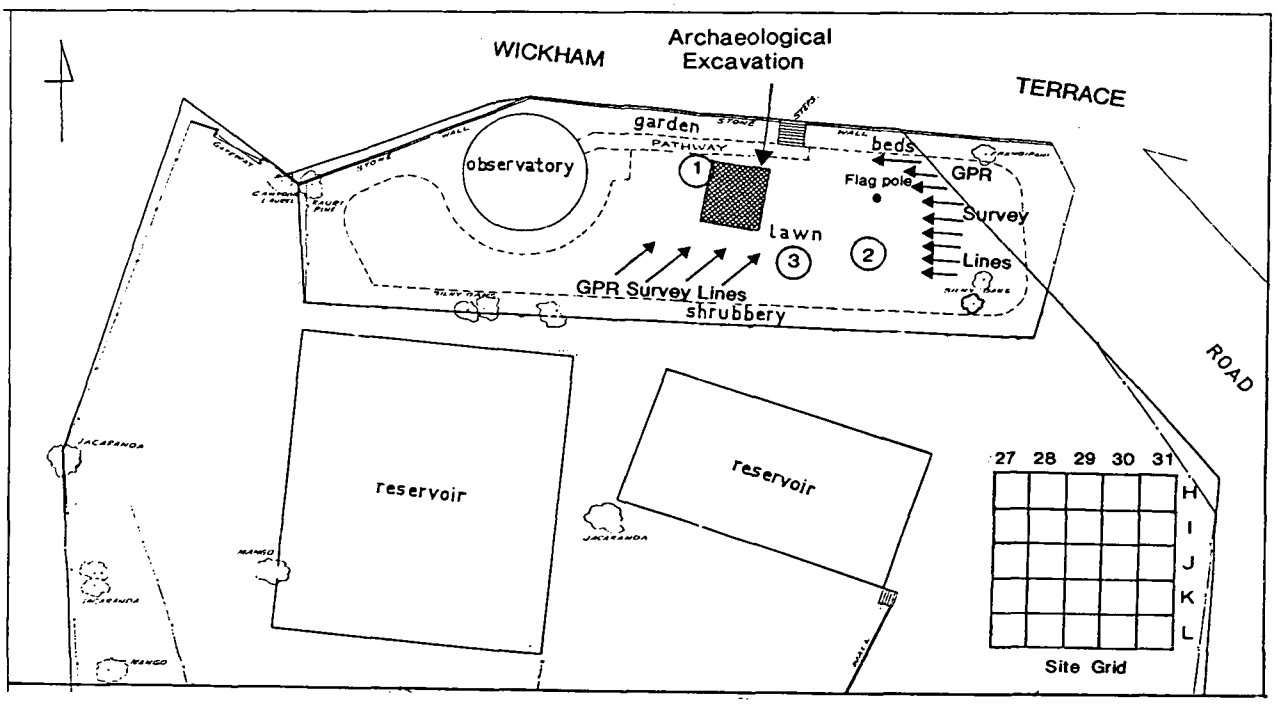

Figure 3. Location of GPR survey lines and archaeological excavation.

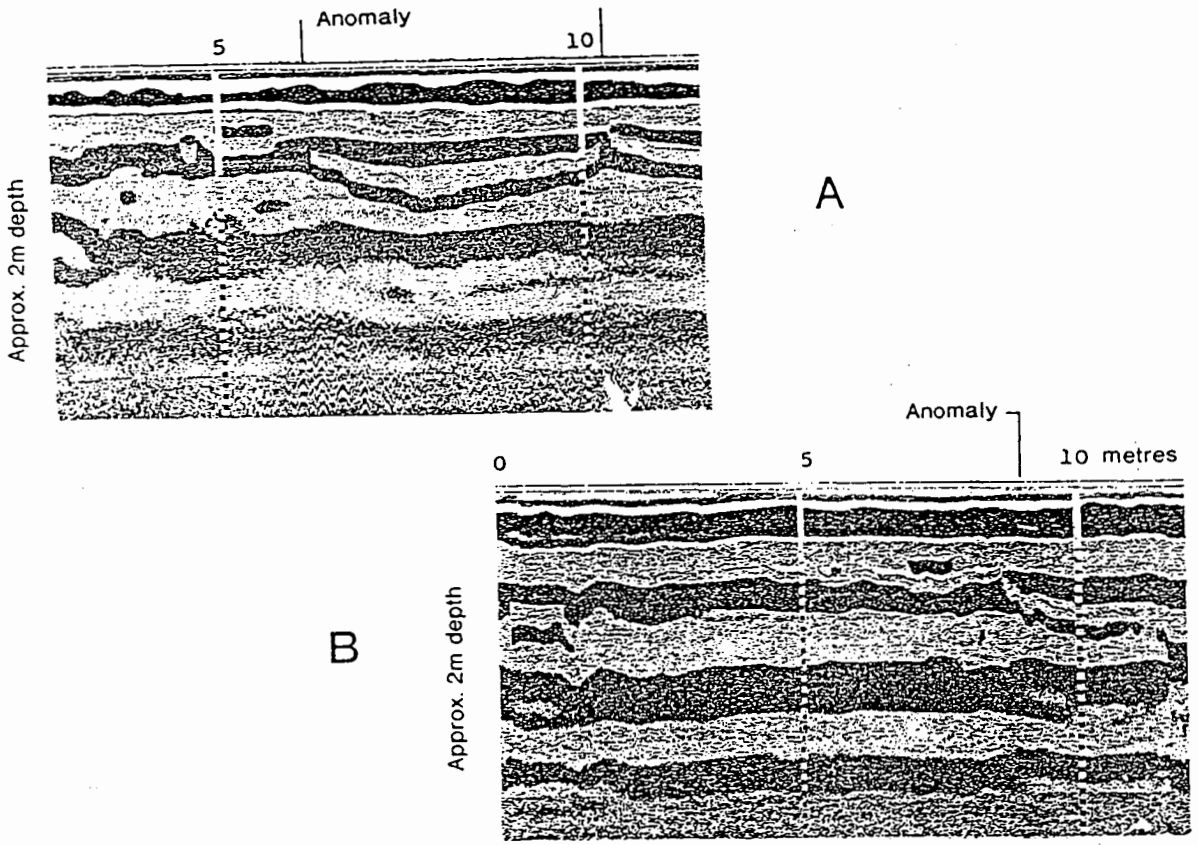

Figure 4. Two radiograms from the Tower Mill GPR Survey which show the sub surface anomally later investigated by excavation (Yelf 1990).
A. Line 2. B. Line 15 which intersects Line 2 at 45^0.

Excavation, Stratigraphy and Features

For the purpose of this pilot excavation we chose to excavate in a $25m^2$ area in between the Tower and the present flagpole (Fig. 3) where the GPR survey exposed the pit anomaly noted above and the magnetometry survey suggested a linear feature thought to represent a drain. A second reason for this selection was that this part of the site had witnessed the most cultural construction over the past 160 years or so. This was also one of the areas under greatest threat from development. An alpha-numeric grid comprising 1m square Grid Units (GUs) was laid down for horizontal control (Fig. 3). Excavation proceeded within GUs which were dug in arbitrary Excavation Units (XUs) within identified Stratigraphic Units (SUs). All artefacts noted during excavation were recorded 3-dimensionally, plotted on to small-scale plans made up for each Stratigraphic Unit identified and bagged separately. In addition, all stones of >2cm in length were plotted on to master plans (irrespective of their cultural or natural status). All fill was weighed, wet-sieved through 6mm and 3mm nested wire mesh, and bagged for removal to the laboratory where sorting and analysis took place. Sixteen Grid Units were excavated in one block (Fig. 3), four of which (GUs I30, J30, I31, J31) were dug either to bedrock or the culturally sterile clay overlying it (David 1990). These four were selected because they contained the anomaly described by the GPR survey.

Stratigraphy

Thirteen Stratigraphic Units (SUs) were identified; these are described below and illustrated in Figure 5.

SU 1 The surface turf (grass, roots and soil) which was laid down during landscaping in the 1980s. It was removed from all 16 GUs by shovel as a single XU, the turf being retained for relaying after the excavation. No artefacts were found.

SU 2 A thin, fine homogeneous black humic stratum with minor gravel content which was removed as a single unit from all GUs. It is interpreted as a topsoil laid down during landscaping to support turf (it contained much fine rootlet penetration).

SU 3 A very gravelly unit underlying SU 2 which was situated in a blackish humic loam matrix (as in overlying Stratum 2).

SU 4 A well-defined layer of thick orange/black mottled clay with numerous inclusions of schist throughout. It lay in marked contrast to SU 3 above. Although the upper surface was exposed throughout the 16 GUs, due to a field decision to restrict the area of excavation it was removed from GUs I30, I31, J30, J31, K29, K30 and K31 only. It was the thickest continuous stratum found and it contained cultural material throughout.

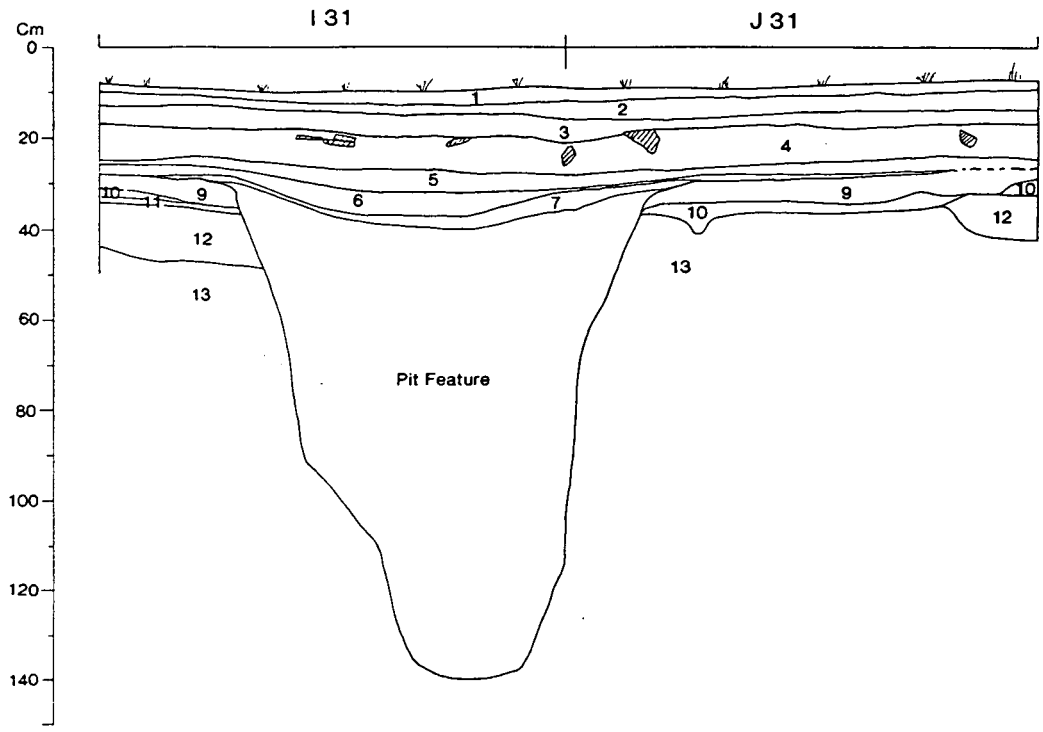

Figure 5. Stratigraphy of Eastern Profile of Grid Units I31 and J31, Tower Mill.

SU 5 A layer of black humic sediment which is identical in colour and texture to SUs 7 and 9. Only where SUs 6 and/or 8 intrude between them (in GUs I30, I31, J30, J31) could the sediments of SUs 5, 7, and 9 be differentiated. Taken together they resemble SU 2 in texture.

SU 6 A discontinuous brownish sand of variable thickness and containing numerous artefacts (nails, glass, coins, pottery) which extended in an east-west direction through GUs I30, I31, J30 and J31 between SUs 5 and 7.

SU 7 A discontinuous black humic sediment ranging between 3cm and 8cm in thickness. It is rich in charcoal and other cultural materials. This stratum is associated with two features. One is a large pit in GUs I31 and J31 which is cut into underlying strata. The other is a shallow depression in GU J31 which is rich in charcoal and animal bone.

SU 8 A discontinuous, thin clay lens in GU I30 and a rocky-brick-rich thin lens in GUs J30 and K30. It is brownish and mottled and contains relatively few artefacts.

SU 9 A very thin black humic layer which lies directly under rocks/bricks (SU 8) where these occur. It contains much charcoal.

SU 10 A discontinuous brown sandy sediment in GUs I30, I31 and J31 (which were the only GUs excavated to this depth).

SU 11 A discontinuous and heterogeneous greyish-white and "crusty" layer containing ash and charcoal (David 1990:5) in northern and southern portions of GUs I30 and I31 and throughout GU J31.

SU12 A comparatively thick (ca. 10cm) homogeneous but discontinuous grey clayey-silty gravel which is culturally sterile. The gravel is pointed and uniform in size. This stratum disconforms markedly with the overlying SU 11 and underlying SU 13.

SU13 A thick basal clay which is continuous over the weathered schist bedrock. It is culturally sterile.

While for the most part all SUs presented as discrete and well-defined strata, SUs 5, 7 and 9 are stratigraphically differentiated only where SUs 6 and 8 occur. In other parts of the grid they could not be separated. We interpret this configuration to mean that SUs 6 and 8 were deposited as discrete events during the course of the build-up of SUs 5,7 and 9. Thus, while for practical and analytical purposes these three units should be combined as a single stratum, they are kept separated above in order to facilitate understanding of SUs 6 and 8 and associated features.

Features

Five features were identified; each is described separately below.

Feature 1 - Depression

A shallow depression was found within SUs 5/7 in GUs I30 and I31 which contained a profusion of artefacts and

charcoal. Since the feature was not differentiated in the field but after careful analysis of post-field notes (David 1990) the materials coming from it could not be separated from other material from the surrounding matrix in the two Grid Units.

Feature 2 - Pit/Post Hole
As Figure 5 shows, a pit was discovered in GUs I31 and J31 at a depth of ca.30cm (beneath SU 8) and was excavated in a section corresponding to the northern walls of these GUs. The pit was about 1m. deep and stratigraphic observation has it being originally dug into SU 9, through SUs 10 to 13 and bottoming out where the clay of SU 13 gave way to weathered bedrock. It was roughly circular with a top diameter of ca. 1m which reduced to ca. 65cm diameter some 60cm lower. At this point the pit was stepped inward, the diameter narrowing from 65cm which was further reduced to a bottom diameter of some 25cm. The schisty basal rock was reached at this point and our own excavations stopped. The eastern portion of the pit was not excavated.

The pit was remarkable in that it contained nothing foreign to the surrounding matrix; in fact, it was filled with a mixture of materials common to the layers through which it was dug. We interpret it as a post hole, our current working hypothesis being that it represents a previous flagpole hole which was dug but almost immediately refilled, the eventual hole for the flagpole being re-dug further from the tower. This notion was inferred from the shape of the hole, it being consistent with the type which used to be dug for tall posts prior to the development of mechanical hole-boring equipment. Such a hole has two stages, the foot of the post being placed in the smaller-diameter hole at the bottom, and fill (including stone or concrete collar) being placed in the larger-diameter hole in the top of the pit. Further support for this hypothesis comes from the fact that the pit is directly in line between the centre of the tower and the current flagpole (Fig. 3).

Feature 3 - Hearth Frame
This feature comprised two post-molds (F3A and F3B) in SU 11 in GU J31. Excavation of F3A yeilded a small hole, 18cm-deep and 10cm in diameter, which was dug into SU 11 and which contained fill which was identical with that of SU 10 above. This feature has been interpreted as postmolds of the legs of a frame used to support a pot or similar container over a hearth (see F4 below).

Feature 4 - Hearth
This feature was noted as a shallow depression in SU 11 of GU J31 which yielded large charcoal blocks, numerous nails and some bones. The soil surrounding and beneath it was reddish in colour, suggesting that it had been oxidised. We interpret it to have been a fireplace or hearth over which an apparatus was placed for cooking purposes (F3 above).

Feature 5 - Hearth
In the southeastern corner of GU J31, a discrete area exhibiting abundant charcoal and rich in artefacts was found in SU 7/9. From the localised nature of this feature and its rich charcoal base we provisionally interpret it as a hearth or fireplace until further, more fine-scale analysis is carried out.

Comparison of GPR with Archaeological Results

The GPR result accords well with the excavation result, especially with respect to the pit feature. GPR survey lines 2 and 3 indicated subsurface anomalies which, when positioned on the excavation grid, corresponded with the outer edges of the pit feature. Presumably, had the GPR traversed the centre-line of the pit, a deeper, more pronounced anomaly would have been recorded in the radargram. The GPR also accurately indicated the depth of this anomaly (beginning at c.40cm below the surface). Further correspondence is indicated in the general stratigraphy, with the radargrams showing roughly the same layers at roughly the same depths as was found archaeologically (see Hall and Yelf 1993 for details).

This close correspondence between the GPR and excavation results demonstrated that employment of this non-invasive subsurface assessment technique in archaeology could benefit research in two main ways. First, by pointing to subsurface anomalies, it may permit more accurate targeting of cultural features. Second, by doing so it would significantly reduce the time involved in searching for cultural features and concomitantly reduce excavation costs. Our test of the GPR result at the Tower Mill also served to convince the B.C.C. to rethink proposals for future development of the site. In short, if GPR can be relied upon to predict cultural materials below the surface (especially features and stratification), excavation may not be necessary in many situations where heritage assessment is required.

Results of Artefact Analysis

A total of 10,525 artefacts were recovered from the 4000 kilograms of sediment removed by the excavation. Preliminary analysis classified these into like-types including glass, plastic, ceramic, metal, faunal material, building materials, charcoal/coke/coal and buttons and beads. Although considerable detailed analysis of the recovered artefacts has yet to be undertaken, the preliminary and general results we present here are sufficient to the main purpose of this paper (see Table 1). Details concerning laboratory methods, a rationale for the choice of artefact classification and for the selection of attributes may be found in Prangnell (1991).

It is important to note that we have had to combine certain SUs in our analysis of the excavated finds because it became quite apparent that the stratigraphy as defined in the field was both cumbersome and impractical from the standpoint of analysing the relationships between artefacts (see Prangnell 1991). For example, SUs 5, 7, and 9 were all recorded as being of a similar sediment, a factor which made their field differentiation impossible at times. Consequently, we decided to consider all three as a single unit. Similarly, SUs 1, 2 and 3 were collapsed into one unit.

Table 1. Distribution of artefacts, Tower Mill.

	SU 1-3		SU 4		SU 5/7/9		SU 6		SU 8		SU 10		SU 11		SU 12		F2		F3		F4		F5		TOTAL	
	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g	N	g
Glass																										
Clear	883	185	406	134	107	11	69	24	2	1							14	4					1	1	148	35
Green	1062	232	306	159	149	45	26	7	13	10							9	4					5	5	157	46
Brown	288	65	9	0	2	1	3	1																	30	6
Blue	19	9	10	1	9	1	1	0																	3	1
Ceramic																										
Coarse Earthenwar	5						1																			
Red Earthenware	60		20		13		6		1						1		2								10	
White Earthenware	32		20		145		8		2								2						1		21	
Coarse Stoneware					3												3									
Fine Stoneware	5		4		6		1		1																1	
Vitreous Stoneware	5		8		1																				1	
Pipe Clay	3		1		62		2		1																7	
Porcelain	6		3																							
Metal																										
Nails	488		375		285		97		21		8						35				18		3		133	
Buttons	1		1		3																					
Coins	2																									
Brass	13		8		2		5																		2	
Copper	113	95	152	233	120	177	57	24	1	1							1	0							44	53
Unidentified	173		143		151		56		12		6				1		10						16		56	
Bone	323	56	1607	80	838	192	80	48	55	3	8	1	2	0	1		19	13			3	1	3	1	293	39
Burnt	5		57		133												1								19	
Sawn			1		3																					
Teeth	2		3		9																				1	
Canis familiaris	2		2		1																					
Bos taurus					3																					
Ovis aries					2																					
Sus scrofa					2																					
Mus musculus					1																					
Shell	30	15	23	9	1266	26	34	6			3	0			8	0	106	8			21	1			149	
Burnt	9	0	12	2																					2	
Oyster			5	6	12	1	8	5									1	3			1	0			2	1
Hairy Mussel	1	0					9	0			1	0													1	
Coral	4	6	1	0			1	0																		
Brick		1235		941		6695		1299																		1017
Concrete		615		259		2916		188		566		584		3		1		35								516
Mortar										18		2														2
Plaster								766																		76
Tuff		1321		1069		3710		250		703		33		42												722
Sandstone						0				2305				171												247
Slate		10		15		2		437										0								46
Charcoal		881		489		7470		100		32		97		189		145		345		0		32		1735		1151
Coal		693		968		78		41																		178
Coke		1904		4174		7		175																		626

N = number g = weight in grams

Glass

A total of 3420 glass sherds were recovered. The combined weight was 909.3g with a mean of 0.27g. No glass was found below the level of SUs 5/7/9 although 23 fragments were found in the Pit which is a mixture of SU 5/7/9 and all units below SU 9. Sixty-six percent of the glass was located in SU 1-3. The glass was classified by colour, the four main colours being green, clear, brown and blue. Green glass predominated with 1570 fragments weighing 462.7g. There were 302 pieces of brown glass of which 288 (95.4%) were in SU 1-3. There were 39 pieces of blue glass spread approximately evenly throughout SU 1-3 and SU 5/7/9.

Only eight pieces of glass carried distinctive lettering. Two brown sherds exhibiting the letters "QUE" and "AN" are possibly associated and form part of the spelling of 'Queensland'. A piece of clear glass from K30, SU 4 exhibits a white frosting except for an eight-pointed star, which is clear. This sherd possibly belongs to a soft drink bottle. Two pieces of glass from the Pit have an etched design reminiscent of grass stalks and, although they don't conjoin, their patterns are identical. There are four glass pharmaceutical bottle stoppers, one from K28 SU 1-3, two from J31 SU 4 and one from J31 SU 6. Alfredson (1989) reported a glass stopper from her flagpole excavations (at a depth of 1.2m), however, her stratigraphic diagrams were not sufficiently detailed to permit appropriate comparison with our sample.

Plastic

Excluding buttons and beads (which are considered separately) 196 pieces of plastic were recovered from the site. Of these, 187 (or 95%) are in SU 1-3, 95 of which are a green plastic from Grid Unit I31. This green plastic has a total weight of 0.01 gram. Many types of plastic discard from our modern society are represented within the collection including sticky-tape, twist-ties, straws, polystyrene cups, ink tubes from disposable pens and the blue plastic end piece of a 'Bic Biro'. The latter item was located in SU 1-3. The Bic company established a branch in Queensland in 1957 and commenced selling the 'Bic Stick' immediately. From the start these pens featured small plastic "buttons" in their bases (Keith Kemp, Queensland Manager, Bic Australia: pers. comm., 1991).

Ceramic

The ceramic collection totals 434 sherds. This component includes any material made of fired clay (except for bricks), thus all pottery and porcelain. Identification followed the taxonomy devised by Thompson and Wilson (1987). The predominant ceramic type is White Earthenware and the majority of ceramic (both in quantity and weight) came from SU 5/7/9. Significantly, one piece of Red Earthenware was in SU 12 and three pieces of clay pipe in SU 1-3.

White Earthenware

Of the 210 sherds of White Earthenware found in the excavation, 86 have the same green underglaze transfer-printed pattern which consists of a profusion of vegetation, teapots and scrolls. Twenty-two sherds conjoin to form approximately one quarter of a saucer. This green transfer-printed White Earthenware was all found in SU 5/7/9 except for one piece recorded in SU 4 (though this may well have originated on the surface of SU 5/7/9). Significantly, none of this material was found in either SU 6 or 8. Based upon the curvature of the rim pieces it is possible to determine that at least two different items are represented by this collection.

Figure 6 is a graphical representation of the conjoin analysis. The small number beside each dot represents the depth of the sherd (in millimetres) below the site datum. The graph highlights the discreteness of the distribution. The sherds are not distributed randomly throughout the unit. There were five conjoined sherds of blue and white underglaze transfer-printed White Earthenware that displayed an identical pattern. These five pieces all came from the same unit (SU 5/7/9) as the green and white pieces.

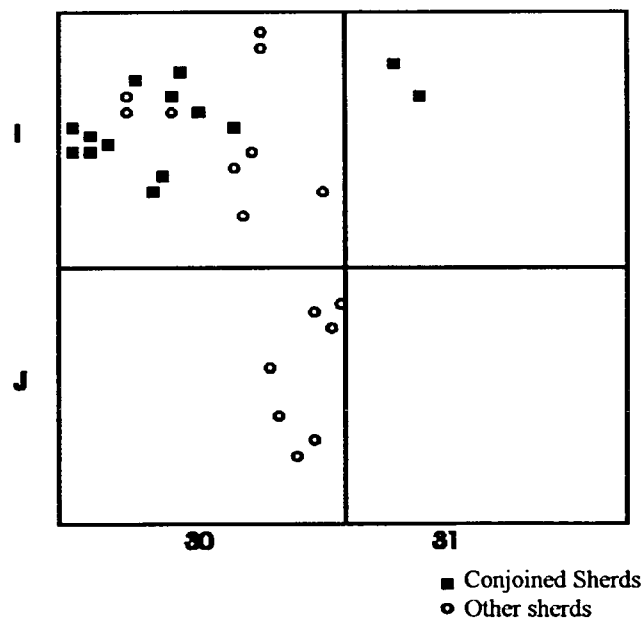

Figure 6. Horizontal distribution of green monochrome transfer-printed white earthernware sherds.

Honey (1945:225) notes that the technique of underglaze green transfer-printing was developed around 1850 and was either applied by itself or incorporated into polychrome items. All the Tower Mill sherds are monochrome. Hughes (n.d.:129) claims that the discovery of the technique of creating underglaze printing with red, yellow, black and green occurred as early as 1828. Honey claims that "the abundant foliage of trees and herbage" (1945:224) implies a Late Victorian attribution for the pieces. However, Hughes (n.d.:131) contends that by 1810 borders were typically made up of "repeat patterns of flower and leaf festoons, fruiting vines and floreate scrolls". Despite this

conflicting evidence, the thickness of the saucer and the monochromatic design, it is most probable that these transfer-printed pieces are cheap, factory produced, later half of the Nineteenth Century wares that copied earlier decorative designs.

Clay Pipes

The clay pipe stems were classified according to shape. There are no lenticular stems and the round and oval stems are equally represented. Nine pieces are too fragmentary to enable shape determination. One stem possesses a makers' mark. The stem has the mark "T.W. & C°" on the obverse and "EDIN^{R}" mould-imparted in serif lettering on the reverse. Walker (1983:20) attributes this mark to Thomas White and Company, an Edinburgh firm that operated from 1823 to 1876. Dane and Morrison (1979) recorded only one pipe made by Thomas White and Company in the Port Arthur collection of 1055 pieces.

Only two of the 37 pipe bowls in the Tower Mill collection exhibit any design. The design on F.S. 67/30 is difficult to interpret: however, it appears to be a half-ribbed bowl with a cross-like motif. This is very similar to a design recorded by Rutter and Davey (1980:208-210) from Chester, England, dated to 1810-1840. The design on F.S. 18/20 is clearly a fully-rigged three-masted sailing ship. Dane and Morrison (1979:Plate III) present a photograph of a bowl fragment from Port Arthur that exhibits a very similar motif; this is the one piece that they attribute to Thomas White and Company.

Spurs were introduced to clay pipes in the Eighteenth Century to replace the flat heels. However, they are most typically associated with Nineteenth Century pipes (Scott and Scott, 1981:9). Only one of the Tower Mill stem pieces possesses a spur (F.S. 19/84 from I30 SU 5/7/9) but it shows no maker's mark.

There are also six stem mouthpieces. All are located in SU 5/7/9 (three from I30, one from I31 and two from J31) and all exhibit the yellow/brown glazing used to make the pipe cooler to the touch. One piece also exhibits teeth marks where the smoker bit onto the pipe.

Metal

Metal was primarily classified by its material type; iron or steel (2049 artefacts), copper (455 artefacts), brass (29 artefacts), lead (17 artefacts), tin (4 artefacts) and aluminium (1 artefact). Of the 2049 iron and steel artefacts 1330 (65%) are nails. A further 568 (28%) could not be identified due to the level of corrosion. Items identified included a key, a fob-link, two bottle caps and three counter-sunk wood screws.

At the base of AU II and orientated approximately north-south through Grid Units I30, I31, J30, J31, K29 and K30, was a distribution of nails configured in such a way that the nails were grouped in pairs. A working hypothesis yet to be tested is that these represent the remains of a former picket fence which was dismantled and burned in the site.

Copper was mainly in the form of small, irregularly shaped ingots and these were distributed evenly throughout most Stratigraphic Units. There are also 11 pieces of copper wire and 17 pieces of lead. The most significantly distributed metallic artefacts are the brass terminal lugs. Both the copper and the lugs may well relate to the period when the Tower Mill was used for radio and television experimentation. Alfredson (1989) also located two brass terminal lugs, one at a depth of 10cm the other at 23cm below the surface.

Coins

Two coins were located in SU 1-3, both from the lowest Excavation Unit. One is a 1916 sixpence, the other a 1950 penny. The sixpence was minted in Melbourne (Skinner, 1980:24) and was the first to be minted in Australia; prior to 1916 they were minted in London. The 1950 penny was minted in Perth. The dates imply that SU 1-3 post-dates 1950.

Faunal Material

Bone

A total of 2939 bone fragments were recovered from the site. Of these only five were identifiable to species level; all were post-cranial remains of *Ovis aries*—sheep. Numerous minute fish and lizard bones plus one bird bone were also recovered. The mean weight of the bone material was 0.13 grams making the vast majority of the collection unidentifiable. Fifty-seven percent of the bone occurred in SU 4 and 29% was concentrated in SU 5/7/9. Four bones showed evidence of saw-markings and 196 displayed some evidence of having been burnt.

Teeth

Fourteen teeth were located in SUs 1-9 (excluding SUs 6 and 8). Horizontally, three were in I30, three in I31, two in J30, one in J31, one in K30 and four in K31. Of the 14 teeth, 13 were identifiable to species level. The species identified included *Canis familiaris* (dog), *Bos taurus* (cattle), *Ovis aries* (sheep), *Sus scrofa* (pig) and *Mus musculus* (mouse); all are introduced animals.

Shell

A total of 1491 individual pieces of shellfish remains were obtained. Eighty-five percent of the shell occurs in SU 5/7/9 (1266 fragments weighing 25.6g). The overall mean weight of the shell fragments was 0.04g. This high degree of fragmentation largely negated the possibility of specific identification except for *Saccostrea commercialis* (oyster) and *Trichomya hirsuta* (hairy mussel). Twenty one of the 1491 pieces of shell show some evidence of having been burnt.

Coral

Six pieces of coral were identified. Like the shell the coral is obviously not indigent to the site and most likely arrived by cultural agency. Species identification of the coral has not been attempted.

Building Materials

Brick

Over 10 kilograms of brick was removed from the site,

the majority comprising pieces less than 2cm in diameter. However, two whole bricks were recovered, both from SU 8. Pieces of brick were located in all the SU groupings analysed and the greatest concentrations were in SU 1-3 (1235g), SU 4 (941g), SU 5/7/9 (6695g) and SU 8 (1299g).

Concrete, Mortar and Plaster

All three of these materials are greatly affected by post-depositional factors such as the level of sediment hydration, and it is probable that the surrounding "calcite matrix [of the artefacts] may become dissolved by weathering, freeing the coarse inclusions into the surrounding sediments" (Courty *et al.* 1989:121). This may well indicate that greater quantities of these materials were deposited than were located archaeologically.

The concrete was distributed throughout all Stratigraphic Units with a concentration in SU 5/7/9 (57%). The concrete was predominantly in the form of minute pieces and no large individual segments, as found by Alfredson (1989), were located. The mortar was almost exclusively restricted to SU 8 (89%), and within this unit the mortar is restricted entirely to Grid Unit J30. This strongly suggests that the mortar arrived in the site as a single depositional event. The plaster forms a discrete deposit within US 6, approximately evenly spread between Grid Units 130 and 131. There was no plaster in J30 or J31.

Stone

Four main types of stone were identified in the site. The first was a shale/schist within SU 4 which was discarded as part of the sedimentary matrix. The second type of stone was slate, small amounts of which (<15 grams) were found within SUs 1-7. There was a concentration of slate in SU 6, in Grid Unit 131. Three pieces of this slate conjoin to form an 8cm by 13cm rectangle. It is possible that the slate in this unit is the result of the deposition of one or two slate tiles.

Sandstone was the third stone type present and approximately 2.5kg was recovered. The sandstone was concentrated in SU 8 (93% of the total), and this represents in excess of 7% of the total sediment recovered from this unit.

The final stone type is undifferentiable from the Brisbane Tuff used in the construction of both the Tower Mill (James, 1978) and the stone wall along Wickham Terrace. This Tuff was present in all units except SU 10 and it is interesting to note that it was not present in any of the delineated features, including the Pit, which originates in SU 5/7/9. More than 3.5kg of Tuff was found in SU 5/7/9.

Charcoal, Coal and Coke

All three elements display distinct patterns within the site. Charcoal was present in every unit group and weighs a total of 11.5kg with 65% (7.469kg) located in SU 5/7/9. The interfingering SU 6 and SU 8 contained 100g and 32g respectively. The post-molds from the hearth frame (F3) contain 0.2g of charcoal. This is the only material other than the sediment of SU 10 that was recovered from this feature. The second largest concentration of charcoal is in the hearth (F5) (1.7kg).

The coal in the site was restricted to SUs 1 to 7 and its vertical distribution followed closely that of the coal (and virtually the opposite of the charcoal). Table 1 presents the weights of the charcoal, coal and coke in SUs 1-7 both by weight and as a percentage of the total sediment weight for that SU grouping.

Buttons

A total of 13 buttons were located. There was a round, black, 'plastic-like' button in SU 6 of Grid Unit J31. Of the five metal buttons found, one (in SU 6), exhibits the logo "STEWART & HEMMANT BRISBANE" embossed on it. Stewart and Hemmant were a large Brisbane drapery and importer of the 19th Century. They are included in the Business Directory of Pugh's Almanac of 1865 and in an advertisement placed in the Brisbane Courier of 8th November, 1865. The business changed its name to Stewart and Sons in 1902. Thus, it is most likely that this button dates to between the 1860s and 1900.

Beads

The beads in the site are classified according to shape (round or hexagonal). There are 107 round beads and 32 hexagonal ones. Beads were found in both SU 6 and SU 8 and there appears to be no pattern to their distribution, either by shape or by colour. The colours represented are white (56), clear (36), black (21), green (11), blue (4), pink (3), purple (1) and brown (1).

Discussion

Distinct differences exist in the nature of the sub-surface deposits and we propose to demonstrate that both SU 1-3 and SU 4 are introduced fill layers and that SU 5/7/9 is an old land surface that built up over a number of decades. There are four types of deposit generally associated with 19th and 20th Century archaeological sites (Birmingham 1988:150-151). The first type is the introduced fill deposit which represents "municipal or private levelling activity in which hard fill characterised by numerous but undistinguished cultural debris is imported into the site from elsewhere in the site, city or country" (Birmingham, 1988:150). The second type is the scatter found over former land surfaces which consists of material built up around buildings, upon roads or in parks or paddocks when that layer was the land surface. The third type of deposit is the accumulation deposit which occurs in wells, as kitchen middens or typically as underfloor deposits. These are usually open for long periods of time. The fourth type is rubbish disposal. Rubbish disposal deposits tend to occur from individual events ranging from "the daily toss-out of kitchen scraps ... to the total household clearance customary when a family property is sold up" (Birmingham, 1988:151). Although people lived in the cottage associated with the Tower Mill, there is no

evidence to suggest that any of the subsurface layers can be identified as an accumulation deposit of the latter type.

For a layer to be considered as an introduced fill its cultural contents should be homogeneously distributed. On the other hand, isolated concentrations of artefacts would indicate the occurrence of discrete depositional events, demonstrating that the particular layer was not deposited as a single event. Alternatively, if significant discrepancies can be shown to exist within the distribution of artefact inclusions within a layer of deposit then one may infer that layer to be the result of a sequence of independent depositional events.

To test the validity of these competing hypotheses in relation to the Tower Mill, a series of intrasite comparisons were generated. Six materials were selected for comparison between four GUs I30, I31, J30 and J31, within each of SU 1-3, SU 4 and SU 5/7/9. These GUs were preferred as they were excavated to the base of SU 9. The six materials selected were charcoal, coal, coke, brick, tuff and concrete. The glass and ceramic classes were excluded as neither weight nor quantity were considered appropriate measures for intrasite comparison. Metals were not considered due to their advanced state of oxidisation and the subsequent effect this has had on both weight and volume. The weight of each of the selected artefact classes was converted to a percentage of the total weight of the sediment of the particular Stratigraphic Unit in the specific Grid Unit. The percentages were then compared. Figure 7 demonstrates the degree of variation present within in each class for the SU grouping 1-9.

The results of the fill analysis demonstrates that for SU 1-3 very little diversity exists between the artefact concentrations in any of the four GUs. Excluding charcoal, GU 130 consistently displays higher concentrations of artefacts than its neighbouring GUs, although cultural materials can not be said to be truly clustered.

Figure 7 demonstrates greater variability between the GUs for SU 4 than was distinguished within SU 1-3. However, the variation is small, the maximum difference being 1.13% (coke). Of all the SUs, the greatest clustering of artefacts occurred in SU 5/7/9. The difference between the maximum and minimum values of the charcoal is 7.7% and the concrete is 4.8%. In percentage terms, the maximum variation observed in SU 1-3 and 679% greater than that observed in SU 4.

The lack of variation exhibited between the GUs within both SU 1-3 and SU 4, supports the inference that both layers comprise introduced (municipal) fill. The substantial differences that occur between the GUs of underlying SU 5/7/9, however, indicate that SU 5/7/9 is not a fill but that it most probably originated through a series of discrete depositional events.

To support this inference we further hypothesise that the relative proportions of the artefactual inclusions within the two fill layers should more closely resemble one another than either would resemble the deposit within SU 5/7/9. To test this proposition a series of correlated groups *t*-tests were undertaken to determine if a relationship existed between the mean values of each of the six artefact classes in SU 1-3 and SU 4 that did not exist between these values in either SU 1-3 and SU 5/7/9 or SU 4 and SU 5/7/9. Significance was arbitrarily set at the standard p=0.05. As predicted, the difference between the mean scores of SU 1-3 and SU 4 proved to be non-significant ($t = 1.732$, $df = 5$, $p > 0.05$). However, the difference between the means of SU 1-3 and SU 5/7/9 proved to be significant ($t = 2.979$, $df = 5$, $p < 0.05$) as did the difference between the means of SU 4 and SU 5/7/9 ($t = 3.294$, $df = 5$, $p < 0.05$). Although statistical significance does not necessarily indicate the cause of the variation observed (Tilley, 1987:88) it does demonstrate that such variation is most likely the result of an agency other than chance.

In summary, the artefact distribution within both SU 1-3 and SU 4 is compatible with the hypothesis that both layers consist of introduced (municipal) fill material. Likewise, the deposit that comprises AU III was most likely the result of a series of independent depositional events.

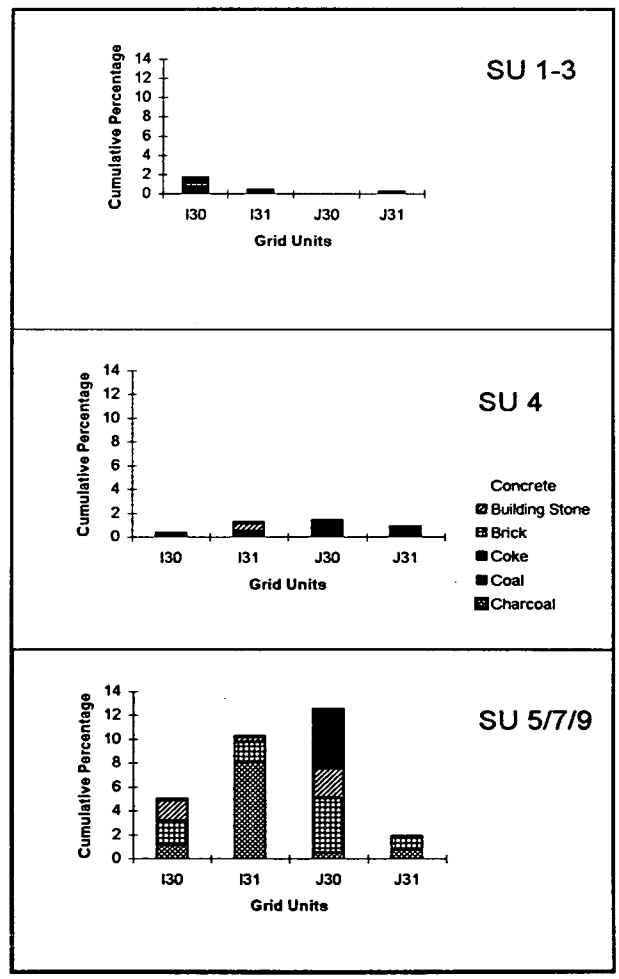

Figure 7. Variation in artefact distribution across Grid Units I30, I31, J30 and J31 within SU 1-3, SU 4 and SU 7.

Developmental Chronology

The following chronology of site development is based upon artefact analysis, the stratigraphic record and hypothesised depositional differences and the historical record (see Prangnell 1991).

SU 1-3

The two coins which were located in the lowest excavation unit of SU 3 act as a *terminus post quem* for this unit. Thus, SU 1-3 cannot date earlier than 1950.

SUs 1-3 are almost certainly fill layers. They were originally deposited as the topsoil and bedding component of the landscaping of Observatory Park that was part of the Brisbane City Council's 1950 renovation of the Tower Mill. This topsoil was supplied as required to maintain the quality of the park and its presence would indicate that at different times in the last 40 years different levels within SU 1-3 would have been exposed, acting as the ground surface. For example, below the current turfed surface (in XU2) there is the button end of a 'Bic' pen which cannot date to earlier than 1957 but which also must date to earlier than the most recent re-turfing. XUs 3 and 4 contained gravel which currently acts as the bedding for the topsoil. These deepest XUs of SU 1-3 also contain relatively large quantities of brick, concrete, tuff and coral which are likely to be the remains of the renovation activity that took place in 1950. It is interesting to note however that the major renovations of 1988 did not leave any archaeological traces, a fact most likely due to the anti-littering mores and behaviour that have developed in Australia in recent times.

SU 4

SU 4 is a fill layer which was spread over the surface of the park sometime between 1921 and 1932. The removal of the old picket fence along Wickham Terrace and its replacement with a stone retaining wall could well be responsible for the features detected in SU 4. If the wooden fence was removed and burnt on the site this may have led to the configuration of nails observed at the base of this unit. Supporting this hypothesis is the fact that almost all the charcoal in SU 4 is large and blocky. If the nails were flat-headed fencing nails this would further support the hypothesis; however, they are far too corroded to yield this level of information.

Excavations for the footing of the broader stone wall fronting Wickham Terrace would have led to the removal of large quantities of the basal orange clay and schist/shale as well as the sediments that had built up upon this surface. We hypothesise that this excavated material was mixed with quantities of coke, coal and other rubbish from the area of the site and then spread over the existing ground surface to level the ground at the top of the hill. The 1607 pieces of bones recovered from SU 4 help to support this hypothesis. Their total weight was only 80.4g and the mean weight was only 0.05g, indicating that a high degree of disintegration of the bony material occurred as the fill was mixed and/or distributed. Also present is more than 1.0kg of tuff, some of which exhibits flakes which may well represent edge-trimmings from the stone used to construct the wall.

SU 5/7/9

This unit is an old land surface that built up from ca. 1850 until the 1920s. The Pit was dug from approximately half way through this unit when that level was the land surface. The deposition of both SU 6 and SU 8 occurred at different times during the build-up of SU 5/7/9. The button manufactured for Stewart and Hemmant indicates a 19th Century date for this layer, as does the design on the green transfer-printed white earthenware. The existence of two terminal lugs does not counter this argument as they may have been deposited in the early 1920s or be associated with the telegraph wires that joined the signal station at Wickham Terrace with Lytton and Redcliffe. Sixty-two of the 72 pieces of clay pipe (86.1%) were also found in this layer and thus support a 19th Century interpretation. Also present were two buttons made of a plastic-like material; however, this may not be incongruous as MacKay (1975:41) records buttons made of a type of glassy paste and "plastic substances derived from bull's blood and milk casein" were manufactured in England from the middle of the 1820s.

The large amounts of stone, brick and concrete in this layer may well relate to the numerous maintenance efforts made on the fabric of the Tower Mill during the last half of the 19th Century as well as the construction of the cottage, the later addition of the detached kitchen or the construction of the neighbouring water reservoirs.

Hearth (F5)

This hearth was possibly built and used by workers involved either with the construction of the cottage or the second reservoir. As it occurred later in time than the deposition of SU 6 it could well date to the early 1880s.

SU 6

This unit was deposited in a single event in an east-west direction between the flagpole and the entrance to the Tower Mill. The ground in this area subsided after the Pit had been refilled. As there would have been pedestrian traffic several times a day between the Mill building and the flagpole we hypothesise that SU 6 was deposited to create a footpath between the door of the Tower Mill and the flagpole. If so, then any rubbish would have been deposited into this fill either before it was laid or shortly afterwards. This unit represents the only example of Birmingham's (1988) "rubbish disposal" on this site. Alternatively, it is possible that the motivation for the creation of this deposit was less formal and that SU 6 was deposited to merely fill the muddy hole created by the subsiding pit. The deposition of the broken slate tile also supports an interpretation of a single depositional event. The presence of the five terminal lugs may also be related to the discard of rubbish from the Tower Mill building.

The clay pipe stem manufactured by Thomas White and Company was found in this layer and indicates a latest possible date of circa 1876 (and we suspect possibly a decade earlier). Dane and Morrison (1979:53) argue that Scottish pipe manufacturers were large exporters to Australia before the "accepted period of their ascendancy in the industry is apparent", which is generally taken to be 1875 to 1885.

The Pit/Posthole

We hypothesise that the pit was dug in 1865 as a hole for the new flagpole, but being either too shallow or perhaps situated too close to the Tower Mill building it had to be abandoned. There is no evidence to suggest that the pit was used as either an earth closet or for rubbish disposal. It appears to have been dug and refilled immediately.

SU 8

This unit follows the western edge of the Grid Units I30 and J30. It is a brick-and stone-rich layer which was deposited before the pit was dug and the material was spread over the existing surface. This probably relates to the 1861 conversion of the Tower Mill to a signal station.

SU 10

This thin layer must date to before 1860 and is most probably a layer of fill as it is different to the sediment that accumulated over the next 60 years. It contains small amounts of brick, charcoal and stone but also over 500g of concrete which may be associated with repair works to the Tower.

Hearth (F4) and Hearth Frame (F3)

This hearth was used when SU 11 was the ground surface and we tentatively interpret the post-molds of F3 to have been created by or for the legs of an apparatus used to support a pot, or similar container, above the Hearth.

SU 11

SU 11 is a very thin greyish layer that contains evidence of building activity (42g of Tuff, 95g of brick, 171g of sandstone). It also contains 188g of charcoal and one bone button. This layer predates 1860 and contains evidence of human activity (e.g. the Hearth [F4] was used when this layer was the land surface). It could well relate to the removal of the treadmill and other machinery from the building around 1849.

SU 12

The vegetation on Windmill Hill was cleared in the middle of 1828 and, according to Spicer (in Hogan, 1978), the Tower Mill was operating by the start of November 1828. It is possible that this land clearance is reflected archaeologically by the marked boundary between SU 12 and the basal clay. The first event that is positively recorded archaeologically is the deposition of SU 12, a thick layer of uniformly-sized gravel that must have arrived on the site by cultural means. Although Alfredson's (1989) stratigraphic diagrams are difficult to interpret, it is probable that the gravel layer extended as far as her excavation of the southern stay footing of the flagpole (some 4 meters to the north). The artefacts from this level include a piece of bone, a small piece of iron, a small piece of unglazed, red earthenware that was most probably a utilitarian piece (e.g. part of a drainage pipe), 144g of charcoal, 2.0g of brick, 1.0g of concrete and eight pieces of shell (0.08g). As this material was homogeneously distributed both horizontally and vertically within the gravel, its origin is probably not the Tower Mill site. A possible explanation is that the gravel was laid over the bare clay of the top of the hill at some stage during the convict period, simply to avoid the muddy conditions that would have been created by a combination of clay, rain and constant human traffic. If this is the case, SU 12 dates to the period 1828 to 1839, and most probably the late 1820s.

Conclusion

The Tower Mill is not a typical Australian historical or urban archaeological site. Most historical sites in Australia have well-defined periods of occupation which delineates their historical significance. Not so with the Tower Mill, where occupation and/or use was continued largely unabated until recent times. During its more than 150 years of history the Tower Mill played a role in a number of significant historical events such as early attempts to supply food to a fledging settlement (1828-1839), the employment and punishment of idle convicts (1828-1939) and pioneering experiments in radio and television in the 20th Century.

In line with the Tower Mill's broad and multi-faceted historical significance, our research likewise can not be said to have been focussed on any single historical event or occupational feature (such as the worker's cottage or the laundry). Rather this research was largely guided by specific management questions, in particular whether or not the land around the tower contained cultural remains worthy of preservation. As a result of our investigations we concluded that such materials do exist below the ground and have recommended to the B.C.C. that no development should occur there which would involve subsurface disturbance. Future and more fine-grained analyses of the materials excavated during our project is also warranted in order to address questions relating to such public issues as early flour production, the nature of punishment in Brisbane's convict era, the operation and maintenance of the public signal station and fire watchtower, and the pioneering development of television in Australia. While such questions may seem considerably removed from investigations of individuals in the past, they may further our understanding of the archaeology and history of specific interest groups in the face of broader societal norms, values and developments. Of interest here also is the question of the emergence and transformation of the historical significance of the Tower Mill itself through the course of Brisbane's history. These questions are beyond the scope of this paper but will hopefully form the basis of further research.

Importantly for us as archaeologists, this investigation has demonstrated that, even in urban settings where both the function and the fabric of the original structure and surrounds have undergone manifest changes, archaeology can make a valid and important contribution to the cultural understanding of a site such as the Tower Mill.

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