How to Dig a Dump: Strategy and Research Design for Investigation of Brisbane's Nineteenth-Century Municipal Dump

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This paper demonstrates the development of a sampling strategy, research design, historical interpretation, and artefact analysis for a municipal rubbish dump. The focus of this paper is the investigation of the municipal rubbish dump, the process by which the rubbish deposits were investigated and suggests the research value of functionally-mixed assemblages. When planning the field investigative approaches and technique, it was necessary to adequately address the large area, the topography, and the potential for vast quantities of artefacts. A research design was developed to pose questions relevant to the city at large during the use of this area as a dump. Historical research focused on sanitation, health and other key economic and social topics pertinent to Brisbane life during the late nineteenth century. Artefact analysis investigated a number of topics, including temporal analysis, functional or use analysis, market access, evidence of an economy in depression, recycling/reuse, and refuse disposal pattern for the municipal dump. These approaches, along with the investigation results, demonstrate that planning and research can turn the mixed deposits of a rubbish dump into a viable archaeological resource.

The ambitious Inner-City Bypass (ICB) project undertaken by the Brisbane City Council (BCC) between 1998 and 2002 represents the largest single infrastructure construction project yet undertaken by a Queensland local government authority. Heritage mitigation works for the development included detailed assessment of the built environment during initial and detailed planning (ARCHAEO 1998a), an application to the Queensland Heritage Council for minor impacts to a listed park landscape, and photographic documentation of impacted sites (ARCHAEO 2000a; 2000b). The primary archaeological consideration was related to the ICB route alongside an existing rail transport corridor through Victoria Park, a recreational and parkland setting on the northwestern fringe of Brisbane's inner-city. This area was highlighted in the project's initial Impact Assessment Study as possessing very high archaeological significance due to known rubbish deposits dating from the early decades of Brisbane's metropolitan growth (potentially 1860s–1920s), (ARCHAEO 1998a:72).

As part of their management of the cultural heritage issues associated with the ICB project, BCC was required by the Queensland Environmental Protection Agency (EPA) to undertake sub-surface archaeological investigations of the rubbish deposits before any impact from road construction could occur. The footprint of the proposed ICB corridor between Bowen Bridge Road and Victoria Park Road at Herston determined the boundaries of the area where excavation could take place. The corridor was to be constructed adjacent to the railway embankment from Bowen Bridge Road to the pond (lake) adjacent to Gilchrist Avenue (Fig. 1). It was then to follow the alignment of Gilchrist Avenue incorporating the existing roadway to Hale Street and the Normanby Fiveways.

In response to terrain variations that were largely the result of historical land use, the study area was broken up into five zones or loci prior to the commencement of excavation (Fig. 2). Terrain variations caused logistic and timing issues in the excavation, all of which required differing approaches and strategies to overcome.

The evidence of regulated rubbish dumping activities from the late nineteenth century was expected to be widespread throughout the study area. It was anticipated that such deposits were localised, centred in pits either purposely excavated or potentially in abandoned clay pits from historic brick-manufacturing activities across the entire project area. It was also expected that no single rubbish pit would span the whole period of rubbish dumping within the study area but instead each rubbish deposit would represent only a narrow temporal range. The rubbish deposits were in fact found only in Locus C and D in formalised trenches, and were also used as fill in a series of historic ponds (Fig. 2).

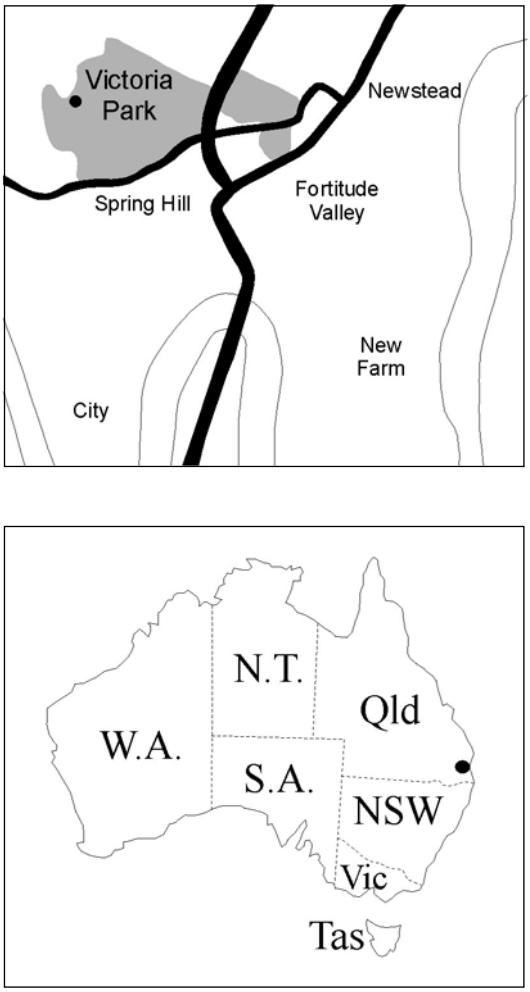

Fig. 1: Location Plan.

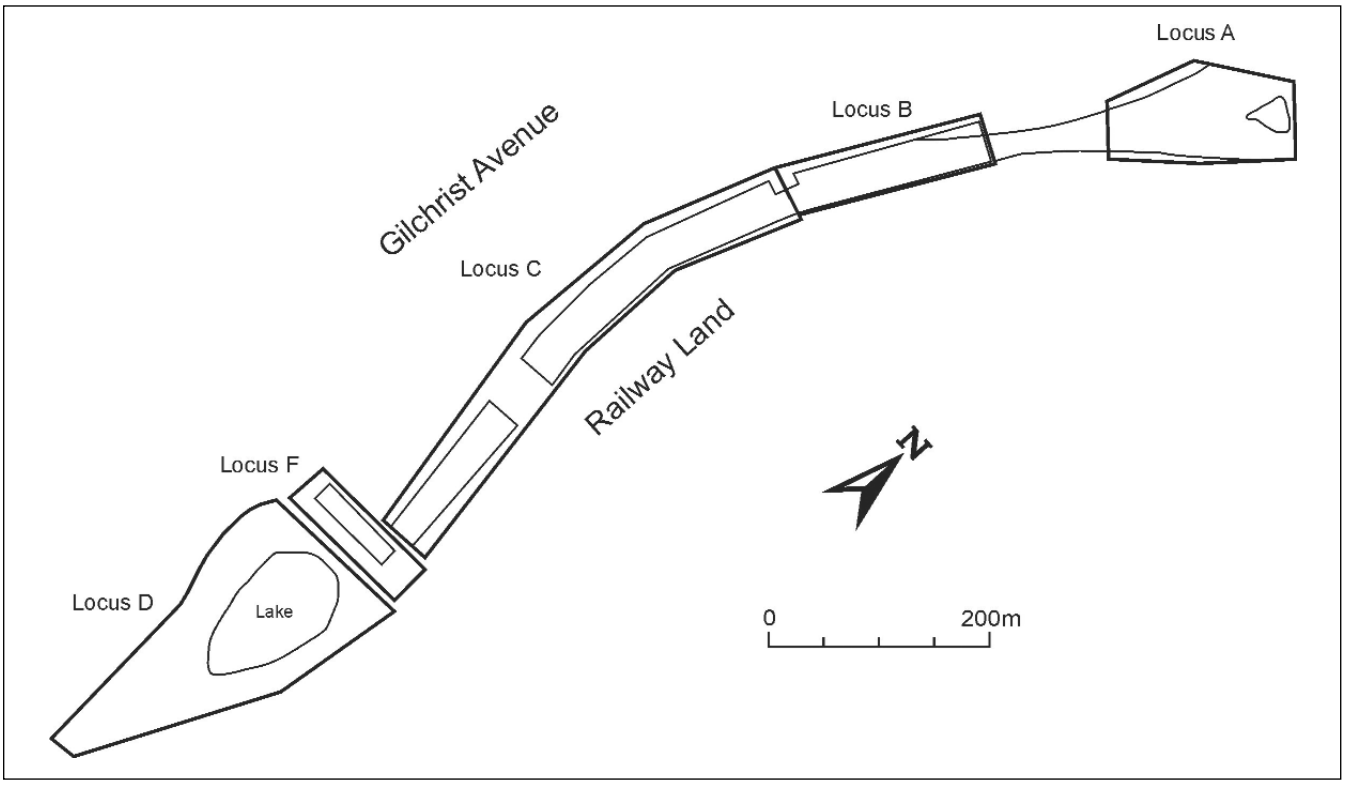

Fig. 2: Plan of site excavation loci, Victoria Park, Brisbane.

RESEARCH DESIGN

As a prelude to identifying research topics a broader perspective was taken to identify what set this archaeological site apart from others. The paucity of late nineteenth-century archaeological excavations in the Brisbane setting provided a starting point. Commenced as a penal settlement in the 1820s and opened to 'free settlement' in 1842, Brisbane developed according to the classic pattern of industrial urbanism in the nineteenth century. By the 1880s the town centre had the first of its typical rings of enclosing suburbs, and a developing transport network of rail and tramways to service them and direct further development. According to Crook, Brisbane in the 1880s was undergoing a transformation from frontier town to colonial city. This process of transformation was much the same as other contemporary frontier towns all over the world, 'population incidence, the development of urban institutions, building booms, social sophistication and diversification emerging as universal manifestations of the same trend' (Crook 1958:21).

Cannon cites the views of nineteenth-century sociologist Adna Ferrin Weber to the effect that Australian cities were the 'newest product of civilisation' and thus emblematic of the industrial age (Cannon 1975:11–12). A pattern of urbanisation was emerging in Australia that seemed to lead global developments, although as Lawson (1973) points out, Brisbane's characteristic 'social segregation by elevation' owed as much to local topography as it did to any universal tendencies in the urban-industrial form.

Thus in the late nineteenth century, Brisbane as the capital of Queensland and the third largest city in population of the six Australian colonies, Brisbane was rapidly urbanising as a sizable, dense and heterogenous centre of commerce, administration, politics and consumption. No frontier settlement or 'big country town', it was emphatically a modern city (Crook 1958; Lawson 1973). However, compared to other major Australian cities of the period, few if any historical archaeology sites of this period had been investigated in the Brisbane area (ARCHAEO 1998b). While the formulation of research topics addressed the comparative aspects of the collection on a national level, they also were designed to provide a basis for future comparative studies for Brisbane.

The research design for the excavation was based upon site-specific and contextual historical research and assessment of the site's research potential, and was developed in three stages. The preliminary research design was developed prior to the commencement of field investigations. Historic research was undertaken to pinpoint locations for excavation, in particular the municipal rubbish deposits, but the results obtained were not specific and did not provide sufficient information to locate these potential historical features. Subsequent to field investigation of the rubbish deposits, further research was undertaken on key topics to assist with the preliminary analysis of the assemblage for the interim report. A final research design, established during the tender for the analysis and report phase of the project, identified key topics to be researched prior to detailed artefact analysis.

The initial historical research established a broad understanding of the history of land use, rubbish disposal and environmental modification across the five zones of the study area. Alongside various published and secondary works, an unpublished research paper on the history of Victoria Park (Laverty 2000, shortly to be published by the Brisbane History Group) was generously provided by Emeritus Professor John Laverty for the purposes of the study, and proved of immense assistance. This detailed account of the park's origins and subsequent management within Brisbane's emerging municipal framework drew from the author's extensive research notes dating back to the 1950s.

HISTORICAL CONTEXT

From the time of British settlement in the mid-1820s, the shallow valley to the north of the Brisbane township (known traditionally as *Barrambin*) was referred to as York's Hollow, a regular camping and gathering site for the Indigenous people

of the North Brisbane area. The new name reflected the stature of the so-called 'Duke of York', the acknowledged elder of the local Turrbal people. Within a few decades, small-scale enterprises such as timber-felling and brickmaking began to impact the York's Hollow landscape. In the late 1840s a man named Humby was manufacturing bricks from clay excavated below the study area at the site of the later Royal National Association (RNA) Showgrounds (Petrie 1904:143). Similarly, the brickmaking firm Bowser and Son excavated clay from the upper regions of York's Hollow closer to Normanby (and thus within the vicinity of the archaeological excavation) and manufactured bricks there until around 1866.

During this period, and prior to its formal reservation as a public recreational park, the York's Hollow area was partially reserved from development as the 'Brisbane Water Reserve' (QSA: A1A 1850c) from around 1850 (Fig. 3). The existence of this informally reserved area appears to have sustained the fringe population of Indigenous people, immigrants and the homeless until the creation of a formal reserve for public use there in the mid-1860s.

With the separation of Queensland from New South Wales in 1859 and the creation of the Brisbane Municipal Corporation (later the Brisbane City Council), Brisbane possessed few formal parks and recreation reserves, one notable exception was the establishment of Victoria Park Reserve. York's Hollow was already informally regarded as a public reserve, referred to as 'Brisbane Park', and by mid-1865 the more patriotic title 'Victoria Park' had been adopted. In 1875 the area was formally reserved for recreation.

Integral to the improvement of the park was the reclamation of its low-lying ground. The Victoria Park trustees were keen to fill areas such as the creek, waterholes and swampy banks, to 'improve' the ground for organised sport and recreation. The archaeological and historical evidence

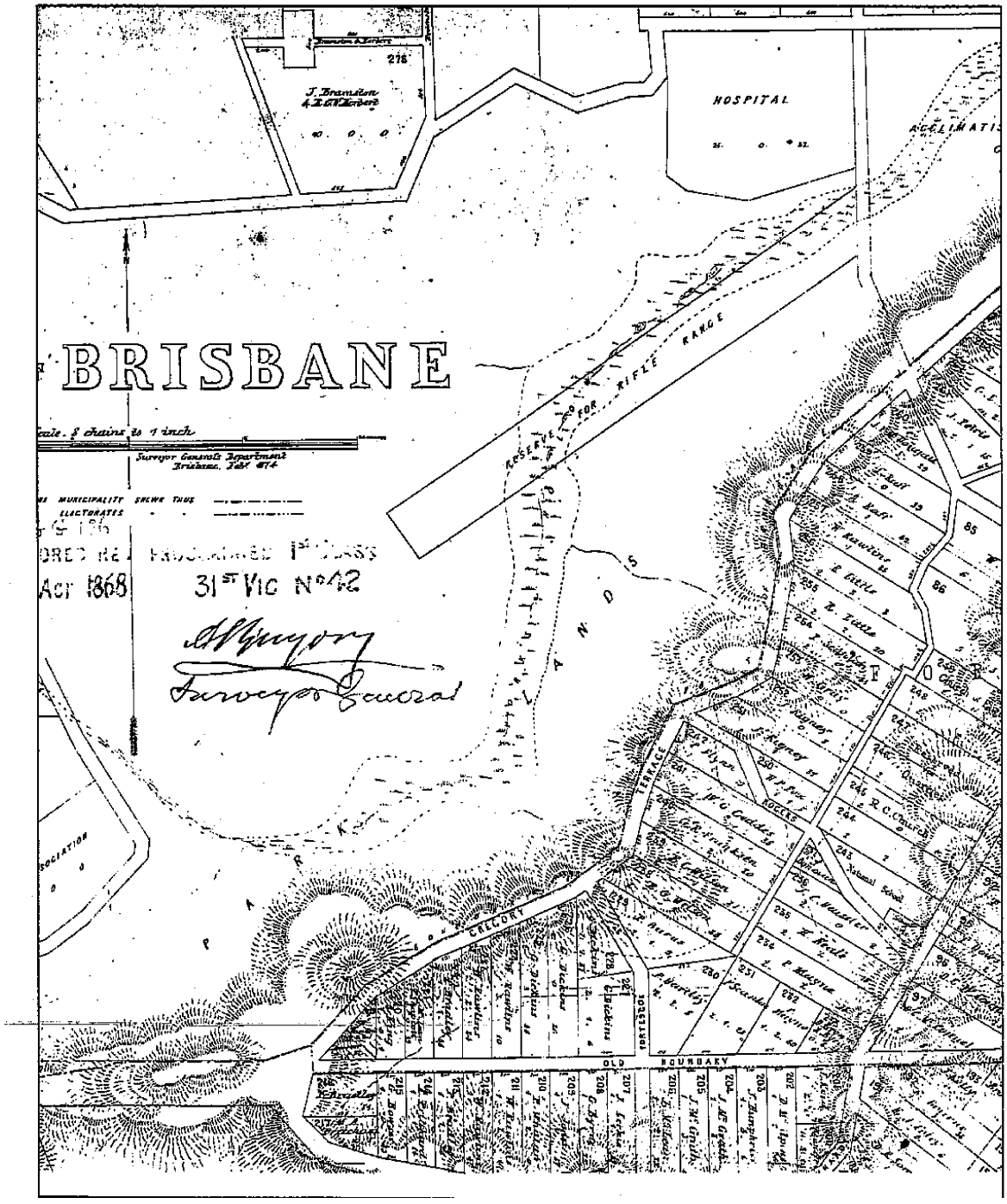

Fig. 3: Part of Victoria Park c. 1874, showing watercourse and rifle range, Department of National Resources and Mines, B3.92.

suggests that this end was partly achieved by land filling with ash burnt from coal, charcoal and wood which were by products of industrial and commercial activities, and street sweepings composed principally of horse manure, newspaper shreds and other stray litter.

The reclamation of low ground in the park could also be achieved by the systematic excavation of trenches for the deposition of domestic and commercial rubbish. Spurred by the booming residential development of Brisbane in the 1870s and 1880s, and the various nuisances and health hazards that followed from *laissez faire* dumping, the Brisbane Municipal Council was by the 1880s prepared to take a leading role in the reform of local rubbish disposal. Therefore, during the 1880s, the Park Trustees and Council developed a mutually beneficial arrangement: the creekside areas of the park were systematically used as a dump for municipal and domestic refuse and street sweepings, for which a fee was levied by the Trustees. Pits were dug along the edge of the creek and waterholes, and were filled with private and municipal rubbish that was carted to the site by drays (Hall 1978:6). By 1886, for example, it was reported that 1053 dray loads of rubbish had been dumped in a network of trenches close by the waterholes and main creek through the park (Laverty 2000:9).

Such measures were acceptable partly because, in this period, the vicinity of Victoria Park still represented the outer margins of Brisbane proper. In Knight's words, the park was 'only across the way, as it were' (Knight 1897:70). Certainly, a wider circle of new suburbs and estates ringed the northerly edge of Victoria Park; but in terms of intensive development and settlement, Gregory Terrace marked the edge of the inner city. One American historian concerned with the social history of rubbish points out that city and town margins were overwhelmingly favoured for rubbish dumps: 'the conglomeration of ashes, food scraps, street sweepings, and old mattresses was carted away to sites at the edges of towns. The bigger the city, the bigger the challenge: larger accumulations had to be hauled further to reach the outskirts' (Strasser 1999:126).

The dumping activities should be seen firmly within the historical context of 'improvements' to Victoria Park. Alongside the clearing out of stumps and unwanted vegetation, tree-planting and road developments, the reclamation of swampy ground was considered a progressive measure.

EXCAVATION STRATEGY

An excavation strategy was devised to allow for sampling of deposits covering a range of dates and different sources, or origins, of the artefacts. Since artefacts in these deposits resulted from widespread collection activities, the challenge to the archaeologists was to create a link back to their origin or in other words, the primary location, cultural event(s) and individuals associated with the collection of artefacts.

This strategy was tempered by a number of factors, including client time constraints, the size of the overall study area (25 000 m^2), ground water permeation, an absence of precise historical evidence for the location of cultural remains, and anticipated thickness of modern fill deposits covering the nineteenth-century rubbish dumps. The resulting excavation strategy included:

- Remote sensing survey undertaken prior to excavation to attempt to locate anomalies that might assist in trench positioning.
- Equidistant location and spacing of the excavation trenches.
- Perpendicular trenching to the railway line to intersect the rubbish deposits.
- Use of mechanical excavator to excavate trenches in natural or *in situ* strata.
- Manual excavation of only designated significant contexts.

Sampling Strategy

The ICB corridor covered a small part of the overall area in which pits were dug and rubbish deposited. By restricting excavations to the corridor, it is believed that total archaeological excavation of all rubbish pits within the park would represent no more than 25 per cent of available rubbish pits. Approximately 40 per cent of the rubbish area within the corridor was excavated, on the basis of taking a sampling from all date ranges and pits available. Thus the overall sample taken from all rubbish pits in Victoria Park probably represents approximately 11 per cent of available material within the park.

The primary investigative tool used in this excavation was mechanically excavated trenches. Trenches were essentially soundings, or sondages, excavated to obtain an understanding of the depth and complexity of the cultural composition by an examination of the stratigraphy. The initial trench width was approximately 2 m. Trenches that went deeper than 1.5 m, were benched in accordance with workplace health and safety regulations. One benefit of benched trenching became apparent when heavy overnight rainfalls flooded trenches (Fig. 4). In this situation some trenches were dug even deeper allowing this lower depth to act as a sump and allowing

Fig. 4: A benched trench flooded by overnight rains.

further excavation and recording to continue. Significant contexts were manually excavated and were defined and designated as pits. The horizontal dimensions of all pits were surveyed. The vertical dimensions were recorded during section drawing, where appropriate.

Remote Sensing

As previously mentioned, remote sensing surveys were conducted across the project area. SenseOre Services performed these geophysical surveys to assist with the prioritisation of excavation areas. The GEM-2B electro-magnetic system was used for these surveys. Data was collected in a series of grids for quality control, so that each section of the data could be analysed as the survey progressed. Results of these surveys provided a wealth of information about the variations in the subsurface in the project area. Some features correlated clearly with buried pipes and cables. This helped in the decision to place trenches in less disturbed areas and away from services that presented significant workplace health and safety issues for the archaeological team. Areas of shallow bedrock were distinguished from fill by the highs in the quadrature data. A primary target for the surveying work was the as-yet unidentified rubbish deposits, but significantly, the remote sensing survey did not confidently identify their location.

Excavation

In the absence of geophysical survey data, anecdotal evidence of the presence of rubbish dumps near the railway underpass dominated the excavation approach for Locus C. In fact, the rubbish deposits were located in Locus C and D (Fig. 2). Originally Locus C was to encompass an area of 20 x 50 m adjacent to the underpass, a tightly defined area established on the basis of the anecdotal evidence. During the course of the excavation this locus was extended further to the north to encompass all the located rubbish deposits north of the causeway within Locus C.

The excavation approach started with the mechanical excavation of trenches at approximately regular intervals perpendicular to the alignment of the railway embankment and extended westwards, on average, 25 m from the embankment. The southern border could not be expanded because the causeway, the railway underpass, pedestrian and vehicle access to the playing fields and the rest of the park had to be maintained during the course of the archaeological investigation. Towards the end of the investigation of this locus, mechanically assisted trenches were cut parallel to the railway embankment. For the most part these later trenches were shallow and created for the purposes of trying to establish links between the earlier trenches.

In total nine rubbish deposits were excavated in Locus C and seven in Locus D. A total of 88 615 artefacts were recovered. The rubbish deposits in Locus C and D could be divided into two categories, rubbish trenches and surface dumps. In Locus C, three rubbish trenches were exposed, side-by-side, aligned north to south. The spacing between the rubbish trenches was approximately 0.5 m. One rubbish trench, which was completely excavated, measured approximately 2.5 m across and 0.15 to 0.2 m deep. The artefacts recovered from within the three rubbish trenches ranged in date from the 1880s to the 1900s, though the rubbish trenches were most likely filled and sealed in the 1890s. Artefacts post-dating 1900 are likely to result from intrusions, as both the excavated rubbish trenches were cut into and disturbed by the land reclamation of the 1930s. Further disturbances were caused in the last 70 years by the erection of a goal post and (possibly) abortive bottle-hunting efforts.

Locus D was wedged between the causeway, Gilchrist Avenue and the railway embankment. The locus was dominated by an existing pond documented on a number of nineteenth-century plans of the area. Leading into the southwest end of the pond was the underground concrete storm water drain that passed under Gilchrist Avenue further to the west. The presence of the pond and the drain within a tightly confined locus presented certain challenges to the conduct of the archaeological investigation.

Finding rubbish deposits in Locus C influenced the approach taken for the investigation of Locus D. The primary objective was to determine the presence and extent of rubbish deposits in the latter area. The secondary objective was to identify pre-1930s surfaces and with the rubbish deposits in mind, pre-1880s surfaces. This excavation approach would provide information as to whether the pond, as it existed in 1999, was in existence in some form prior to 1933.

The first excavated trench in Locus D provided a surprise in that one rubbish trench was uncovered in an unexpected location. This trench was unusual in that it was dug into what appears to have been the muddy edges of a pond. In all, three trenched rubbish deposits were located in Locus D. One trench was dug through the alluvial sediments of the pond's edge, and the others were cut through culturally introduced deposits. Of note here was the evidence that these second and third trenches were capped or sealed with the material that was originally dug out of the trenches.

ARTEFACT COLLECTION

During field investigations, a standard artefact collection policy for this archaeological investigation was established for all site areas. This policy was threefold. In secure contexts recovery was 10 per cent. In less-secure contexts, such as backhoe spoils and general trench cleaning, the policy was recovery of representative examples of observed artefacts, as well as artefacts that were thought to be rare.

LABORATORY PROCEDURES

Designing post-excavation laboratory procedures for this project was a multi-step process. Given the volume of material to be catalogued and the seven-months time frame allowed by the contract constraints for the cataloguing, analysis and reporting on this project, a strategy was required to record the most diagnostic information in the most efficient manner possible.

The first step was to divide the artefacts into two groups: high priority provenances and low priority provenances. Low priority provenances were identified as disturbed contexts, such as backhoe spoils, surface collections, and disturbed sub-surface deposits. High priority provenances were identified as distinct and/or undisturbed sub-surface deposition. Artefacts from low priority provenances were catalogued according to basic guidelines providing information on form, function, material, temporal placement, colour, count and technomorphology. Artefacts from high priority provenances were catalogued according to these same guidelines, however additional data was recorded on completeness, size, weight, pattern, product, manufacturer, place and date of manufacture.

The second step was to devise a system in which the majority of artefacts would be handled only once. The solution was to record as much of the attribute data as possible into a direct entry artefact database. A coded direct data entry system was developed, in which attribute data could be encoded into a computerised catalogue to allow manipulation of part or all of the data sets. Encoding data serves to provide consistency

during data entry and retrieval. This procedure also avoids problems such as spelling, capitalisation, and spacing that prove troublesome in other computerised data systems. Furthermore, the database application designed for this project contained a series of built-in macros and relational reference tables that automatically converted the coded information to its written equivalent. To minimise typographical errors, the application was written in such a way that only codes from a predefined relational table could be entered and written equivalents appeared immediately on screen for the cataloguer's review. The conversion to written equivalents proves to be extremely efficient when exporting summary queries directly to the report text. Also the application imported date information for diagnostic attributes and product, manufacture, and pattern information.

Commercial containers, such as bottles and jars, represent the majority of the collection. A type collection was established whereby each vessel shape was assigned a unique coded identification number. Periodically, throughout the cataloguing process, new vessel types were identified and research on these vessels was ongoing. The codes and research results were entered in a relational reference table that periodically updated the main database table.

Similarly, product, manufacturers, and ceramic pattern database tables were established. In these tables information on all identifying marks on artefacts was recorded. Each new identified product or manufacture was assigned its own unique keyword that was used as an identifier in the main artefact table. Each 'mark' was researched for temporal and locational data. In some instances the research of the manufacturer led to the identification of the product or vessel type.

The third step was to create an application to accommodate all these conventions. First, an attempt was made to build a main table (database) possessing required fields by oversight agencies only to find no such guidelines existed. A review of existing databases for similar projects found great diversity in inclusive fields; some were large databases with numerous fields and relational tables, while others had minimal fields with one very large descriptions field where most diagnostic information was jumbled together (Godden Mackay 1999; Queensland Museum 1995; Wallin & Grimwade 1998). It is of interest to note that more recently this lack of consensus has become a topic of discussion in the Australian archaeology community (Crook et al. 2002:26). Second, was to allow for the catalogue of artefacts from both low and high priority contexts into one database. This was accomplished with a series of basic fields, to accommodate both levels of cataloguing, and more detail fields for artefacts from the high priority contexts. To expedite data entry two distinct on-screen forms were designed. Finally, all data for each record, including all written equivalents for shape, material, functions, attributes, manufacturer, product, and pattern, were related into one database table that could be queried, viewed on screen or printed.

SPECIALIST RESEARCH

As with any large-scale project with anticipation of addressing specific research topics, a support group of researchers and analysts was assembled. For specific artefact types, such as botanical remains, fauna, and bottles, specialists were consulted to conduct more extensive analyses and/or research. The botanical remains, recovered primarily from processed flotation samples, were identified by common and scientific name. Special analysis for faunal remains was conducted by Dominic Steele, and while his report was included as an addendum to the final excavation report, the results of this analysis were included in the discussions of economic conditions and nutrition in the period. Over 400 fragments of cloth are in the collection which were sent to the conservation department of the Queensland Museum for special treatment and analysis. A complete catalogue and report was prepared by noted textile expert Michael Marendy. Analysis of bottle manufacturing technomorphology was conducted in-house, and bottle specialist Lindsay Ballinger was consulted for detailed research on types, technologies and manufacturers.

PERMANENT COLLECTION

At the conclusion of the project, a selection of artefacts to be included in the Permanent Collection was made for permanent curation at the Queensland Museum. Due to the fact that there were over 100 000 individual artefacts in the entire collection, many hundreds of duplicate bottle forms and thousands of fragments of undiagnostic glass, a sampling strategy was required. The volume of artefacts from the complete collection was quite extensive, with over 2000 unique artefact types, which could range from the smallest piece of undiagnostic colourless glass to a complete dark-green bottle manufactured in a 3-piece Rickets mould with an applied string finish and iron pontil; an unidentifiable corroded iron fragment to a complete tablespoon; or an undecorated unglazed earthenware fragment to a complete whiteware plate with Asiatic Pheasant transfer-printed decorative design. Given the scale and range of the working collection, it was decided by BCC and the Queensland Museum that the Permanent Collection should include representative examples of artefact types.

Each diagnostic artefact type was digitally photographed, as were unique and unusual artefacts that remained unidentified for their form or function. This digital record was submitted along with the collection and a representative sample of digital images was included as an appendix to the report.

COLLECTION ANALYSIS

At the May 2003 Museum of Sydney symposium 'Exploring the Modern City: Approaches to Urban History and Archaeology', Tim Murray suggested that historians' participation should not stop at the research design of an archaeological project. As many prior studies have demonstrated, the experience of the Victoria Park work confirmed that the historian's involvement should be an integral part of historical archaeological investigations from the outset through to analysis and reporting (Godden Mackay 1999; Yamin 2000; Ginn & Harris 2002). During the crucial latter phases of this project, the archaeologist and historian worked in tandem to address research topics, as well as further areas of interest that came to light during the artefact analysis process.

The project's research topics were identified in anticipation that sufficient data would be collected to illuminate several areas of the social history and culture of late nineteenth-century Brisbane. In this expectation, the preliminary research design extended beyond the basics of temporal and functional analyses to encompass topics such as refuse disposal patterns for a municipal dump and market access. During the initial cataloguing it became apparent that these topics could be widened to include an examination of key themes in Brisbane's social history. The site's archaeological evidence could therefore potentially contribute to topics such as the consumption implications of an economy in depression (namely Brisbane's slump of the early 1890s, aggravated by severe flooding in 1893), issues related to

general nutrition and health, and the potential for comparative studies of historic sanitation activities on a local, national and international level.

These topics are discussed in turn. Given the difficulties of presenting analytical processes in the absence of any attention to the historical research that accompanied and informed the archaeological investigation, the collection processes have been presented in the following discussion along with summaries of the results produced by these efforts.

Refuse Disposal

A study of refuse disposal patterns furthered the basic functional analysis by establishing type assemblages that exemplify social and economic units. Studying refuse disposal patterns for the Victoria Park municipal dump proved challenging. The majority of historical archaeology sites deal with individual households or comparative studies of a group of households in a neighbourhood. While these studies provided insight into the composition of social and economic units, they could not be applied to this study due to its inability to discriminate between specific households, commercial and service entities. Furthermore, popular studies, such as *Rubbish! The Archaeology of Garbage* (Rathje & Murphy 1992), reports the results of an ongoing 20 year+ study of modern waste disposal problems which were not applicable to the report's research topics. Fortunately, Catherine Blee's 'Sorting functionally-mixed artifact assemblages with multiple regression: a comparative study in historical archaeology', provided an approach that could be applied to this study (Blee 1991).

Blee's dissertation devises a classification system to be used in defining the data calibrations sets by establishing functional categories that would select the most likely contributors to a late nineteenth-century rubbish disposal site (dump) in Skagway, Alaska (Blee 1991:83). The archaeological community is beginning to recognise the usefulness of this system when analysing rubbish deposits. It has been discussed, analysed and criticised in papers and dissertations, leading Blee to revise and update some of the statistical aspects of this system (Hardesty 1998; Gould 2002; Spude 2001, 2004).

Applying the methods used by Blee, hypothetical assemblages were built from functional categories in the Victoria Park assemblage. This was accomplished in a two-step process. The first step was to determine the social and economic units of Brisbane that constituted the potential contributors to the Victoria Park rubbish dump. In this broad distinction, social units were considered as individual households in the community, while economic units were taken as businesses, agencies and enterprises catering to the physical, social, and service needs of the populace. Secondly, for each unit class, typical or hypothetical assemblages were established. Thus, three types of representative assemblage were built: Family–Household, Hospital, and Hotel/Club type assemblages (Table 1).

The Family–Household and Hotel/Club type assemblages were selected for their comparative research potential. The Hospital type assemblage was selected because of the close proximity of the Brisbane Royal Hospital to the rubbish dump and the intention to provide a comparative assemblage for future studies. Discrete deposits were identified and examined for high and low relative frequencies of certain artefact classes. If the criteria were satisfied for inclusion in a particular assemblage type, the deposit was delegated to that assemblage.

From the onset, the study of disposal patterns at the Victoria Park dump had two objectives. The first was to determine if any discrete rubbish deposits were recovered that could accurately reflect specific type assemblages. This proved to be problematic; mostly due to the suppositions of those who built the type assemblage models. There were unexpected anomalies in each rubbish deposit identified with a specific type assemblage. For example, in one of the Family–Household type assemblages, there is a high relative frequency of faunal remains that suggest butchering activities. A deposit that met the criteria for a Hotel/Club type assemblage included a nursing bottle and a child "ABC" dish. There are many possible explanations for these results. The butchered bones in the Family–Household type assemblage could have represented a home base business. While children-related artefacts in the Hotel/Club type assemblage were not anticipated, research subsequent to the submission of the report indicates that historically publicans were legally required to live on the premises (Wright 2003:5). In 1876, 22 per cent of Victorian pubs were operated by women. By the end of the nineteenth century that figure had risen to 50 per cent (Wright 2003:5). Therefore, the presence of children's possessions, while not in high relative frequencies, could be commonplace in a Hotel/Club type assemblage.

The second objective was to determine if type assemblages could be constructed using a predetermined set of criteria that would accurately reflect a specific segment of the social or economic community. The analysis results proved that indeed type assemblages for a rubbish deposit do work and that their use can facilitate the identification of the social and economic units that contributed to that deposit. In all, eight Hospital, two Family–Household, and two Hotel/Club units were identified for the assemblage. Due to their unique components, it was much easier to identify the hospital units. Hotel/Club and Household–Family units have many similar components and identification was in large part on the relative frequencies of inclusive elements.

Table 1: Components of Hypothetical Type Assemblages

Family Type Assemblage	Hospital Type Assemblage	Hotel/Club Type Assemblage
High freq. decorated ceramics	Caduceus logo on plates	High freq. of undecorated ceramics
Low relative freq. Liquor	Denture	High freq. of tobacco pipes
Child-specific items	Toothbrushes	High freq. of liquor bottles
Female-specific items	Low freq. Liquor	Tumblers
Canning jars	Medicine bottles	High freq. of food remains
Furnishings	Syringe	Low freq. of medicine bottles
Personal items	Crucible	Condiment bottles
	Bulbous syringe	
	Chamber pot	
	Vial	
	Human teeth	

Trade and Market Access

A market access study is the examination of factors affecting individual selection of goods in the context of the supply-demand interactions and spatial distribution of goods along transportation networks from manufacturers to distributors to consumers. Any study of market access issues requires intensive and artefact-specific research to establish product, manufacturer and temporal data for the collection in question. While this type of data is perhaps the most direct and accessible to result from an excavation analysis, its interpretation requires a study of complex patterns in commerce on the local, state, national and international levels.

The value of a market access study for the Victoria Park artefact collection derives not from any innovatory

approaches, but from the fact that it is the first such study with sufficient data to provide an account of Brisbane's market access during the late nineteenth century (Fig. 5). The focus was to ascertain which markets Brisbane merchants were pursuing during the late nineteenth century, to recognise any changing patterns, and to potentially compare these results to Australia's other major cites.

Fig. 5: Advertisement from Post Office Directory.

Using a variety of resources, location information was obtained for 58 manufacturers, including makers of bottles, commercial containers, ceramic vessels, tobacco pipes, and toothbrushes (Godden 1981; Boow 1991; Williams 1986; Ford 1995; Gojak & Stuart 1999; Wetherbee 1985). These came from six countries: Australia, England, Germany, Ireland, Scotland, and United States. The origins for 109 products from ten countries (Australia, England, France, Germany, Hungary, Ireland, Netherlands, New Zealand, Scotland and the United States) were identified. Most products and containers were from the same country of origin (Fikes 1986; Boow 1991; Deutsher 1999; Arnold 1989). The exceptions were bottles manufactured overseas for domestic bottlers.

The significance of this data was measured in the context of worldwide commerce during the nineteenth century, and the positioning of Australia and Brisbane's place in this market. Australia's horizons were broadening during the late nineteenth century, due in part to complex patterns of supply and dependency within the orbit of colonial Britain and trade connections with Asia and North America. Yet Australian commerce was still dominated by imports from the British Isles, a circumstance that can be readily demonstrated in the archaeological record. Nowhere was this better demonstrated than in the assemblage from the Victoria Park rubbish dump where Britain was the single largest source in all categories: ceramics (92%), ceramic patterns (100%), bottles (59%), and bottled products (42%) (Table 2). During the late nineteenth century as Australia started developing its own industries, an increasing share of the consumer market became domestic in origin. This shift is demonstrated in the archaeological record at Victoria Park.

Table 2: Market Access: Relative Frequencies for Ceramics and Bottles by Location

	Ceramics		Glass Bottles	
	Manufacturers	Patterns	Manufacturers	Packaged Products
Australia	8.16		17.24	27.27
NSW			6.90	2.27
QLD	8.16			19.32
VIC			10.34	5.68
Britain	91.84	100	58.62	42.05
England	91.84	100	48.28	36.36
Ireland			3.45	1.14
Scotland			6.90	4.55
France				5.68
Germany				1.14
Hungary				1.14
Netherlands				2.27
New Zealand				1.14
United States			24.14	18.18

While Brisbane still looked to Great Britain for its ceramic wares, an increasing diversity in market access of other products such as bottles, bottled products, and personal items such as pipes and toothbrushes is evident. In the domestic market, Brisbane residents turned to local potters for utilitarian wares. All marked utilitarian wares were produced by Queensland Pottery, which manufactured in the period 1887–1897 (Ford 1997). Similarly, all domestic tobacco pipes bore the marks of local tobacconists. Local industries marketing bottled products turned to firms such as Melbourne Glass Works, Botany Glass Works, and J. Ross (Sydney).

Tobacco pipes were one of the few artefact types in the collection for which research data within Australia could be obtained (Gojak & Stuart 1999; Wilson & Kelly 1987). In particular, Gojak and Stuart's paper 'The Potential for Archaeological Study of Clay Tobacco Pipes from Australian Sites' (Gojak & Stuart 1999) establishes basic analytical data for dating, typing, and sourcing tobacco pipes found on Australian archaeological sites. More works like this need to be published on Australian artefacts classes. Tobacco pipes are ubiquitous on eighteen and nineteenth-century sites throughout Australia, and marked pipes can provide temporal and market access information.

As previously noted, the original research design was subsequently broadened during the life of the project, and built upon the initial results of the excavation to explore a wider range of themes in the social history of Brisbane in the period. Principal among these were an examination of the evidence relating to household and business activities during the economic slump of the 1890s, and to more generalised issues of nutrition, health and hygiene within the period's social history.

An Economy in Depression

For the fledgling city of Brisbane, the last two decades of the nineteenth century represented an 'economic boom … swallowed by deep depression which was in turn followed by prolonged recovery' (Lawson 1973:37). The 1880s saw an

unprecedented wave of prosperity for the young colony, as gold discoveries, an expanding primary industries base in wool and beef export, and a burgeoning population base contributed to an expansion of economic activity and wealth creation. Infrastructure programs such as railway development in particular boosted local employment, and overseas investment provided the means for many new enterprises.

This picture, generally sustained through the 1880s, had changed by the early 1890s. A number of factors combined to send the economy into deep depression: the withdrawal of overseas (especially British) capital, the collapse of confidence and activity in the building sector, conditions of severe drought alternating at three-year intervals with extreme flooding that reached its worst in 1893, and a wave of industrial unrest on the pastoral stations and in shipping were among the most prominent.

While the first of these factors should be considered in the light of broader global developments, the speculation in land and buildings that had been a hallmark of the 1880s was characteristic of the local economy. The 1880s boom resulted in an oversupply of offices and homes; as confidence declined the builders and building suppliers and manufacturers (bricks, tiles, timber, carpenters, timberyards, brick makers) were hardest hit (Lawson 1973:42). Their difficulties rippled out to other sectors, typified by the collapse of local building societies and banks (including the Queensland National Bank) in May 1893. Finally, a wave of industrial unrest and agitation by the unemployed materialised during these years, associated with falling wages and widespread hardship among the working class. Some of the key events of Queensland's history are identified with this period, including the prolonged and bitter shearers' strike, the formation of the Australian Labor Party, and mass demonstrations by the unemployed.

To compound the gloom that had gathered during three years of extreme drought, the two great floods of February 1893 hit the colony's capital with an extraordinary destructiveness. On 1 February 1893, the first floodwaters broke the banks of the Brisbane River. Before the floodwaters subsided, bridges collapsed and wharves and shipping were devastated. Two weeks later, as the clean-up continued, a second serious flood brought another wave of destruction. Taken together, the floods of 1893 initiated severe dislocations in a local economy that had been struggling through the effects of the prolonged depression.

Clearly, this broader pattern of boom and bust had a marked influence on commerce and domestic consumption. In general terms, the comparative level of imports gives an approximate indication of the patterns of consumption during this period. According to the statistics marshalled by Lawson, 'in 1885 the value of imports through Brisbane had reached a maximum, and in the period 1886–1889 it had fallen only slightly below this level'. Imports then fell dramatically during 1890 and 1892, and bottomed out in 1893 before slowly recovering to exceed the levels of the mid-1880s by 1899 and 1900 (Lawson 1973:38). Only at the end of the 1890s did the general level of consumption and demand for imports reach the peaks of the early to mid 1880s. In a broad sense, evidence suggests that domestic demand remained reasonably constant during the years of economic depression and that it was the larger, more capital-intensive and investment oriented industries that suffered the worst effects (Lawson 1973:40–1).

So how do the deposits of the city's municipal dump through this period represent these economic conditions? The building industry was one of the first affected by the depression in the early 1890s. By the early 1890s the last of the city building projects of the era was completed, a circumstance reflected in the 1891 census which showed a marked decrease in carpenters, masons and other building trades. The effects of the depression on the building industry were long lasting, for as late as 1898 the industry was still at a standstill (Lawson 1973:53).

Numerous studies have been conducted on the correlation between the relative frequency of structural debris and building activities (Blee 1988:127–135; Rathje & Murphy 1992; South 1977). As previously noted modern landfill studies such as Rathje's *Rubbish!* were considered but were found to be not compatible to this study due to modern society's increased manufacture and consumption of disposable domestic products. Structural debris in modern landfills represents only 12 per cent by volume (Rathje & Murphy 1992:100–101). However, other studies have supplied models for expected relative frequencies of structural remains in archaeological assemblages. One demonstrates the relative frequency of structural artefacts and the amount of construction, repair, or demolition activities.

In other words, the amount of structural debris, such as window glass, nails, bricks, etc., was a direct function of construction, upkeep and demolition of a structure rather than a reflection of the site's activities (Blee 1988). Given that the archaeological sites used in these studies were in considerably less urbanised settings than Brisbane, which was a thriving metropolis in comparison, expectations for higher relative frequencies of building debris might be expected. Yet in the Victoria Park collection, building materials represented only 20 per cent, which is 5 per cent less than these sites and those of eighteenth-century British colonial sites in America that were included in South's (1977) 'Carolina Artifact Pattern'. Furthermore, the paucity of other non-recyclable building materials, such as timbers, mortar, plaster, cement, etc., indicates that little new building construction was occurring during this time.

Beyond analysis of structural debris, two classes of artefacts were identified as having the potential to provide indicators of an economy in depression: faunal remains as an indicator of the diet patterns, and bottles for their reuse potential. For these classes there are sources of comparative analyses in the archaeological record. Further-more, there are historical and literary accounts that were used to enhance the findings, including census data, economic studies, memoirs and even songs (Shann 1967; Lawson 1973; Petrie 1904).

Diet as an economic indicator

One favoured approach for economic indicators is to examine the faunal remains, in order to distinguish the characteristics of a late nineteenth-century to early twentieth-century 'depressed diet'. This task is clearly difficult, particularly when the remains have provenance to a city dump serving the needs of an expanding township. People obviously express their relative affluence or difficulties differentially, and it is clear that food *per se* is a poor indicator when used in isolation in archaeological studies to provide a definitive benchmark. Sheep and cattle constitute the majority of faunal remains. For each, both good quality meat cuts (hindquarter) and lower quality meat cuts were represented in the assemblage. It is however possible that the highly restricted range of the animal varieties represented amongst the Victoria Park identified faunal sample reflected limited market choice. The character and composition of the Brisbane diet during the period under study appears to be limited when compared to other Australian urban contexts investigated through archaeology (Table 3) (Steele 1999). Traditionally ascribed 'poor foods' such as rabbit are absent, along with a range of domestic fowl species and shallow and deep-water fish varieties (Steele 2001:36).

Table 3: Animal Varieties Represented in the Victory Park Collection*

Animal Species	No	Wt (g)	%
Mammals			
Sheep *(Ovis aries)*	1140	9964	39.0
Cattle *(Bos taurus)*	465	12787	15.9
Pig *(Sus scrofa)*	82	702	2.8
Rodent *(Rattus Norvegicus)*	8	4	0.3
Cat *(felis catus)*	3	4	0.1
Dog *(Canis Sp)*	1	4	<0.1
Equid *(Equus Sp)*	1	30	<0.1
Birds			
Chicken *(Gallus gallus)*	20	32	0.7
Unidentified Bird/Fowl	3	5	0.1
Fish			
Unidentified Fish	16	23	0.5
Unidentified			
Unidentified	1183	3070	40.5

* By NISP, Weight (g) and % according to fragment number.

Bottle reuse

Another way to study how this recession might have affected Brisbane consumerism is to examine the bottle collection for evidence of bottle reuse patterns. This pattern is evidenced by a comparative analysis of manufacture-deposition lag patterns for ceramic and bottles. Bottle reuse is well documented in the historical record, literature, and even in song. One account details the downfall of a prominent Brisbane architect, who, along with his family, was reduced to selling jam, collecting leeches, and scrounging bottles along the beach (Lawson 1973:42–43). More generally, this widespread practice gave rise to the figure of the 'Bottle-O' in Australian folklore, a colourful character immortalised in Banjo Patterson's song of the same name.

Manufacture-deposition lag is the difference between the time of manufacture and the time an artefact enters the archaeological record. Consideration of the mechanisms responsible for lag can reveal behavioural patterns of the user. Several studies have demonstrated that in late nineteenth-century urban settings ceramic vessels have a much longer manufacture-deposition lag than glass bottles (Busch 1991; Hill 1982; Harris 1988). The major explanation for this difference is the fact that by the late nineteenth century the glass bottle was a mass produced, inexpensive, and therefore readily expendable commodity. At the same time, ceramic vessels maintained their value and were items subject to much reuse and only discarded when broken beyond repair or use.

In contrast to these previous studies, examination of data from the rubbish deposits of Victoria Park demonstrates that there is very little, if any difference between the manufacture-deposition lag of ceramic vessels and that of glass bottles. In fact in some rubbish deposits, ceramics entered the archaeological record more rapidly than did glass bottles. These results suggest that during this time of depression in Brisbane, bottles were a more valued commodity. Beside domestic cottage industry reuse, members of the aerated waters industry most likely made a converted effort to reuse its custom made bottles beyond their average 'lifespan'.

Thus the examination of the collection from the Victoria Park dump for indicators of an economy in depression produced a set of limited but tangible results. Evidence of substantial bottle reuse was demonstrated through the comparison of manufacture-deposition lag for ceramics and bottles. Evidence of the depressed building industry was noted by the paucity of certain classes of architectural artefacts and debris in the collection. And finally, as is discussed below, results of faunal analysis demonstrated distinct limitations in the Brisbane diet.

Nutrition, Health and Hygiene

Nutrition

What could be discerned about nutrition from the Victoria Park artefact collection? This study's focus was to produce data that could be compared with contemporary cities and to provide a municipal model for future studies in Brisbane and Queensland. Given that food remains are organic and the Victoria Park Dump was located in a low-lying damp area, few survived after 100 years. What survived were faunal remains and a small number of fruit seeds and stones, and an in-depth analysis of the former was conducted. Flotation of soil samples, using a multi-modal flotation system, was conducted to recovered macrofloral remains. While preserved 'tinned' meat production was at its peak during the 1890s, the corrosive conditions eradicated any evidence and there were relatively few bottled meat essence or paste bottles (Farrer 1980:254).

Examination of food remains from the Victoria Park dump indicate that the diet of Brisbane residents during the late nineteenth century still relied heavily on meat as a staple. The exhibited preference for sheep is similar to the national preference during the late nineteenth century (Clements 1986:35–36). Fruit and vegetable remains, recovered from soil samples, were limited to seeds and stones of exotic plants, such as pumpkin, peach and plum, and the native passionfruit. While poor preservation produced relatively few vegetable remains, the recovered remains suggest that the Brisbane diet favoured exotic plant foods.

Health and hygiene

Attitudes and practices in health and hygiene during the period were markedly different to the well-funded and regulated arrangements of the following century. Hospitals were largely for the diseased and dying, and only those who could not afford private health care graced their doors. While methods of antisepsis have been introduced by the 1860s, personal and medical hygiene lagged behind these methods in practice. Examination and interpretation of an archaeological collection from this era must consider and address these factors while attempting to interpret the evidence from a nineteenth-century perspective.

In Brisbane, hospital reform was a major factor in improved public healthcare. In 1862, the new Queensland government passed a *Hospitals Act* and by 1867, the New Brisbane Hospital was opened at Herston (Gregory 1988). The subsequent nursing school trained ladies in the methods patterned after those introduced by Florence Nightingale. Numerous artefacts associated with the hospital made their way into the municipal rubbish dump in Victoria Park. Annular-banded porcelain tea cups and earthenware dinner service, for example, were recovered from the rubbish deposits, many of which bore a caduceus on the back side. Photographs in Gregory's text documents wards in which large, undecorated white earthenware basins and pitchers are visible. Similar basins and pitchers are included in the assemblage. These objects are evidence of cleanliness regimes introduced by the trained nursing staff.

While medical improvements were significant during the nineteenth century, there was still an acute lack of qualified doctors in Australia. Furthermore, the medical profession was held in generally low esteem (Cannon 1975:133), and home remedies, medical books and recipes were often handed down from generation to generation (Piper 1983). This lack of qualified medical advice presented quack practitioners with the opportunity to advertise their 'cure-alls' and patent medicines in reputable journals. Among the most common of

these were Holloways opium-based pills and ointments, Bosito's 'Syrup of Red Gum' and 'Barry's Pain Relief'. Such patent medicine bottles dominated the collection of medicine bottles from Victoria Park. This fact indicates a demonstrated preference for patent medicines by Brisbane family households that follows the national trend at the time (Davis 2001; Piper 1983).

On the other hand, in an age where weekly bathing might be considered excessive, archaeological evidence of hygiene practices is limited. While numerous combs were included in the collection, they cannot speak to the hygienic condition of the hair that was combed. The numerous toothbrushes and toothpaste pots in the collection denote attempts at oral hygiene. However, many of these artefacts were found in hospital related contexts. This association may indicate that practice of good oral hygiene might be limited to that environment and not widespread throughout the population.

CONCLUSION

The archaeological excavations at Victoria Park provide an opportunity to investigate a site that, despite its position on the city's periphery, was central to its daily cycle of consumption and disposal of material culture during the late nineteenth century. The 1999 archaeological excavations sought to delineate evidence of various documented activities at Victoria Park throughout time, most notably the deposition of municipal rubbish.

Prior to excavation, an electromagnetic survey was conducted across the site. This survey identified subsurface anomalies that assisted the archaeological team in locating some subsurface deposits for the larger project area, but unfortunately did not assist in locating the rubbish deposits. In addition, the survey assisted the investigations by identifying subsurface services and thus avoiding workplace health and safety issues.

The rubbish deposits provided a rare and exciting opportunity to study the material culture of late nineteenth-century Brisbane. The close cooperation of field investigators, historians, and artefact analysts produced a body of comparative information that was heretofore unavailable in the Brisbane context. Special analyses in cooperation with historical research enabled the establishment of type assemblages for family households, hospitals, and hotels. Comparison of these assemblages and the collection as a whole gave insight into rubbish disposal patterns, market access, nutrition, health, dietary patterns, and economic life. The results of market access studies demonstrate a changing pattern in Brisbane's patterns of consumption, and a shift from a heavy reliance on foreign markets to marked increase in domestic market preference in some spheres. The conditions of depression that prevailed in the local economy in the 1890s were illustrated by the paucity of building materials, dietary limitations, and recycle patterns. Analysis of faunal and floral remains gave insight into eating habits of nineteenth-century Brisbane. The archaeological evidence suggests that the general population preferred patented remedies to conventional medicine, and that while the concept of oral hygiene was apparent, it was not widely practiced outside the hospital environment.

It is the authors' hope that, as more archaeological investigations are conducted in Queensland, this artefact collection will provide the basis for comparative data to enhance our insight into Brisbane's late nineteenth-century development, social history and material culture.

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ABBREVIATIONS

BCC – Brisbane City Council

EPA – Environmental Protection Agency

ICB – Inner City Bypass

QSA – Queensland State Archives

RNA – Royal National Association

BIBLIOGRAPHY

ARCHAEO CULTURAL HERITAGE SERVICES 1998a A cultural heritage analysis of the proposed City Valley bypass corridor, Brisbane, unpublished report for Brisbane City Council and Connell Wagner.

ARCHAEO CULTURAL HERITAGE SERVICES 1998b An assessment of archaeological sites in the south-east transit corridor, south Brisbane, unpublished report prepared for the South-East Transit Project and Connell Wagner.

ARCHAEO CULTURAL HERITAGE SERVICES 2000a A photographic record of buildings at the RNA Exhibition Grounds, Brisbane, unpublished report for Leightons Contractors Pty Ltd and the Inner City Bypass Project.

ARCHAEO CULTURAL HERITAGE SERVICES 2000b A photographic record of the Queensland Rail accommodation building and diesel pump house, Mayne, unpublished report for Leightons Contractors Pty Ltd and the Inner City Bypass Project.

ARNOLD, K. 1989 *Collecting Australian found stoneware*, Crown Castleton Publishers, Maiden Gully.

BACH, J. 1976 *A maritime history of Australia*, Pan Books, Sydney.

BLEE, C. 1988 *Archeological investigations in Skagway, Alaska, volume II: The Moore cabin and house, Klondike Gold Rush National Historical Park, Alaska*, United States Government Printing Office, Denver.

BLEE, C. 1991 Sorting functionally-mixed artifact assemblages with multiple regression: A comparative study in historical Archeology, unpublished Ph.D thesis, University of Colorado.

BOOW, J. 1991 *Early Australian commercial glass: Manufacturing processes*, prepared for the Heritage Council of New South Wales.

BUSCH, J. 1985 'Second time around: A look at bottle reuse', in *Approaches to material culture research for historical archaeologists*, The Society for Historical Archaeology.

CANNON, M. 1975 *Life in the cities: Australia in the Victorian age: 3*, Thomas Nelson Pty Ltd., Melbourne.

CLEMENTS, F. W. 1986 *A history of human nutrition in Australia*. Longman Cheshire Pty Ltd.

CROOK, D. P. 1958 Aspects of Brisbane society in the eighteen-eighties, unpublished B.A. Hons. thesis, Department of History, University of Queensland.

CROOK, P. Lawrence S. and Gibbs, M 2002 'The role of artefact catalogues in Australian historical archaeology: a

framework for discussion', *Australasian Historical Archaeology* 20:26–38.

DAVIS, R. 2001 'John Gibbon: Tipperary pig stealer to Van Diemen's Land quack doctor: the rewards and punishment of 19th century medical entrepreneurs, *The Electronic Journal of Australian and New Zealand History*, http://www.jcu.edu.au/aff/history/articles/davis2.htm

DRUTSHER, K. 1999 *The breweries of Australia: A history*, Lothian Books, Port Melbourne.

FARRER, K.T.H. 1980 *A settlement amply supplied: Food technology in nineteenth century Australia*, Melbourne University Press, Melbourne.

FIKES, R. 1986 *The bottle book: A comprehensive guide to historic, embossed medicine bottles*, Peregrine Smith Books, Salt Lake City.

FORD, G. 1995 *Australian pottery: The first 100 years*, Salt Glaze Press, Victoria.

GINN, G. and HARRIS, E. J 2002 'Sherds of early Brisbane: history, archaeology and the convict lumber yard', *Journal of the Royal Historical Society of Queensland*, Volume 18 No. 2:49–67.

GODDEN, G. A. 1981 *Encyclopaedia of British pottery and porcelain marks*, Barrie Jenkins, London.

GODDEN MACKAY HERITAGE CONSULTANTS 1999 *The Cumberland/Gloucester Streets site, The Rocks: Archaeological investigations report*, 4 vols, prepared for the Sydney Cove Authority, Sydney.

GOJAK, D. and STUART, I. 1999 'The potential for archaeological studies of clay tobacco pipes from Australian sites', *Australasian Historical Archaeology* 17:38–49.

GOULD, R. 2002 Logic and analysis of functional in historical archaeology, unpublished PhD dissertation, Southern Methodist University, Dallas.

GREGORY, H. 1988 *A tradition of care: A history of nursing at the Royal Brisbane Hospital*, Boolarong Publications, Brisbane.

GREGORY, H. 1996 *The Brisbane River story meanders through time*, Australian Marine Conservation Society: Brisbane.

HALL, P. 1978 *Royal Children's Hospital Brisbane 1878–1978: A century of care*, Herston, n.p.

HARDESTY, D. 1998 Archaeological perspectives on settler communities in the west, unpublished paper presented at the Settler Communities in the West Symposium.

HARRIS, E. J. 1986 Which came first—the bottle or the bowl?, unpublished paper presented at the 1988 Southeastern Archaeological Conference, New Orleans, Louisiana.

HILL, S. 1982 'Examination of manufacture-deposition lag for glass bottles from late historic sites', in R. Dickens (ed.) *Archaeology of urban America: The search for pattern and process*, Academic Press, New York, pp. 291–327.

KNIGHT, J. J. 1897 *Brisbane: A historical sketch of the capital of Queensland; giving an outline of old-time events, with a description of Brisbane of the present day*, Biggs and Morcom, Brisbane.

LAWSON, R. 1973 *Brisbane in the 1890s*, University of Queensland Press, St. Lucia.

LAVERTY, J. 2000 'Victoria Park: an historical overview', unpublished typescript.

PETRIE, C.C. 1904 *Tom Petrie's reminiscences of early Queensland*, Watson and Ferguson (reprinted. Lloyd O'Neil, 1975), Brisbane.

PIPER, M. 1983 'In days of old, when quacks were bold', *Australian antique bottle collector* 1:4.

QUEENSLAND STATE ARCHIVES: A1A ca.1850c: Plan of the Town of Brisbane, c.1850.

RATHJE, W. and MURPHY, C. 1992 *Rubbish! The archaeology of garbage*, The University of Arizona Press, Tucson.

SHANN, E. 1967 *An economic history of Australia*, Georgian House, Melbourne.

SOUTH, S. 1977 *Methods and theory in historical archeology*. Academic Press, New York.

SPUDE, C. 2002 'A saintly old man of jovial disposition: Considering multiple variables in the study of a priest's household artifacts', unpublished paper presented at the 34th Annual Meeting of the Society for Historical Archaeology, Long Beach, California.

SPUDE, C. 2004 personal communication.

STRASSER, S. 1999 *Waste and want: A social history of trash*, Metropolitan Books, New York.

STEELE, D. 1999 Animal bone and shell artefact report, in Godden Mackay Heritage Consultants, *The Cumberland/ Gloucester Streets Site, The Rocks: archaeological investigation report, Volume 4, Part 2 – Specialists Reports*, Godden Mackay Heritage Consultants, Sydney. pp. 141–237.

STEELE, D. 2001 Victoria Park faunal report, in Archaeological investigations of Victoria Park, unpublished report by ARCHAEO Cultural Heritage Services for Brisbane City Council.

WALLIN & GRIMWADE PTY LTD 1998 Archaeological assessment and excavation of 75 William Street, North Quay, unpublished report for Department of Primary Industries, Brisbane.

WETHERBEE, J. 1985 *A second look at white ironstone*, Wallace-Homestead Book Company, Lombard, Illinois.

WILLIAMS, P. 1986 *Staffordshire II: Romantic transfer patterns*, Fountain House East, Jeffersontown, Kentucky.

WILSON, G. C. and KELLY, A. 1987 *Preliminary analysis of clay tobacco pipes: First Government House site, Sydney*, prepared by Heritage Resource Services, ANUTECH Pty Ltd for Heritage and Conservation Branch, Department of Planning New South Wales Government.

WRIGHT, C. 2003 *Beyond the ladies lounge–Australia's female publicans*, Melbourne University Press, Melbourne.

YAMIN, R. (ed.) *2000 Tales of Fine Points: Working-class life in nineteenth-century New York*, prepared for Edwards and Kelcey Engineers, Inc. and General Services Administration.