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Old Marulan 2007

FINAL REPORT








VOLUME 4

Specialist Reports

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Old Marulan 2007

FINAL REPORT

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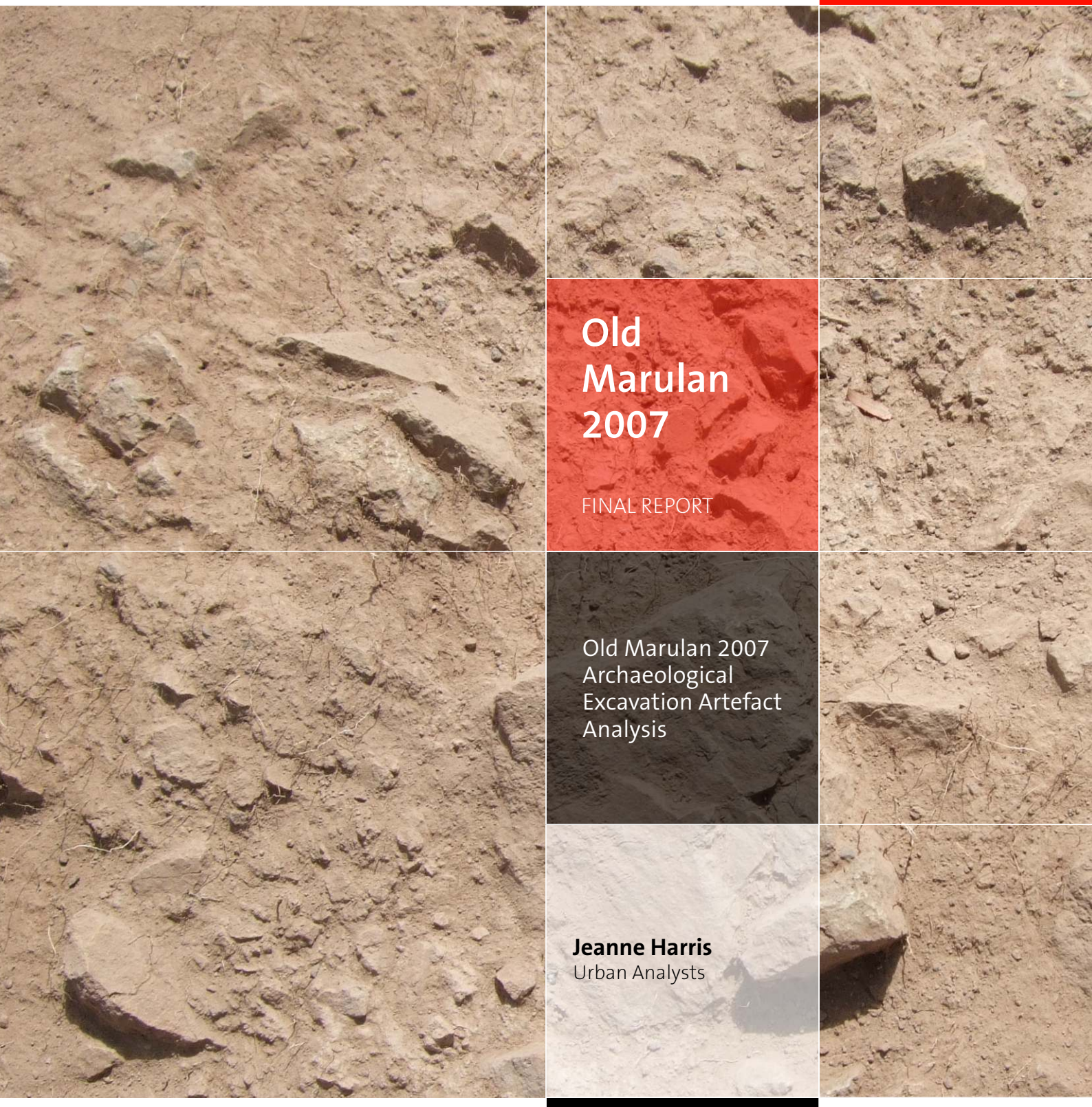

Old Marulan 2007

FINAL REPORT

Old Marulan 2007 Archaeological Excavation Artefact Analysis

Jeanne Harris
Urban Analysts

Old Marulan 2007

Archaeological Excavation

Artefact Analysis

Jeanne Harris, Urban Analysts

December 2009

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1.0 The Artefacts

1.1 Processing and Cataloguing

A general description on artefact recovery and processing:

Artefacts recovered during the excavation were retained and form part of the archaeological collection. The general procedure carried out was as follows:

1. Excavation took place in stratigraphic units. This was documented by a unique number for each stratigraphic context, such as a layer of soil, structure, post-hole cut, surface or fill. Excavation took place in a grid system consisting of 2 x 2 metre squares for spatial control. Each square was designated with the Cartesian coordinate of its southwestern corner in 6 digits, for example 250 / 592. The same stratigraphic unit could extend into two or more adjacent squares. Also in post-excavation analysis differently numbered stratigraphic units could be identified as identical or equivalent. Generally in such cases the original numbering is remained but the data have been aggregated where necessary.

There were two exceptions to this general system. Firstly, during the mechanical excavator grading of large areas. Artefacts were recovered and retained within 10 x 10 metre blocks rather than in more closely delineated areas. Secondly, all Aboriginal artefacts were individually given exact Map Grid of Australia coordinates using an unrectified GPS.

2. All artefacts uncovered during excavation were retained. Generally this meant anything that was not the soil, plant or root material or natural stone outcrop was retained for cleaning. Most excavations were sieved through 5mm sieves, and all artefact material retained. Particularly small pieces of glass, charcoal and other material were not retained.

All retained artefacts, whether from digging or sieving, were kept together with their provenance information as a single find context.

3. A field number was allocated to each find context. This was in the form FS XXX [now I've entered your territory, you'll have to lead from here on]

The 49 221 artefacts were cleaned using appropriate methods for each material type. Artefacts were sorted and bagged by material and context. Most of the artefact material was able to be cleaned on site during the excavation period. The remainder was cleaned during the initial stages of analysis at lab space in Sydney.

Artefacts were catalogued according to guidelines providing information on form, function, material, temporal placement, colour, count, weight, technomorphology (how something is made), completeness, size, weight, patterns, products, manufacturer, place of manufacture, and date of manufacture. All efforts were made to assure that all diagnostic data for each artefact or class of artefacts was recorded.

Minimum item counts (MIC) were calculated for fragmented items during cataloguing, and MICs are used throughout this report, so that counts used in the following discussion represent whole, partial and fragmented items. Therefore, unless otherwise specified, the use of the term 'artefact' in this report is synonymous with 'minimum item.' There were 5058 minimum items represented in this study. Given this large number of artefacts, this report concentrates its discussion on artefacts types by material and basic form. Temporal, functional and other attribute data is discussed when pertinent to subsequent analyses.

2.0 Methodology

2.1 Typology and Chronology

Standard typologies were established for the assemblage as a prelude to chronological reconstruction. Artefacts were then assigned dates based on use-popularity date ranges (merchant records, advertisements and manufacturers' records) and on technological advancements (patents and manufacturers' records). In this manner, ceramics and glass provided a wealth of chronological information and a review the typological and chronological ramifications of these material classes is included below.

This short paragraph above actually represents a considerable body of work by the author, other archaeological artefact specialists, museum curators, hobbyists and collectors over many years. Establishing 'standard typologies' relies upon familiarity with the range of material being found from a many archaeological sites of the past 200 years in Australia, most of which are not adequately documented or described, identifying the frequency of different sorts of material that come out of them, eg seeing both the common and rarer types of ceramic decoration, and then researching all these different varieties. This last step involves finding out about changes in technology, evolving taste for different types of decoration, the affordability of different items and who was likely to use them, and ultimately how they were used. Only then is it possible to work backwards from the artefact evidence to a story about what actually took place in the past.

The following description of the evolution of the main artefact types focuses on the period of the mid-nineteenth century when Marulan was at its modest peak, and from when most of the artefact material dates.

2.1.1 Ceramic Typology and Chronology

For the purpose of this study ceramic artefacts were grouped into four basic categories: earthenware, stoneware, porcelain and brick. Ceramic wares are defined by a number of factors, including firing technique and temperature, glaze, the type of clay and tempering agents. Generally, earthenware is made from naturally occurring clays that are fired at low temperatures, stoneware is a made from a high-temperature fired clay and porcelain is a highly fired vitrified composite of kaolin, silica and feldspar. Bricks, technically a form rather than material, are made of low-temperature fired, coarse earthenware, however, brick manufacturing technology and typology are distinct from that for earthenware vessels. Therefore, bricks are assigned a separate ceramic category.

The value of this analytical approach lies partly in the use of ceramics to date deposits. Dates for ceramic artefacts (excluding brick) are derived primarily from researched use-popularity patterns. Ceramic use-popularity patterns reflect times during which ceramic wares, types, and/or decorative designs accomplished peak popularity in the consumer market. These patterns are expressed as date ranges and are established through research of merchants' and manufacturers' records.

Identification/dating of nineteenth century ceramics is also based on identifying gradual changes in paste [the body material] and glaze to accommodate shifting trends in the ceramic market. The value of this analytical approach is the dating of ceramic artefacts, in particular refined white-bodied earthenware, in the absence of datable decorative design techniques. Gradual changes occurred in decorative designs and design techniques on differing nineteenth-century ware types provide a chronology for dating decorated wares. Changes in ware type and decorative designs did not necessarily coincide. Therefore, separate chronologies for wares and decorative technologies were established for this study. During analysis, a combined date range was established that considered all of these variables. As a result, it is possible to say that ceramic artefacts in the Old Marulan

assemblage dated primarily from the early – to mid-nineteenth century. Some of the more characteristic typologies, and more useful chronological indicators, are discussed below.

Earthenware

The ceramic artefacts in the Old Marulan assemblage consisted largely of refined earthenwares. To understand the development and chronology of nineteenth century refined earthenwares, it is necessary to consider the history of eighteenth century wares. From the as early as the 1600s porcelain has was the preferred European tableware. During the eighteenth century European potters began to produce new and more economical alternatives, mainly refined earthenwares, to compete for the ceramic market that was dominated by Chinese porcelains, replicating their blue-tinged whiteness and the rich blue decoration. The subsequent development of increasingly refined earthenwares reflects their attempts to gain control of this market. Some of the earliest forms developed for the European market include tin-enamelled earthenwares (1600s - 1800), white salt-glazed stoneware (1720s - 1790s), and creamware (1762 – 1820s). By the time of Australian settlement both tin-enamelled earthenware and white salt-glazed stoneware were dying out as a result of competition from the new and more durable creamware. Creamware, a cream-coloured refined earthenware perfected by Josiah Wedgwood circa 1762, was one of the most successful wares in the last 250 years.[1] By the 1790s creamware had secured England's domination of the world ceramic market. The success of creamware can be attributed to astute marketing techniques and increased availability, related to the timely 100% tariffs placed on imported porcelains.[2]

The popularity of creamware began to wane in the late 1700s about the time a new whiter variety, termed pearlware by archaeologists, started to appear in the market. While pearlware did not win over the porcelain market, it represented an economical substitute to the preferred ware. Characterised by its cream-white paste covered with a thin soft blue- to blue/green-tinged glaze, pearlware vessels had walls that were thinly potted (moulded) with sharply defined edges and foot rings. [3] During the late eighteenth century, Spode's whiter-bodied 'bone china' gradually replaced Chinese porcelain in the English market. This led to earthenware potters gradually decreasing the amount of bluing in their pearlware glazes until the glaze became almost clear. This clear glazed type is referred to as ‘whiteware’, ‘CC ware’ or ‘refined white earthenware’ by some archaeologists, although the potters made no distinction between wares with bluing and those without. Throughout this period, decorations on both wares remained the same. The process of change was a gradual one.

By the 1840s, a heavier semi-vitreous ware, termed ‘white graniteware’ or ‘ironstone’ (not to be confused with Mason’s Patented ironstone of 1813), was developed by the adding of pulverised slag to an earthenware paste.[4] There are many similarities in paste and glaze between refined white earthenware and graniteware, but generally these wares can be distinguished by the paste hardness. However, it should be noted that potters did not always make a distinction between these wares. Many examples of refined white earthenware recovered from archaeological investigations exhibit manufacturers’ marks identifying the wares as ‘graniteware’ or ‘ironstone’ when in fact they are whiteware.

Over the course of the nineteenth century independent changes occurred in ceramic decorative technology and style on earthenwares. As previously mentioned, these technological and stylistic

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[1] Brooks 2005:29

[2] Miller 1980

[3] Sussman 1978:106

[4] Moore 1944:164

variations occurred on a variety of earthenwares at the same time, with overlapping production dates. Because of the difficulties in distinguishing some wares, especially refined white earthenware and white graniteware (ironstone), documentation of these stylistic attributes is an essential analytical tool and temporal marker. Stylistic documentation, and stylistic documentation of 'ironstone' patterns, provides date ranges based.[5] The following decorative types occurred on refined white earthenware vessels from the site:

Edged ware – More commonly called "shell edged," this was primarily manufactured featuring an intricate edge mould, coloured with in blue and green. In use as early as 1775, it was one of the first patterns applied to pearlware. Early examples were intricately moulded, presumably to represent naturalistic shell rims. Through time, incised and moulded decorations became increasingly simplistic, until the rims became unscalloped. Incisions developed to simple straight lines. Underglaze hand painting applied to enhance moulded designs followed a similar progression. In early examples, colour application followed the relief of the moulding; in later examples, the colour was no more than a straight band following the circumference of the rim.

Lustre – A technique of depositing a metallic coating – silver, gold, copper or purple – on top of the glazed vessel. Used on earthenware and porcelain, lustre was popular from the early nineteenth century. Lustre was used to create decorative designs and often was used to entirely coat the vessel, resulting in an effect that mimicked highly polished silver serving vessels.

Mocha – Dendritic and/or finger-trailed "common cable" decorative designs applied on a dipped background with banded borders occurred from the eighteenth through the nineteenth centuries.

Transfer Printing—English potters produced transfer printing as early as 1750, but it was only applied as an overglaze decoration after 1760. This process started with a design engraved on copper plating. Once the plate was covered with the paint, tissue paper was placed over it, transferring the design to the tissue paper, which in turn was transferred to the ceramic object. When the colour was dry, the paper was washed off, leaving only the painted design. Transfer printing enabled the potter to produce identical intricately detailed designs on innumerable matching pieces at a cost far below that of similar hand-painted pieces.[6]

Flow Blue (and black) – In the late 1820s, Staffordshire potters developed a variation of transfer printing that involved adding chemical agents, such as saltpetre, borax and white lead, to the saggers during the glaze firing to achieve a softer blurred effect.[7]

Spongeware – the product of underglaze application of colour accomplished by dipping a porous sponge into paint or colour and applying it to the unglazed surface of the ware. Sponge decoration can be done in either cut decorative designs or uncut decorative application. Due to the elastic nature of the sponge, application to a smooth or curved surface will result in blurring when the sponge is removed, causing a fuzzy effect.[8]

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[5] Wetherbee 1985

[6] Miller 1980

[7] Gaston 1989, p. 7.

[8] Greaser & Greaser 1967

Annular banded (slipped) – Banding produced by a clay slip applied horizontally to the vessel. Commonly found on bowls, these bands could consist of coloured clay slips.[9]

Annular banded (painted) – Painted horizontal bands that appear generally in regular bands along the rim of vessels.

Ball Clay

Ball clay is a term used for earthenware made from a blend low-fired fine clays that was used for tobacco pipes. Tobacco pipes became common in Europe during the late sixteenth century when the consumption of tobacco products was introduced to the European market.

The English ball clay tobacco pipe is among the most commonly found artefacts in colonial contexts. The kaolin tobacco pipe production process remained unchanged for centuries. The ball clay was washed to remove dirt and other impurities. The clean clay was then formed into balls which were pressed into a mould, creating a roll shape. A thin rod was used to pierce each of these cylinders, creating the bore. The stem was the placed into a two piece mould where the bowl was added. The completed pipe was then dried, trimmed and fired. After 1788 the form of the clay pipe became largely standardised, consisting of a basic egg-shaped bowl with a tapering stem. The bowl could be moulded or left undecorated and the base of the bowl could be either rounded or have a spur (Gojak & Stuart 1999: 38). Pipes were fragile and cheap and therefore readily disposed of, making them a useful artefact for dating historical contexts. The Old Marulan tobacco pipes range in date from 1806 to 1967.

Porcelain

Porcelain is a highly vitrified ceramic ware with an alkaline glaze. This ware is not made of naturally occurring clay, but rather a compound of three ingredients: kaolin (ball clay), feldspar and silica.[10] It was first manufactured in Asia and later in England, continental Europe, and the United States. Within this ware type, two common type distinctions are apparent. Asian and Continental porcelains are considered 'hard paste' (made of natural clay and sparkly, fine-grained and vitreous when broken). Until the twentieth century English porcelains were 'soft paste' (more porous and dull, and made of artificial clays). It should be noted that all modern porcelain is hard paste. Porcelain clay was used to produce items including fine dinnerware, accessory serving pieces and ornamental pieces such as figurines. Other porcelain subcategories include ‘parian’ and bisque fired. Parian porcelain, named for its resemblance to marble from the Greek Island of Paros, is and unglazed ware used primarily in slip casting for sculptures and figurines. Bisque is a term used by potters to describe an item that has only been fired once. Most items are then glazed and/or decorated and fired again. However, bisque porcelain (bisque fired porcelain), is has only been fired once and is usually fragile. Ceramic dolls are often made from bisque porcelain. One final type of porcelain is classified in this study as ‘industrial porcelain’ and is used in the manufacture of electrical fittings and plumbing components.

The following decorative types occurred on porcelain vessels from the site:

[9] Brooks 2005:36

[10] Cappell 1977:17

Sprigged – a small moulded blue clay sprig in patterns of grape leaves, forget-me-nots, and thistles applied most often to teawares. Generally found on porcelain and most commonly on English 'bone' china from the 1820s.[11]

Gilt – is a process of applying gilt paint as decoration. Primarily found on porcelain and refined earthenwares, 'tea leaf is the most common motif identified in Australian archaeological contexts.

Stoneware

Stoneware is a compact, finely grained ceramic. The body is an opaque non-porous paste, produced by high firing temperatures (1300^{o}), and ranges in colour from grey to buff to dark brown. The most common uses of stoneware are for storage vessels and plumbing fixtures. Stoneware vessels are often glazed, but glaze on stoneware is aesthetic rather than functional. The most common glazes were Bristol and salt glazing.

Salt-glazing – was first introduced in fourteenth century Germany. It is created by adding common salt (sodium chloride) into the chamber of a hot kiln. Salt melts at 900^{0} C, but at the traditional 1280^{0} C temperatures at which bisque stoneware is fired, the salt becomes an active vapor that settles on the surface of the firing vessel. When cooled the result is a glassine finish with orange-peel texture.

Bristol glaze - During the late 1850s stoneware bottle manufacturing moved away from the ornate vessel forms that had dominated the market since early 1800s. Bristol glazing was a much smoother, more protective, and more versatile glaze than salt-glazing techniques. It allowed for more than one colour of glaze to be applied to the vessel and allowed for highly decorative designs to be placed on the bottle.[12] As this method of glazing became more popular it began to replace the traditional salt-glazing potteries.

Brick

Brick manufacturing technology was a manual process until well into the twentieth century. After the clay was dug, process and tempered, it was placed into moulds, set out to dry and then fired. During very early colonial times bricks were imported or manufactured using moulds shipped with the First Fleet While British brick laws and duties did not apply to exported products, early colonial brick sizes and weights were influenced by British standards. The most common brick type in colonial New South Wales was the sandstock brick. Characterised by their warm earthy colours, varying density and gritty temper, these bricks were totally hand made.[13] They are characterised by a sandy texture on five sides, with sand used as a lubricant to help ease the 'green' brick from the mould. A depression called a frog provided adherence for mortar when the brick was laid. Frog shapes varied from maker to maker, and some have chronological implications. The other side normally has striations along the long axis where excess clay was trimmed with a wire cutter.

Unlike other ceramics bricks could be made using local clays near their eventual site of use, as well as in a specialist works or factory. Clay was dug from creek-side pits, pugged or mixed and then shaped in moulds and allowed to dry before being fired in a clamp, essentially a bonfire with stacked green bricks covered with combustible materials. A brickmaking area was found to the north of the creek behind the Woolpack Inn lots.

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[11] Brooks 2005: 43

[12] Stau 1984:4

[13] Gemmel 1986:24

Technological advancement during the late nineteenth century enabled processes for the machine manufacturing of bricks, including extruded wire cut bricks, plastic moulded bricks, dry pressed bricks and re-pressed bricks. These are normally far denser than handmade bricks.

Marked bricks provide the best source for dating. Distinctive frogs can be attributed to particular brickmakers or their clients, or can at least provide a sense of how many building episodes are implied by the range of bricks. Size and weight are also factors in classify bricks. The general trend during the eighteenth century tended to be thinner in width and depth those manufactured from the early nineteenth century and beyond.[14]

2.1.2 Glass Typology and Chronology

Modern blown glass technology, discovered sometime between 27 BC and AD 14, changed little until the late nineteenth century: a glass blower took a blowpipe, dipped the end into a pot of liquefied glass, turned it around to collect a batch on the blow pipe, put the other end of the blow pipe in his mouth and blew air into the batch while forming the exterior of the batch to the desired shape. In this manner bottles, tableware, lamps, window glass, marbles, etc were formed. Over the centuries specialised tools, such as paddles, moulds, scissors, among others, were developed for each specialised aspect of the industry. Many of these tools provide date-specific information. The basic technologies are discussed separately below.

Manufacturing evidence can appear anywhere on the bottle, although the base and finish are the main areas where changed technology left its mark. These are also the more robust parts and survive best if the bottle is broken. Undifferentiated cylindrical bottle fragments retain seam lines but it is difficult to count whether there are two or more per original bottle.

Bottles

A typology for glass bottles is not simple. The innumerable combinations of the many technological attributes must be considered during the identification of individual bottles. For the purpose of this study these attributes are grouped into four basic diagnostic categories: mould type, empontilling method, finishing techniques and colour. These attributes represent process used in bottle manufacture from the mid eighteenth century.

During the 1800s the pace of technological advancements increased dramatically in many areas of the glass-manufacturing industry. Free-blown bottle technology of the seventeenth century was gradually replaced by hinged metal moulds and by the 1800s mould-blown bottles were ubiquitous. Development of shoulder and full height moulds, new empontilling methods, and improved finishing techniques were primary areas of advancement.

Moulds

The use of shoulder height moulds can be identified by the absence or disappearance of seam lines on bottles, just above the curve of the shoulder. The main types of this mould were the shoulder height multi-piece (1820-1920) and the one-piece dip mould. On full height moulds, vertical seams appear from the base to just below the lip. Above this point, seams were removed during the finishing process. The principal varieties of this mould type include:

[14] Varman 1993:16

the bottom hinge (1810–1880), with a basal seam running either diagonally or straight across the bottom;

multi-part leaf mould (1850–1920), with two, three, or four vertical leaf parts and a separate base part; and

a three-part dip mould (1820–1920), an improved version of the dip mould that allowed variation in bottle shape not possible with the plain dip mould.

Two additional moulding variations used at the time were turn-paste and plate moulds. Turn-paste moulds (1880–1900) were produced by adding a paste to the mould to allow the bottle to slide when the mould was turned over (Kendrick 1966:43). This process produced a symmetrical bottle and removed seam lines, but it also prevented the embossing of bottles. Plate moulding (1821–1920), was an adaptation of the previously mentioned moulds and contained removable or interchangeable plates. Thus, the same main or base mould could be used to manufacture bottles with different embossments (Jones et al 1985:49).

Pontils

Several methods exist for holding bottles during the finishing stage of hand blown glass. All of these methods involved holding the bottle by the base, allowing the craftsman free access to finish the bottle lip. Methods using pontil rods that were:

Glass-tipped, using either a solid rod bar or blow pipe, was the earliest empontiling method. Each method left a distinctive scar on the base of the bottle.

Sand empontilling method was common on eighteenth-century and nineteenth-century beer and wine bottles.

Bare rod empontilling method was popular until the early 1870s when it was replaced by the snap-case method as the primary empontilling method.

The snap-case empontilling device was ‘a four-pronged clip attached to an iron rod, a closely fitting case of wrought iron mounted on a long handle from which only the neck of the bottle is allowed to project.’ This method provides no evidence of its use and is therefore not helpful in dating (Jones et al. 1985:46).

Finishes

The finish is everything above the upper terminus of the neck. This is termed the ‘finish’ because it is the last step in bottle production involving the formation of the bottle lip. The shape of the finish is dictated by the intended bottle use, preferred method of closure, and artisan preference. Prior to the mid-1800s, various methods of finishing were used, including lips that were cracked-off, burst-off, everted or flared, flanged, fold-in and foldout, and others demonstrating applied lip techniques.

Two primary production methods employed in the mid- to late nineteenth century were the form-finishing tool and flared or fired lip. A form-finishing tool is a handheld clamp and plug device. The plug is placed in the bore of the reheated bottleneck and the two-pronged clamps around its outer edge. The tool is rotated manually to shape the lip. Evidence of this method consists of the absence of mould seams on the neck, horizontal striations on the glass, and an excess of puddled glass on the neck at the bottom of the tooled finish.

The fired or flared lip is a method by which the neck of a full height mould bottle was reheated by placement in the 'glory hole' of the furnace. This reheating melted and smoothed rough edges left by the mould. Additionally, this process also faded or completely removed seam marks, depending upon the amount of reheating and the distinctiveness of the marks.

During the late nineteenth century, manufacturing of glass containers became progressively more mechanised, beginning with development of semi-automatic machinery (c1880), and culminating with the introduction of a fully automated version (1903). By this method bottles were made in one step and moulds were the full-height of the bottle (including the finish). First developed by Michael Owens, this fully mechanised process quickly gained worldwide acceptance for quick and inexpensive manufacture of glass bottles. By the 1920s his machines had become the primary bottle manufacturing method in North America. During the next decade Owens's machines (and those of his competitors) began to operate worldwide.

The early finishes produced opening sizes that varied from bottle to bottle. Finishes were defined by their closures. While corking and wax sealing would allow a reasonably airtight closure for wine and spirits, a more consistent device was needed for aerated beverages and beer that would rapidly go flat. A range of stoppers and built-in closures, including Codd's patent 'marble' stopper, attempted to manage the escape of gas. Many of these were patented and can provide reliable dating evidence. The development of the crown seal in 1892 was widely adopted, providing a very useful dating 'horizon'.

Colour

Generally, colour cannot be used as a functional or temporal indicator. 'Green' or natural glass is a crude silicate of lime and soda. It contains high amounts of iron oxides, which result in colours ranging from brown to olive, amber to olive-green, and light green to aquamarine. Black glass, in popular manufacture until the 1870s for of beer and wine bottles, is actually dark green glass made by adding iron slag to the glass recipe (Kendrick 1966:55). It was only the first attempts to decolourise common glass that provide assistance in assigning temporal placement to glass. While the addition of flint and/or lead to the batch made the glass colourless - used for tableware and pharmaceutical bottles, late nineteenth-century glassmakers attempted to achieve decolourisation by adding manganese (1876 – 1930s) and early twentieth century glassmakers used selenium as a decolourant agent (1914 – 1930s). When exposed to unfiltered ultra-violet rays, bottles manufactured in this manner solarised. For bottles made with manganese the metal turned purple and for those made with selenium the resulting colour is described as like honey or ripened wheat. The use of these decolourants continued until the 1930s when arsenic, a more stable decolourant, was introduced.[15]

Table glass

Until the early nineteenth century manufacturing methods in the glass industry as a whole were predominately mouth-blown processes. During the nineteenth century and early twentieth century the technology slowly progressed until by the 1940s glassware was predominately machine made. Foremost of these advancements was the development of pressed glass tableware that introduced in the 1820s. This technology opened the market to middle class households by providing inexpensive imitations of prestigious hand-cut wares. Other advancement included the mechanised needle etching for fine design work (1860s), blow-over moulds (1810 – 1830s), enamelling (1880s), and silver bonding (1880 – 1930).

[15] Kendrick 1966:59

Technology for traditional cut glass was also affected by these advancements. Traditionally, cut-glass tableware was mouth-blown and then decorated by wheel cut or 'etched' designs. By the late nineteenth century vessel blanks were mass produced and then current cut designs were crafted.[16]

The fledgling Australian glass industry did not start until the mid-nineteenth century and then primary production was commercial containers (bottles and jars). The importation of undecorated tablewares , called "blanks", was common practice by local craftsmen. Crown Crystal Glass (1926), a subsidiary of Australian Glass Manufacturers, was of the earliest Australian firms to successfully compete for the glass tableware market.

Flat Glass

During the nineteenth century there were two manufacturing techniques for production of window glass: crown glass and broad glass. Crown window glass was thinner and finer than its contemporary broad glass, which was commonly described as inferior to crown glass.[17]

Plate glass was originally developed by the French in the seventeenth century. English polished plate glass was first processed at Ravenshead in 1773. While use of plate glass was unlimited in both household and commercial settings, one common use during the nineteenth century was that of mirrors.

2.1.3 Metal Typology and Chronology

The history of crafting objects from processed metal extends back several millennia. Many technological improvements in metal working were made during the Bronze Age and Iron Age. The iron industry was well established by the 1600s. By the eighteenth century instrument and armament craftsmanship was well established. With the birth of the Industrial Revolution mechanisation allowed for the machine-made manufacture of useful items, such as nails, screws, tin cans, buttons and padlocks.

Nail Typology

Nails are one of the most commonly found artefacts on archaeological sites. The identification of various nail types is useful in both temporal and functional analyses and therefore, merit their own discussion. There are three basic technological stages apparent in nail typology: wrought nails, cut nails and wire-drawn nails. The earliest nails were fashioned by blacksmiths cutting and shaping nails from square-section nail rod. While wrought nails are still manufactured today, they are used primarily for restoration and reproduction purposes. Hand-forged wrought nails were the primary construction fasteners in the seventeenth and eighteenth centuries. Their use effectively ended with the introduction of cut nails.[18]

Cut nails were introduced to the hardware market in the 1790s. These nails initially had a machine-cut body with a hand-made head. While cut nails had very little impact in Australian construction practices before 1820, they have been found in dated Australian contexts from the late 1790s. Not until technological advancements around the 1840s produced a totally machine-made version did cut

[16] Jones 2000:174

[17] Lardner 1832:114-148

[18] Nelson 1963

nails begin to replace wrought nails as primary construction fasteners.[19] Wrought nails continued to be used by cabinet makers and for larger fastenings as spikes.

Wire-drawn nails were first introduced from Europe c.1850. These earlier wire nails were used primarily for box construction. Wire nails for building construction date as early as the 1860s, and by the 1890s, the use of wire nails in Australia had superseded all other nail types (Varman 1993:162). Although some builders prefer cut nails today, they were replaced almost universally by the wire nail by the turn of the twentieth century.

2.1.4 Chronological Analysis of the Assemblage

Approximately 60 percent of the Old Marulan artefact assemblage provided temporal information, if only about the possible manufacturing date of the artefact itself. Dating of materials is the primary level of analysis. Establishing defined date ranges for discrete deposits from this excavation is key to any further analysis, as the date of use and deposition can differ significantly from manufacture. For without this base data, many subsequent analyses would have little meaning.

Standard typological methods were applied as a prelude to chronological reconstruction. Artefacts then were assigned dates through comparison of identified artefacts with others having documented use-popularity patterns. These dates were further enhanced by documented temporal information that was available for manufacturers and product manufacturers. All datable artefacts have a terminus post quem (TPQ) or a date when the item was first manufactured or a terminus anti quem (TAQ) or an end date for manufacture. During context analysis TPQs are graphically represented. These tools form the basis of statistical data that aid in calculating chronological placement for contexts.

Items such as high value ceramics may be used intermittently for long periods, and therefore have less chance of breakage and entry into the archaeological record. Other items such as bottles can be recycled and constantly reused. While the technological description of the different artefact types [section ?? above] identifies the earliest introduction of different technologies and so the date after which it must have been made [TPQ], there is seldom a secure latest date of manufacture, let alone a latest date by which an item is likely to have been used [TAQ]. Marulan's position on a rural transport corridor also may have made people more likely to stick to older technologies such as ways of building, or more carefully keeping household objects because of the replacement costs.

Dating of materials is achieved through a variety of techniques. Documented consumer use and popularity date ranges, derived from production and distribution records, help to establish date ranges for ceramics, window glass, nails, and a variety of other materials that are recovered from archaeological sites.[20] These dates reflect the peak popularity of items in consumer markets.

Glass artefacts were dated primarily by reference to manufacturing attributes. During the mid- to late nineteenth century, advancements in bottle manufacturing technologies developed at such at rate that documented diagnostic attributes serve to provide tight chronological data. These attributes are well-documented in records and archives of leading bottle manufacturers.[21] Documented embossments for bottle manufacturers and product manufacturers also contributed to temporal placement.

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[19] Varman 1993:143 – 144

[20] Jones etal: 1985, Worthy 1982, Nelson 1963, Varman 1993, Brooks 2005

[21] Brooks 2005, Miller 1980, Miller 1988, Worthy 1982

Established date ranges for nails are based on preference and technological innovations. Advancements in nineteenth century nail manufacture resulted in more cost-efficient production, greatly affecting the consumer market. However, preference also had an effect on the market. Therefore, date ranges reflect the time span for which a nail type was used as a primary hardware fastener.

Documented manufacturer's marks evident on such items as ceramics and glass further serve to establish date ranges.[22] Ceramic patterns were identified and dated using manufacturers' marks, manufacturers' pattern records and researched catalogue pattern references.[23] Finally, trademarks for product manufacturers also aid in establishment of data-specific information for archaeological materials. (Table 2.2)[24]

Table 2.2 Chronological Data for Product Manufacturers

Product Manufacturer	Product	From	To	Country
John Gosnell & Co	Tooth paste	1853		England
Holloway	Pot	1842	1909	England
Hyam & Co	Button (clothier)	1850	1900	England
David Jones & Co (for NSW Police)	Button (clothier)	1862		Australia
Josephson	Ointment	1866	1900	Australia
Lea & Perrin	Club Sauce	1837		England
Moses Levy & Co	Button	1846	1878	London
J. H. Schweppe & Co	Aerated Water	1884	1930	Australia
Toohey's Ltd.	Beer	1876	1900s	Australia
George Whybrow	Oil/vinegar	1845	1910	England
Udolpho Wolfe	Schnapps	1848		Netherlands

Archaeologists often produce seemingly accurate dating of assemblages based on the impressionistic observation of frequency of common types and the absence of others. These may be expressed as 'being typical of the 1830s'. While useful at a general level of interpretation, as the grouping may indeed contain only material likely to be produced during the 1830s, it may also contain material that could be made in the 1840s, but in ratios that incorrectly suggest a different date. The much stricter analytical approach taken in this study is therefore necessary to remove the risks of this *ad hoc* inductive approach.

[22] Ford 1995, Boow 1991, Godden 1981

[23] Heaivilin 1981, Williams 1986, 1987, 1998, Coysh & Henrywood, 1989, Sussman 1979

[24] Baldwin 1975, Fike 1986, Deutsher 1999

2.2 Functional Analysis

Functional classification of artefacts into activity categories provides a means to identify how an object was used. Artefacts recovered from the site also were examined on the basis of function or original intended use. The purpose of functional classification is to cluster artefacts into groups so that statistical analysis of these clusters provides interpretive data on the site.

Creating a classificatory system that will select for the variables of interest for the research design is an approach that historical archaeologists worldwide have employed for decades to assist in site interpretation anc creating a system that will appropriately classify these variables of interest is a problem that has plagued historical archaeologists for decades. In the 1977, Stanley South set forth one of the first attempt to classify artefacts according to functional taxonomic groups. His Carolina Pattern is designed to aid in the statistical interpretation of eighteenth British Colonial sites (South 1977). While South's classification was the first attempt to establish the signature of "normal" Euro-American artefact assemblages, it was found not to be applicable on sites that originated in other areas of the United States and nineteenth century and subsequent twentieth century sites. In 1981, Roderick Sprague published a taxonomy that was widely used by historical archaeologists in the western United States (Sprague 1981: 251- 252). Unlike South, Sprague sought to standardise terminology and to provide a common template for those archaeologists studying similar sites in order to present the data on their material culture in a common format and common language. Unlike South's taxonomy, Sprague's system was not devised to solve any particular types of problems that require a statistical comparison of the relative frequencies of the categories.

In the 1990s, Australian institutions, such as The University of Sydney's Archaeological Computing Laboratory, began to set the framework for artefact cataloguing of artefacts for Australia's historical sites, which included functional classification. More recently, there has been a call for standardisation of terminology and categories (Crook, et al 2002), but given the wide variety of type sites investigated, be it residential, commercial or industrial, the feasibility of creating one national classification system would be a daunting task.

The classification system used for this study is organised around data based upon behavioural activity groups identified for general cultural and social frameworks. It allowed for the subdivision of each group into subcategories that further assist in use interpretation during the analysis and reporting phases of this study. This system does allow for staticical comparison of relative frequencies within the site and the results of other local, regional and national archaeological investigations.

Theses groups are organised according to the following categories:

- Activities—This group comprises a miscellaneous collection of artefacts. It includes those artefacts that had more than one possible function, or those that did not fit into any specific functional group classifications. It includes subcategories for multi-functional items, such as tools and hardware; multi-purpose activities such as fishing, that could be either leisure or food procurement; and leisure activities such as games and toys.

- Architecture —These artefacts were identified as those structural elements directly associated with the built environment eg bricks, mortar, nails, window glass, building hardware, cementing agents and shingles. Furnishings (discussed below) were not included in this group.

- Arms—This included all forms and varieties of weaponry (gun and pistol parts and ammunition, as well as knives, swords and bayonets). This group was sub-divided into gun parts, ammunition and miscellaneous.

- Clothing—This category included artefacts directly associated with clothing (such as buttons, snaps etc), accessory clothing items (such as belt buckles, shoe hooks and shoes), and those items used in the construction and repair of clothing (such as needles, pins, scissors and thimbles).

- Food—Those material remains that are directly associated with food and drink preparation, service, and storage were designated 'domestic' artefacts. This group included ceramic food service and storage vessels; glass food containers, serving vessels and drinking vessels; metal implements, cooking vessels and utensils; and food remains such as bones, cobs, nuts, seeds, pits and shells. The group was subdivided into: food preparation, food service, food storage, alcohol and drink storage and food remains.

- Furnishings—This group included furniture, mirror glass, figurines and other miscellaneous decorative household items associated with the enhancement of the built environment.

- Household—These artefacts relate to the maintenance of house and garden. This group includes containers, such as bottles for household cleaning products, poisons and lubricants, candle sticks and flower pots.

- Personal—This group included artefacts directly associated with an individual or with individual use. Besides coins, jewellery and keys, this group was subdivided into tobacco related artefacts, items of cosmetic and personal hygiene use, medicine and all writing related materials.

- Transportation—Artefacts in this group include elements associated with stables (including some agricultural implements, wagons parts, and the accoutrements of equestrian activities, such as Horse harness, horseshoe nails etc.), railroad/tramway elements (primarily railroad spikes and other identified hardware), and automotive elements (such as windscreen glass and spark plugs).

- Utilities—Elements associated with lighting, plumbing (water and sewerage), electricity and natural gas supply.

Functional analysis categorised artefacts into five major identified groups. Functionally-uncategorised artefacts are shown as "Miscellaneous." Figure 2.1 is a functional overview of the artefact assemblage from Marulan.

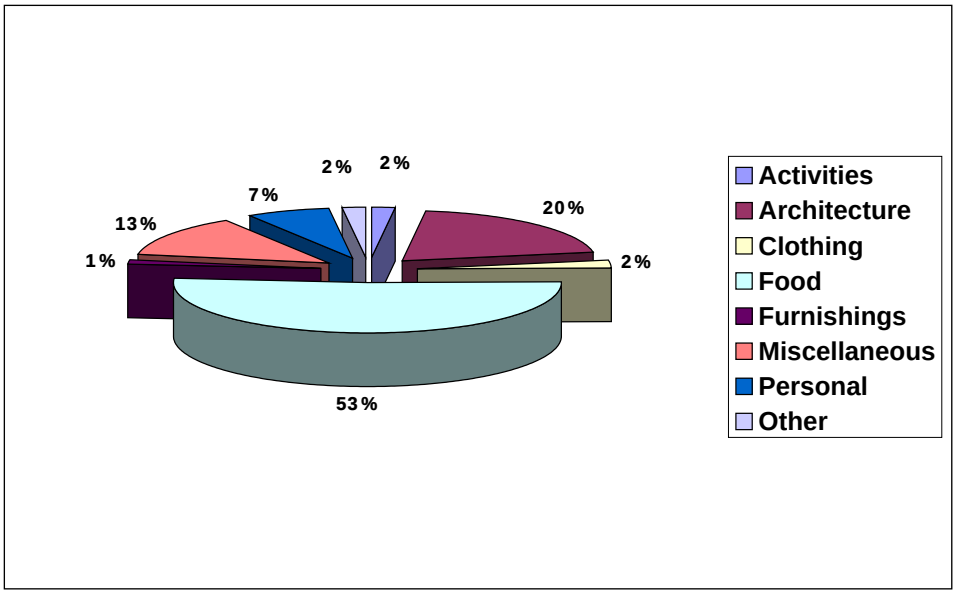

Figure 2.1 Relative Frequencies of Functionally Classified Artefacts.

2.3 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 manufacturer to distributor to consumer. A network could be as small as purchases from the neighbourhood shop or extend half way around the world. To determine where the residents of Marulan were looking to for its commerce requires understanding the commerce of its closest port – Sydney, and of the entire nation. To understand changes in market access in Australia requires the examination of worldwide commerce. In the period under discussion the colonial economy altered from one where almost all goods were imported apart from a small amount of handmade, almost cottage industry, goods and relying on imperfect credit to overcome a chronic shortage of currency, to a mature economy with an increasing capability of domestic production for many goods and a buoyant economy resulting from an economy based on gold and wool export.

During the nineteenth century many developments affected international commerce on a worldwide basis. In the 1869, the opening of the Suez Canal brought new and faster trade routes to Australia from Europe. The late nineteenth-century introduction of the iron steam freighter led the way to new trans-Pacific routes between Sydney and major North American ports, such as Vancouver and San Francisco.[25] While Germany and America were new market competitors actively cultivating the Australian market, Britain was still Australia's major trading partner. Australia's place in the world market elevated considerably due to Britain's increased dependency on Australian wool and the downturn in British agriculture. In the 1870s, Circular Quay was rebuilt to accommodate this increasing trade and Darling Harbour, Balmain, and Pyrmont all underwent reconstruction by the mid-1880s.[26]

One way to determine where the residence of Marulan were looking for its commerce is to look to the archaeological record. There are 143 artefacts from seven countries that contributed information on market access, including artefacts with manufacturers' marks and/or product labelling and those items uniquely associated with a particular country. Obviously, marked or labelled artefacts are the

[25] Bach 1976, p. 146.

[26] Cannon 1975, p 186.

best sources of information for observing trade practices. As Table 4.1 shows manufacturers and/or product manufacturers were identified for a variety of products from six countries.

Table 4.1 Summary of Identified Manufacturers and Product Manufacturers by Country		
Country	**Shape**	**Quantity**
Australia	Bottle	4
	Ceramic tableware	2
	Pipe, tobacco	8
England	Bottle	7
	Button	6
	Ceramic tableware	21
	Lid	3
	Pipe, tobacco	1
	Stopper	3
France	Bottle seal	1
Netherlands	Bottle	2
Scotland	Bottle	13
	Foil	1
	Pipe, tobacco	28
USA	Key	1
	Shotgun shell	3

In some instances the artefact was manufactured by an overseas company for a local company. In the Old Marulan assemblage examples of this practice were evidenced in a glass bottle manufactured by John Lamont of Glasgow, Scotland for Toohey's Ltd of Sydney and English ball claypipes manufacture for Hugh Dixson, a Sydney tobacco merchant, that were made by an undocumented Scottish pipe manufacturer.

In addition, there are items commonly associated with a particular country. Locally, the Australian market provided the majority of unglazed and poorly glazed utilitarian coarse earthenware vessels and most likely the source of 25 such vessels in the Marulan assemblage. Due to new marble-making technology, Germany was responsible for production of ornate glass swirl marbles during the nineteenth century. Three spiral swirl marbles are in the Marulan assemblage.

Other observations on market access include:

- Ceramic tableware were manufactured in England
- Glass bottles were from the United Kingdom (England and Scotland)
- The majority of tobacco pipes were manufactured in Scotland.
- The majority of stoneware beverage bottles were manufactured in Sydney by T. Field. The other was manufactured in Scotland.
- Buttons are stamped or embossed with names of the clothiers rather than the button manufacture. There are three identified merchants: two are London merchants and one is Sydney's David Jones & Co.

Observed purchasing patterns at Marulan are similar to for a variety of other nineteenth-century sites throughout NSW. Even though they were living in a small town in the bush they participated in a global consumer market. Residents drank Scottish whisky and Dutch schnapps, they seasoned their foods with the same brands meat sauces and condiments and ate their meals on English "china." Logically, Marulan purchased domestic products from Sydney merchants, as exampled by the pipes from Dixson's tobacconist shop and a patented ointment from Josesphson's chemist.

Marulan was less than a day's walk, or a morning's ride, from Goulburn, a thriving city with a range of shops. It is quite likely that many of the goods at Marulan came past the town initially as freight and were bought at Goulburn. This and the town's position on the Great Southern Road would have reduced its remoteness and generally made access to consumer goods more reliable. Within Marulan there were, at different times, three hotels, several stores and other businesses such as blacksmiths that may have on-sold goods. The wealthier may also have submitted orders to their agents in Sydney to buy and ship goods directly.

3.0 Artefact Analysis Discussion

3.1 Introduction

Initial discussion of the assemblage is presented as background for context analysis. This discussion is not intended as an analysis of the assemblage from the Old Marulan 07 excavation, for the site is composed of several activity areas and different occupational episodes, representing numerous individuals over time. Artefacts cannot be lumped together in one mega-assemblage that provides any substantive analysis that will contribute to the reconstruction and understanding of the site's history.[27]

Minimum item counts (MIC) were calculated for fragmented items during cataloguing. MIC are used throughout the report, so that quantities used in the following discussion represent whole, partial and/or fragmented items. Therefore, unless otherwise specified, the use of the term 'artefact' in this report is synonymous with MIC. There are 5058 MIC represented in this study. Given this large number of artefacts, this report concentrates its discussion on artefact types by material and basic form. Temporal, functional and other attribute data are discussed when pertinent to subsequent analyses.

3.2 Glass Analysis

The glass assemblage consisted of 1636 MIC. Glass artefacts represent approximately 32 percent of the assemblage. Since dating of glass items relies heavily on technological advancements for specific forms, this discussion artefacts are grouped by form and function, including bottles (which includes vials and jars), tableware and flat glass. Bottles and their closures are discussed first by form and then by functional subcategories. Tableware and flat (window) glass are discussed first by function and then by form. Glass bottles were the most abundant artefact form (1429) recovered from Old Marulan and are subject to an in - depth discussion. Other glass artefacts are subject to descriptive overviews.

3.2.1 Bottles

Current research in historical archaeology realises the importance of bottles in interpretation of a provenance (site, feature or context). For each bottle formal attributes were noted, including size, shape, colour, weight, function and temporal information. In association with other artefacts in a provenance, bottles suggest patterns of use and preservation. The bottle is one of the most common of glass artefact types recovered from archaeological sites. Therefore, it was not unexpected that glass bottles represent approximately 28 percent of the entire assemblage and 87 percent of its glass sub-assemblage.

The term "bottle" was used throughout this discussion to represent commercially manufactured glass storage containers, such as bottles, vials and jars. Bottles contributed to both temporal placement and use (function) of the site. Chronological data for bottle glass were based on advancements and/or changes in manufacturing technology over time. Recognised bottle shapes enable identification of products consumed by the occupants of a site, which help answer questions about trade and economics. Patented shapes and documented manufacturer and/or bottler embossments contribute chronological data, as well as helping to answer questions on consumer choice and market access.

[27] Miller 1991

Until the late-nineteenth century Australia did not have a successful glassworks and Australia looked to Great Britain for its glassware. So naturally, any chronological discussion of bottle glass prior to the development of the Australian glass industry must begin with the British glass industry: its technology and factors that affected it. For nearly 100 years (1746 – 1845) there was a dichotomous development in British bottle glass technology. The discrepancy between the excise tax on common green bottle glass and flint glass was such that the tax on the former was one eighth that levied upon the latter.[28] The development of the two- and three-piece moulds for flint glass containers enabled manufacturers to produce thinner and lighter bottles.[29]

Approximately 23 percent of bottles were cylindrical British beer/wine bottles (335) that were made from common green bottle glass that range in colour from dark green (black), olive, to medium green.[30] These all-purpose alcohol bottles were also used for cordial, aerated waters and other household products, but often their use as the latter was in fact a reuse of the bottle.[31] While there was steady progress in eighteenth-century and early nineteenth-century technology, by the mid-nineteenth century shapes and volumes were standardised by the 1824 introduction of the British Imperial Weights and Measures Act. Bottle finishing techniques throughout the eighteen century and early nineteenth century went through a steady progression, however by the mid-nineteenth century the form finished lip was the standard for British beer/wine bottles.[32] Seventy percent of the finishes on beer/wine bottles were manufactured by use of a form finish tool.

For other bottle forms bottle technology advanced steadily throughout the nineteenth century. Free trade opened the British and imperial markets to unfettered competition, stimulating reciprocal action by other countries during the middle quarters of the nineteenth century. Furthermore, Australia's glass industry was established and growing rapidly. As a result of these factors, by the end of the nineteenth century glass containers were mass-produced, relatively inexpensive, readily disposable and consequently increasingly popular as packaging for all manner of commercial products. The frequency of container glass entering into the archaeological record since the mid-nineteenth century has also increased dramatically as a result. Chronological data for manufacturing techniques are shown in Table 3.1. These techniques form the basis for dating bottles in the assemblage from the mid-nineteenth century to early twentieth century.

Table 3.1. Chronological Data for Nineteenth Century Bottle Glass

Technomorphology	**Date Range**
2, 3 or 4-piece vertical mould	1820 – 1920s
Bottom-hinge mould	1810 – 1880
Finishing tool	1820 –1920s
3-part mould	1820s–1920s
Post bottom mould	1820s+
Cup bottom mould	1850 +
Blow-back mould	1850s+

[28] Lardner 1821:151

[29] Boow 1991: 115

[30] Colour cannot be used in assigning temporal placement of these bottles, as the composition of the metal was determined by each manufacturer's preference.

[31] Davies 2004:238

[32] Jones 1986:33

Table 3.1. Chronological Data for Nineteenth Century Bottle Glass	
Technomorphology	**Date Range**
Crack-off finish	1850–1920s
Applied finish	Until 1870s
Solid rod/blowpipe/sand pontil	Until 1880s
Patent Common Name	**Date Range**
Torpedo (Hamilton)	1790+
Lamont	1876
Ricketts	1835 – 1920s

Bottle and Product Manufacturers

The basic distinction was made between bottle manufacturers (glassworks) and product manufacturer (brewer, distiller, etc). Documented manufacturer's marks for glass containers served to establish date ranges each company. Principal sources of this information included Toulouse (1971) and Boow (1991). Three different bottle manufacturers were identified. Chronological and location data for manufacturers are shown in Table 3.2.

Table 3.2. Chronological and Location Data for Glass Bottle Manufacturers					
Manufacturer	**Description**	**From**	**To**	**Location**	**Country**
R. Cooper & Co.	**Bottle - beer/wine**	**1868**	**1928**		**Scotland**
York City Glass Co.	**Bottle - medicine**	**1860**	**1900**		**England**
John Lamont	**Bottle - beer/wine**	**1876**	**1900s**		**England**

3.2.2 Tableware

Glass tableware is an underappreciated artefact category in the archaeological record. This is due, in part, to the low relative frequency of recognisable glass tableware in a typical assemblage, because fragility and resulting fragmentation of this type of artefact often renders its form and decorative motif unrecognisable. There are 111 tableware artefacts recovered Old Marulan including stemware (17), tumblers (35), a jug, an open dish, a lid, a plate and 55 unidentified glass tableware items with remnants of decorative design elements, including press-moulded and cut designs.

Technology for press moulded tableware was developed in the mid-1820s. Press moulding made designed tableware much cheaper and quicker to manufacture. However, it was not until the late 1830s that technology was developed to produce complicated or thin-walled forms, such as stemware, tumblers and jugs. Until the late 1830s, these forms were still manufactured by traditional blown methods. The majority of glass tableware is press moulded (63). Tumblers represented the majority of identified tableware forms (24) and provide the most temporal and consumer-choice information. Press-moulded tumblers, along with a stemware and a jug, date from the late 1830s. From the mid- nineteenth century panelled pressed-moulded glass tumblers are ubiquitous on archaeological sites, and the presences of pattern variations was common throughout the country from the 1850s. The remainder of press-moulded tableware (55%) is too fragmented to determine form.

3.2.3 Flat glass

From the time of first colonisation until the mid-nineteenth century window glass was imported from England. Unlike other imported commodities, consumer choice for window glass was not based on quality, but rather was influenced by the British weight-based excise duties placed on glass. By the 1830s Australians began to realise that the thinner glass was not well suited for the frequent hail storms in Sydney and surrounds. In 1845, the excise tax was repealed. By the 1870s broad glass and the new and improved cylinder glass had gained preference over crown glass and by the 1880s crown glass had all but disappeared from the Australian market. From Old Marulan there were 43 fragmented crown glass window panes and 2 broad glass window panes (Unit 41).

In the collection there were three occurrences of plate glass (Context 3202, 3213 and 3232). Plate glass various household and commercial applications, the most common was for mirrors. Unfortunately, the metallic backing or "silvering" erode more quickly than glass and does not last in an archaeological context through time.

3.2.4 Marbles

Marbles recovered from Old Marulan were stone, ceramic and glass. For purposes of this study, marbles of all material classes are discussed together. The archaeological record world wide has proven that marbles predate written history. These earliest marbles were mostly clay and stone. Mechanised stone marble manufacture began in seventeenth-century German with the help of small mountain-based water mills. By the nineteen century the industry had moved to larger mills and, for example, there were an estimated 100 marble cutters in the Coburg area and an average worker could produce 40,000 to 50,000 marbles per week.[33] There are two examples of stone marbles in the Old Marulan collection.

Glazed earthenware, stoneware and porcelain marbles gained popularity by the mid-nineteenth century. As with stone marbles, Germany led the way in the production of ceramic marbles. By 1800, South Thuringen in eastern Germany specialised in the production porcelain or "china" marbles. Glazed or "crockery" marbles were popular from the 1870s through the early twentieth century.

Glass marbles (3) are German swirl or candy stripe types. These types of marbles were first manufactured in Lauscha and Sonneburg, Germany in 1846, after one of the glass cottage workers invented a new work tool – marbelscheres or marble scissors – that had one cupped-end shear that aided in the formation of the marble (Figure 3.1).[34]

[33] Baldwin 1987: 19 –21

[34] Baldwin 1987: 35

Figure 3.1 German Marbelscheres.

3.2.5 Buttons

White and black opaque glass sew-through buttons are used on shirts and dresses. There are 23 white 4- hole buttons and 4 white 2-hole buttons. The majority of buttons (21) are from the Woolpack Inn cesspit (266/588, Unit 41 and 268/588, Unit 41). One button each was recovered from 274/612, Unit 40 and 286/596, Unit 2.

3.3 Ceramic Analysis

The ceramic assemblage from Old Marulan consists of 1971 MIC, including tableware, buttons, tobacco pipes, bottles, bricks and marbles. This discussion begins with an examination of vectors of use. Dating ceramic items relies heavily on technological advancement for specific forms. For example, ceramic tableware has a vastly different technological evolution than bricks. As form follows function, ceramic artefacts in the following discussion are grouped by form and function (Table 3.3).

Table 3.3 Summary of Ceramic Artefacts by Function

Function	Description	Quantity
Activities	Games & leisure	9
Architecture	Construction material	40
	Non-structural	1
Clothing	Apparel	12
Food	Alcohol	4
	Beverage	9
	Food preparation	9
	Food service	1407
	Food storage	6
Food	Miscellaneous	53
Household	Garden	1
	Maintenance	5
	Ornamental	3
Medicine	Patent	3
	Unidentifed	1
Miscellaneous	Unspecified function	141
Personal	Hygiene	27
	Miscellaneous	2
	Personal adornment	1
	Tobacco	235
	Writing	1

Table 3.3 Summary of Ceramic Artefacts by Function		
Function	**Description**	**Quantity**
	TOTAL	1970

3.3.1 Kitchen-specific

Kitchen-specific ceramics are any vessel used for food service, preparation and storage. Since the technology for manufacture of commercial packaging, such as bottles or jars, are included in the statistics for this discussion. There are 1488 kitchen-specific ceramic vessels, including earthenware, porcelain and stoneware As Table 3.4 shows, each ceramic type was subdivided into specific ware types with refined white earthenware, such as graniteware, whiteware, and ironstone comprises the majority of kitchen-specific ceramic vessels (83%).

Table 3.4 Ware Types in Ceramic Tableware		
Ware	**Type**	**Quantity**
Earthenware	**Buff paste earthenware**	**12**
	Graniteware	**6**
	Ironstone	**1**
	Jackfield	**5**
	Pearlware	**64**
	Red paste (coarse)	**12**
	Red paste (refined)	**7**
	Unidentified type	**4**
	Refined white earthenware	**1236**
	Yellow ware	**23**
Porcelain	**Bone china**	**36**
	Hard paste	**7**
	Soft paste	**43**
Stoneware	**Buff stoneware**	**2**
	Domestic buff stoneware	**16**
	Domestic grey stoneware	**8**
	Dyed body	**6**
	TOTAL	**1488**

There are 15 identified glazing and/or decorative technologies (Table 3.5). Transfer-printed (including Flow Blue and Black) is the most common decorative technique and occurs primarily on refined white earthenware vessels. Gilding is the most common decorative technique for porcelain. Stoneware vessels (32) are utilitarian, consisting of bottles and utilitarian storage vessels. Glazing is

not required for stoneware vessels, however, most food-related stoneware exhibited some type of glaze on both exterior and interior.

Table 3.5 Decorative Techniques on Ceramic Tableware	
Decorative Technique	**Quantity**
Annular/banded, painted	5
Annular/banded, slipped	5
Applied ornamentation/sprigged	11
Edge decorated	7
Flow blue/black transfer printed	145
Gilded	12
Lustred	2
Moulded	21
Painted	31
Rockingham type glaze	3
Slip decorated	5
Spatter	3
Sponge/stamped	30
Stencil	3
Transfer printed	1016
Total	1299

Vessel forms were separated into four specific and one miscellaneous sub-categories (Table 3.6). The majority of kitchen-specific ceramic artefacts are (95%) food service tableware, which included 12 different forms and the majority of these represent individual service vessels such as cups, plates and bowls. The majority of identified forms are cups (33%) and plates (34%). All porcelain vessels are individual food service vessels, however ten percent of refined earthenware vessels are large food service items, such as platters, tureens, serving bowls and teapots.

Table 3.6 Ceramic Tableware shapes by Specific Function.		
Function	**Shape**	**Quantity**
Beverage	Bottle, stout/ginger beer	13
	Barrel/Filter, water	1
Food preparation	Bowl	4

Table 3.6 Ceramic Tableware shapes by Specific Function.		
Function	**Shape**	**Quantity**
	Vessel	5
Food service	Bowl	37
	Cup	157
	Drainer	2
	Egg cup	8
	Ewer/jug	1
	Jug	7
	Lid	6
	Plate	162
	Platter	15
	Saucer	35
	Tea pot	5
	Tea pot lid	1
	Tureen	6
	Vessel	966
Food Storage	Crock	1
	Vessel	1
	Lid	3
Miscellaneous	Bottle	7
	Bowl	2
	Lid	1
	Vessel	43
	TOTAL	1489

The majority of kitchen-specific ceramic vessels are transfer-printed refined earthenware tableware (Table 3.5). There are 20 recognisable transfer-printed patterns (Table 3.7). The most common transfer-print pattern is “Willow” (166), followed by “Rhine” (69). Willow pattern is on both whiteware (155) and pearlware (9). Vessels decorated with Willow transfer print are shown in Table 3.8. Unlike Willow pattern, which was solely blue transfer-printed, the print on Rhine vessels is blue, black, brown, grey and green. Also of note are a few patterns that are very similar to Rhine, such as Chantilly and Medici that possibly were purchased as replacements when Rhine pattern vessels were not available.

Table 3.7 CeramicTransfer-printed Patterns	
Pattern Name	**Quantity**
Agriculture	1
Albion	9

Table 3.7 CeramicTransfer-printed Patterns	
Pattern Name	**Quantity**
Aliwal	12
Belforte Castle	1
Blonde	4
Byzantium	1
Cable	3
Chantilly	1
Clarendon	3
Duncan Scenes	1
Fibre	3
Lily	1
Marble	7
Medici	1
Palestine	2
Pevane	1
Rhine	70
Vienna	1
Willow	166
Wreath	4
Total	292

Table 3.8 Vessels Shapes Decorated with Willow Transfer	
Shape	**Quantity**
Bowl	3
Bowl, serving	2
Bowl, small	1
Cup	2
Drainer	1
Plate	34
Plate, small	5
Platter	7
Saucer	2
Vessel	92

Table 3.8 Vessels Shapes Decorated with Willow Transfer	
Shape	**Quantity**
Vessel	1
Vessel, flat	10
Vessel, hollow	6
TOTAL	166

Ceramic manufacturers

Australian potters during the early nineteenth century manufactured primarily utilitarian wares, therefore, it is not unexpected that the all refined earthenware and porcelain tableware were imported. There were nine identified potters' marks and all but one – Reed & Taylor of Ferrybridge, Yorkshire, were Staffordshire potteries. Dates of operation for these companies range from 1835 to 1905. Stoneware bottles for beer, stout or ginger beer were manufactured by T. Field, Sydney, (1845-1880) and Port Dundas Pottery Co. Ltd, Glasgow, Scotland (1850s-1932).

Table 3.9 Chronological Data for Ceramic Tableware Manufacturers			
Manufacturer	**From**	**To**	**Country**
Alfred Shephard & Co	1864	1870	England
Copeland Late Spode	1847	1867	England
Francis Morley (& Co)	1845	1858	England
J R Ridgeway	1841	1855	England
John Tams (& Son)	1875	1890	England
Mellon & Venables & Co.	1834	1851	England
Ralph Hammersley (& Son)	1860	1905	England
Ralph Malkin	1863	1881	England
Reed & Taylor	1840	1856	England

Results of analysis of kitchen-specific ceramics indicated that the majority are English transfer-printed refined earthenware individual table service vessels.

3.3.2 Bricks

Brick, technically a form rather than material, is made of low-temperature fired, coarse earthenware, however, brick manufacturing technology and typology is distinct from that for earthenware vessels. Therefore, bricks are assigned a separate ceramic category. Forty bricks (40) were retained for the collection. Six bricks were taken as representative samples. The remainder were recovered *in situ* from various contexts across the site.

3.3.3 Buttons

There are seven ceramic buttons in the collection. All are prosser buttons, a highly vitrified ceramic process, that was patented in 1849. Similar to glass shirt and dress buttons, prosser buttons are usually 2- or 4-hole sew through types. The largest concentration of these buttons was in the Woolpack cesspit (266/588, Unit 41 and 268/588, Unit 41). Others were recovered from 238/598, Unit 04; 266/590, Unit 02; 274/610, Unit 40; and 274/612, Unit 02.

3.3.4 Bottles

There are 87 ceramic bottles. All bottles were stoneware, and while stoneware does not need to be glazed, the majority (97%) are glazed on the at least the exterior: salt glazed (70%), Bristol glaze (7%), alkaline glazed (3%) and engobe or slip washed (17%). As Table 3.10 shows, there is a variety of functional uses for bottles. Over 93 percent of stoneware bottles are less than 25 percent complete, which hinder bottle shape and function identification. Approximately 14 percent of bottles have an alkaline glazed interior, which suggests they were used for food or beverage storage. However, it should be noted that not all food or beverage storage bottles have glazed interiors, but in the absence of an identified shape, association with food storage cannot be determined.

Table 3.10 Functions of Stoneware Bottles

Description	Function	Quantity
Bottle	Food	12
Bottle, stout	Food	4
Bottle	Household	1
Bottle, blacking	Household	4
Bottle, ink	Personal	1
Bottle	Miscellaneous	65
	TOTAL	87

3.3.5 Tobacco Pipes

English tobacco pipes are an incredibly useful archaeological resource in historical Australian contexts. Pipes are dateable in several ways. Firstly, tobacco pipe manufacturers often stamped or moulded makers' marks on the bowl or stem. These marks commonly include the manufacturing company's name on the stem, with the location of production on the reverse side. Importers marks and advertising stamps placed on the stem or bowl are also dateable. Pipe form can also provide dating evidence. Variations in form include shape, size and angle of the bowl, the absence or presence of spurs and whether spurs are pointed or pedestaled.

This study concentrates largely on manufacturers' marks and other identifiable features and will therefore rely on documented manufacturers records and other archaeological and historical studies. English ball clay tobacco pipes from nineteenth-century and twentieth-century Australian historical sites can provide useful dating information. Additionally, the presence of manufacturers' marks can document trade in imported pipes and rise of local tobacco pipe manufacturers. However, due their fragility, they are very rarely found whole in archaeological contexts. Undecorated stems and bowls can provide little information by way of dating and therefore contribute little to the archaeological record.

In total 855 tobacco pipe fragments were during the excavations at Old Marulan. The majority of these pipe fragments were recovered from hand excavated units. These can be divided into four

categories: pipe bowls and pipe bowl fragments, pipe stem fragments, pipe stem/bowl fragments and partial pipes (consisting of a combination of stem, bowl and spur).

Pipe stem/bowl, partial pipes and bowl fragments account for 286 out of the 855 ceramic pipe fragments recovered and 16 of these were whole pipe bowls. Of these fragments 167 have moulded decoration and 119 are undecorated. In the pipe bowl category 12 common decorative themes were identified. Dominant themes include:

a) Vertical fluting on bowl with leaf moulding on bowl seams. Variations on this pattern accounts for 97 of the total pipe fragments, with a MIC of 26.
b) Moulded effigal pipes account for 7 of the total pipe fragments, with an MIC of 4. One of these is attributed to the manufacturer William Murray of Glasgow (1830 – 1861). His pipe has a distinctive curled moustache and is wearing a decorated circlet. This example of an imported effigal pipe does not have the distinctive lobes on the upper stem that distinguish locally made effigal pipes.
c) The masted ship and anchor with cable motif accounted for 9 of the total pipe fragments, including two complete bowls, with an MIC of 7. This is a type known to have been produced by Thomas White & Co. of Edinburgh from excavations of the clay pipe cargo of the *Tigress*, a brig sunk off the Gulf of St Vincent in 1848[35]. Thomas White & Co. are represented in this assemblage by 3 pipe stems stamped with the manufactuer's mark.
d) The masted ship and Scottish thistle motif occurred on one complete bowl, with an MIC of one.
e) A grapevine pattern occurred on 10 of the total pipe fragments, with an MIC of eight. Many of these fragments also had leaf moulding along the mould seams. This type was also identified at the Cadmans Cottage Historic Site, Sydney.[36] This decoration was also identified at The Rocks and attributed to Duncan McDougall of Scotland [37]
f) A single example of a partial bowl with a ship on the right side and a train on the left, with an MIC of one. This motif is similar to one associated with Scottish pipe manufacturers [38] showing a steam paddle ship on one side, with a locomotive on the other. It is likely this is a depiction of a Stephenson's Rocket, an early steam locomotive built in the UK in 1829.
g) A single of example of a possible Britannia shield on the right side of a partial pipe bowl, with an MIC of 1.
h) Three examples of undecorated bowls with diagonal hatching on mould seams, with an MIC of 3. This type of seam hatching was used from 1830.
i) A single example of a small bowl with leaf pattern along the seam lines, with a rouletted bowl rim and vertical ribbing from base to mid section with a band of flowers and other motifs including a crescent moon and sunburst around mid bowl. This is probably Masonic in character (320/610 unit 70).
j) Decorative vertical fluting and swags from the rim, with leaves on the mould seams and a flat spur with lettering either side accounts for 2 pipe fragments, with an MIC of 2 (cat no. 3841).
k) A single identifiable bowl fragment of a SQUATTERS BUDGEREE pipe (cat no. 2476) was found. Two stem/bowl fragments and 5 stem fragments can also be identified as being SQUATTERS BUDGEREE pipes, giving a minimum count of 4. The only known maker of these pipes was David Swallow of Rainford, UK[39].

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[35] Gojak & Stuart 1999; Harris 1986; Davey 1987

[36] Gojak & Stuart 1999: Fig. 4

[37] Wilson 1999: 340, Type 119

[38] Davey 1987; fig. 87

[39] Ron Dagnall pers comm. to Denis Gojak

Pipe stems fragments account for 512 of the 855 ceramic pipe fragments recovered. Of these 473 were undecorated, 4 had some form of moulded or impressed decoration, 60 were glazed, 43 were stamped with legible makers marks and 7 were stamped with illegible or partial makers marks.

Table 3.11 Chronological Data for Tobacco Pipe Manufacturers

Manufacturer	Begin Date	End Date	Country	MIC
Charles Crop	1856	1924	England	1
Duncan McDougall	1810	1967	Scotland	19
Thomas White	1823	1882	Scotland	3
William White	1806	1955	Scotland	1
William Murray	1830	1861	Scotland	3
'L' within dashed cartouche	--	--		6

Eight stem fragments advertise Hugh Dixson, a prominent Sydney tobacconist. It is likely that these pipes were manufactured by one of the major Scottish pipe exporters.[40] Dixson pipes date from 1839 to 1904. A single pipe fragment is associated with William Aldis, also a Sydney tobacconist. David Swallow, who produced the Squatters Budgeree pipes also produced pipes with Dixson's name[41]. Aldis pipes are dated from 1839-1868.

The majority of pipes from Old Marulan appear to have been imported from the main pipe producing centres of Glasgow and Edinburgh in Scotland. Local pipe manufacture in Australia collapsed around 1840 due to pressure from overseas markets, in particular Holland and then the UK.[42] The Scottish pipe export industry largely dominated the Australian market after 1850.[43] The two Australian tobacconists represented at Old Marulan, Aldis and Dixson, appear to have had their pipes produced overseas by one of the major Scottish importers SQUATTERS BUDGEREE pipes are also believed to have been made for the Australian market by one of these overseas pipe manufacturers. The lack of locally produced pipes in the assemblage suggests a lack of access to the Sydney and other local markets. Considering that Old Marulan served as a stopover between Sydney and localities further south does confuse this interpretation however. It is also possible that this assemblage represents personal preference toward imported brands in this locality.

Of all the stem fragments from the Old Marulan assemblage 54 had their mouthpieces attached. Of these, 22 fragments had a brown, green or yellow glaze applied prior to firing. This stage in production was required to stop the lips of the smoker sticking to the mouthpiece due to the porous nature of ball clay, the most commonly used material in the production of pipes in this period. Thirty-two (32) mouthpieces were unglazed.

Two fragments of pipe stem associated with Duncan McDougall of Scotland made from red clay were found in areas 238/596 (unit 15) and 274/612 (unit 40). Many manufacturers used red clay in the production of their pipes.

[40] Gojak 1995: 18

[41] Ron Dagnall pers comm. to Denis Gojak

[42] Gojak and Stuart 1999: 43

[43] Ayto 1994: 14

A single fragment of an amber coloured synthetic pipe stem was found in area 246/594 (unit 2). Stems and mouthpieces made from amber, carved bone and early plastics were used with carved wooden briar or stone meerschaum pipe bowls. Carved meerschaum pipes were popular from about 1830, but were largely superseded by wooden briars by the late 19th century.[44]

In addition, at least five upright pipe bowls without a spur were found. All but one of these was found in the privy. This is a type that was introduced to imitate wooden briar and meerschaum pipes that became popular after 1850. One of these bowl fragments was also highly polished and amber in colour, also suggestive of a briar type pipe.

Discussion

Pipe fragments were dispersed over the entire Old Marulan site. Some of the most significant areas are outlined in Table 3.12.

Table 3.12 Distribution of Tobacco Pipes Across the Site.

Unit	Square	Number of fragments	Description
02	286/594	13	
02	286/596	25	
02	286/598	35	
02	305/635	55	
03	240/598	15	
15	236/600	12	
15	238/596	20	
40	276/612	40	A feature covering areas 274/612, 276/612 and 276/610. Dark soil with numerous fragmented artefacts, including pipe fragments. Some charcoal and ash also present.
41	268/588	16	The artefactual deposit within the Woolpack Inn privy (unit 32). Finds of ceramic, glass, a high percentage of weathered bone, pipes and metal (nails, remnants of buckets, cans, etc) mixed with brick rubble.

3.4 Metal

Approximately 26 percent of the assemblage is metal items (1343). Summarised in Table 3.13, there are 86 distinct forms identified in 10 identified functional groups. The following discussion for metal artefacts is organised by function and shape.

[44] Amoret and Scott 1981: 10-11

Table 3.13 Summary of Metal Artefacts by Function		
Function	**Description**	**Quantity**
Activities	Games & leisure	1
	Miscellaneous hardware	63
	Multi-purpose item	14
	Multi-purpose tools	6
Architecture	Construction material	15
	Non-structural	918
Arms	Ammunition	18
	Miscellaneous	1
Clothing	Apparel	74
	Making/repair	1
Food	Alcohol	7
	Beverage	1
	Food preparation	8
	Food service	5
	Food storage	9
Furnishings	Hardware	57
	Miscellaneous	1
Household	Garden	2
Miscellaneous	Unspecified function	101
Personal	Coins	2
	Miscellaneous	4
	Personal adornment	4
	Writing	1
Transportation	Stable items	25
	Automotive	1
Utilities	Lighting	1
	Unspecified	3
	TOTAL	1343

3.4.1 Activities

Activities, or miscellaneous category, encompass a variety of pursuits. For the purpose of this study it includes, games and leisure, miscellaneous hardware, multi-purpose items and tools. Summary of these subcategories is as follows:

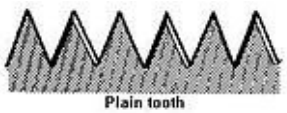
Games & Leisure - The jew's harp or "trump" was know by a variety of names throughout history and has been around for over 400 years. It is a musical instrument played by placing against the lip

or teeth and the centre tang is plucked. The example is this collection is cast with only a remnant of the tang.

Miscellaneous hardware consists of a variety of elements that are part of a complex item, and as part of this collection, no specific association could be determined. Miscellaneous hardware includes: fasteners, such as grommets, rivets, hinges, screws, cotter pins, hooks, bolts and brackets.

Multi-purpose items are distinct forms that can be used for a variety of pursuits. Included in the collection are barrel parts, a billy can or pail, a padlock and scissors

Multi-purpose tools are those used in a variety of pursuits. Included in the collection are files, a sledge hammer head, scissors, tool handles and a cross cut saw. The cross cut saw is plain toothed (Figure ?) that was commonly used in conjunction with an axe to fell trees and clear land.



3.4.2 Architecture

Nails are one of the most abundant architectural-related artefacts recovered from the site. Across the site there is a 6:1 ratio of cut nails (774) to wire-drawn nails (125), which indicates that the majority of structures on the site were constructed prior to the 1850s. The relative frequency of wire-drawn nails (13%) suggests maintenance, repair or alternations to these structures were undertaken during the late nineteenth century.

There are five screws in the collection. Machine-made screws have been manufactured since the early nineteenth century in much the same process as Henry Maudslay's first steam engine powered screw cutting lathe in 1800. A screw-cutting lathe is a machine capable of cutting very accurate screw threads via single-point screw-cutting, which is the process of precisely guiding the linear motion of the tool bit in relation to the rotating motion of the workpiece.

Two hardware items were meant to be fitted into masonry. There is a heavy hook-and-eye hinge that is for a large door, possibly for a barn door (Unit 41). The hook half of a hinge is chisel pointed to be secured in masonry. The other item, recovered during excavator monitoring (Unit 69) is a heavy hook with a triangular point on one end.

The remaining metal architectural elements represent a variety of hardware elements, including: a rim-lock door plate that was common from the late 1830s, wo common triangular shaped strap hinges for doors, storage boxes, gates, etc., five fence staples, a door latch and two bolts.

3.4.3 Arms

Arms-related metal artefacts consist of spent ammunition and a metal powder flask. Development of metal powder flasks lead to the gradual replacement of common powder horns by the 1830s.[45] These flasks would have been in the kit of most musket owners.

[45] Kindig 1998

Both .22 and .25 caliber cartridges were recovered from various contexts across the site (Units 1, 2, 24, 26, 41 and 46). Rim-fire cartridges were relatively low pressure and not terribly powerful, consequently their use was gradually lessened in the late nineteenth century and early twentieth century. After World War II .22 caliber cartridges had a renewed interest.

The shot gun is used for hunting and by the military. Due to its lesser recoil, the 12-gauge shotgun has been the most popular since the 1870s. Three 12-gauge shotgun primer caps were recovered from three different contexts (266/590 – Unit 02, 270/590 – Unit 2, and 266/588 – Unit 41). These shells were manufactured by the US firms Winchester Repeating Arms Company (1866-1932) and Union Metalic Cartridge Co (1867 -).

3.4.4 Clothing

Clothing by its nature does not survive well in the archaeological record. What do survive are the fasteners attached to clothing. In this collection there are a variety of metal fasteners including buttons (56), hook-and-eyes (2), waist coat and shoe buckles (11), the heel plate from a shoe and shoe eyelets (5). Tools for the manufacture and repair of clothing include a pair of ladies sewing scissors and a thimble.

The majority of buttons (53) are for men's trousers, including one-piece cast (1800–1860) and two-piece pressed (after 1870) varieties. Several trouser buttons have impressed marks of London Clothiers:

- MOSES LEVY & Co / LONDON were wholesale clothiers and general shippers, particularly to Australia (1846-1878). This company primarily sold work-wear for sailors. While it is possible that these buttons were from articles of clothing worn by a sailor who decided to remain in Australia, it is more likely that they were reused from sailors' discard clothing.

- HYAM & Co / 86 OXFORD ST, was a London suit clothier from the mid to late 19th century.

- One button was marked NEW SOUTH WALES POLICE and was sold by Sydney merchant D. JONES & CO. The NSW Police force was established in 1862.

3.4.5 Kitchen-specific

There are 30 artefacts associated with food preparation, service and storage. Among the seven cast iron cooking pots used for food preparation, two are 3-legged English-type pots.

Cutlery includes forks (2), a table spoon, and a knife. One fork is the common 3-tine variety popular from the mid 1700s, and a 4-tine variety became popular in the nineteenth century. Other food-service items include two cylindrical cups with strap handles. Food storage items include foils (3), seal (1) and bale seals (4) for beer and wine bottles, and tin cans (9).

Foil and bale seals are common on alcohol bottles to secure the cork and keep moisture in. One foil seal was embossed - J & F MARTELL / TRADE (LOGO) MARK / COGNAC / PARIS LONDRES – BOR[DEAUX]. Martell established his brandy trade in 1715 and by 1785, cognac, the new brandy type, was designated. By 1810 Martell has secured an exclusive agreement to import his cognac into England and by 1868 had developed new export markets to British-dominated Australian, Hong Kong and Chinese markets.

The technology for storing food in tins was developed in the early 1800s. Originally seams on tins were hand soldered to reinforce the seams, which prevented the cans from bursting. The first improvement in tin can technology came in the 1840s with the development of the stamped or crimped end can and the lap seam. In the 1860s the key-wind tear-strip was invented. This type of

container is often associated with tinned sardines, but was used for a variety of foods. Machine soldered cans were invented in the 1870s and by the 1884, John Meyenburg had developed the Matchstick Filler Hole can for condensed milk.[46] All tin cans were recovered from the Woolpack Inn cesspit (266/588, Unit 41). Among these are three identified with stamped ends, one key-wind tear-strip rectangular, and one machine soldered with filler hole.

3.5 Organic Artefacts

Organic materials include a range of floral and faunal materials, including clothing items, personal adornment, stable tack, and building materials (Table 3.14). Fabrics consist of woven and pressed felt wool cloth fragments. Felting is one of the oldest textile forms and felt fabric is used for manufacture of clothing, blankets, hats, boots, etc. Woven wool has a history nearly as long as felt, but uses are more versatile. The examples of wool fibres are Z-twist, which may relevant in a future study of textile sourcing. Clothing-related artefacts, wood, shell and bone buttons and leather shoe fragments. There are two tortoise shell ladies hair combs. The most popular hair accessories during the mid- to late nineteenth century were combs which might hold the hair back at the sides, or a larger comb with fewer teeth which was placed down through the bun on the back of the head.

Table 3. 14 Organic materials

Function	Material	Shape	Quantity
Architecture	wood	Timber	1
Clothing	bone	Button	7
Clothing	Shell	Button	2
Clothing	wood	Button	2
Clothing	leather	Shoe	1
Food	chicken	Egg	1
Miscellaneous	wood	Charcoal	7
Miscellaneous	wool/felt	Cloth	3
Personal	tortoise shell	Comb	2
Transportation	leather	Harness/saddle part	1

3.6 Stone Artefacts

Two arms related elements indicate the presence of at least one muzzle-loading firearm – the powder flask and the gun flint. Gunflints were first used as part of an internal firing mechanism in wheel lock muskets in the early 1500s. The flintlock musket was the most common armament until the development of the breech-loading rifle in the early 1800s. Gunflints are more often found than any other gun part, because they gradually wore and had to be replaced. While replacement flints were fashioned from locally sourced material, the best flints were imported England. While military muskets were replaced by percussion carbines in 1843, muskets continued popularity among the general public.[47]

Aboriginal artefact material is not included here. A low-density scatter of flaked stone artefact material was found across the site, particularly during the mechanical removal of topsoil. There is

[46] Rock 1981 pp 6-10.

[47] Hanson 1979, pp 51-58.

no evidence of any of this being post-contact, and neither is there evidence from the glass or ceramic artefacts of flaking.

4.0 Context Analysis

There are 197 contexts that yielded artefacts. Pertinent data for each context is summarised in Appendix One and includes quantity, MIC, and *TPQ*. To provide an in depth accounting of each would be prohibitive and in most instances meaningless. Therefore this study focuses on units or groups of units rather than individual contexts to provide a more meaningful interpretation of activities across the site.

The primary focus of this study are units associated with the Woolpack Inn, as the inn was a major focal point of the community and there are structural remains specifically identified with the inn. Other units subject to analysis are Unit 45, which is part of an unidentified feature in use over some period of time, and contains a mixture of stones brought to the site, evidence of burning or dumping of greasy residues and other activities.

4.1 Cesspit, Back yards and gardens Behind the Woolpack Inn

A large area behind the Woolpack Inn was systematically excavated in natural soil stratigraphy. Unit 1 was the sod and surface area. Units 2, 3, 4, 5 and 15 were underlying deposits. Each of these units will be individually analysed individually below, followed by the analysis of Unit 41, a large double cesspit at the rear of the inn. Finally, all units associated with the Woolpack Inn will be collectively discussed.

4.1.1 Unit 2

Unit 2 is the top soil layer across a wide area of the site at the rear of the Woolpack Inn (220/596 to 305/636). Unit 2 has 13037 artefacts and 1071 MICs. There are areas of dense artefact concentrations – 236/594 to 238/600 (4525 artefacts, 187 MICs), 246/592 to 248/598 (1874 artefacts, 133 MICs), 256/592 to 258/592 (2718 artefact, 117 MICs) and 286/594 to 286/598 (1699 artefacts, 279 MICs). For the purpose of this study the artefacts were subject to temporal and functional analysis

Temporal Analysis

Approximately half of the artefacts provided temporal information. The majority of date specific information was derived from use popularity date ranges and/or documented technological advancements. Most of the use popularity date ranges are so broad that they encompass most of the nineteenth century and do little to further refine temporal placement for this deposit. However there are a few observations that do assist in narrowing the date range.

- All window glass is crown glass, which has an 1870 t*erminus anti quem* based on use popularity in Australia.
- One stemware has characteristics that indicate an 1840s *terminus post quem*.
- There is one NSW Policeman's button. The NSW Police Force was established in 1862.

The most definitive date were obtained from manufacturers and product manufacturers' marks (Table 4.1 and Table 4.2)

Table 4.1 Chronological Data for Manufacturers from Unit 2

Shape	Manufacturer	Begin Date	End Date	MIC
Bottle, alcohol	Cooper & Wood	1859	1928	1
Key	Clum MFG Co,	1914		1
Pipe, tobacco	Hugh Dixson	1839	1904	1
Shotgun shell	Winchester Repeating Arms Company,	1866	1932	1
Shotgun shell	Union Metallic Cartridge Co	1867		1
Pipe, tobacco	McDougall	1810	1967	3

Table 4.2 Chronological Data for Product Manufacturers from Unit 2

Shape	Product Manufacturer	Begin Date	End Date	MIC
Button	David Jones & Co	1867		1
Stopper	Lea & Perrins	1845	1910	1

Results of temporal analysis suggest that the majority of artefacts recovered from the top soil layer at the rear of the Woolpack Inn are contemporaneous with the documented date for the inn. Some casual-discard items (shot gun shells and cartridges) and unintentional-discard items (keys and buttons) post date the period the inn was open. Since they were recovered from the top soil layer this finding is not inconsistent with occasional use of the area following the closure of the inn.

Functional Analysis

Functional analysis classified 78 percent of the assemblage in to eleven identified groups (Figure 4.1). The majority of artefacts are food related (53%) or architectural debris (14%). The highest relative frequency of food-related artefacts is ceramic food service items (337 MIC). Most are individual table-service vessels, such as plates (20), cups (30), a bowl and saucers (8). Serving vessels consist of two jugs and two serving platters. Glass tableware consists of tumblers (5), stemware (3) and unspecified tableware (5).

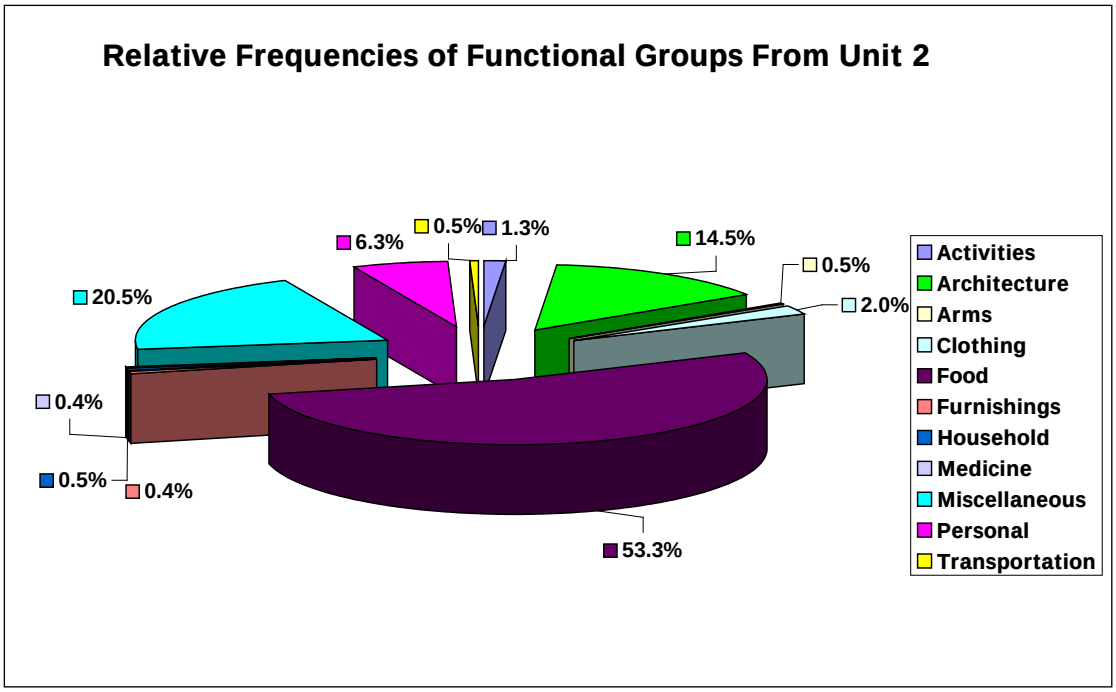


Figure 4.1 Relative Frequencies of Functional Groups from Unit 2.

The majority of food-service ceramic vessels are refined white earthenwares (337) such as whiteware and pearlware. Also there are 14 porcelain vessels, however the only identified shapes are saucers. Transfer-printed wares, including flow blue and black, are the most abundant decorative technique in the food-service sub-assemblage, representing approximately 82 percent of all food-service items. There are five identified transfer-print patterns, the most abundant being Willow, which was found on plates, saucers and serving platters. Other patterns include Agriculture, Albion, Fibre and Rhine.

Food-related bottles are alcohol, beverage and condiment bottles (Table 4.3). The relative frequency of alcohol bottle could have resulted from either the hotel or from a residence(s) and while a low relative frequency of condiment bottles does not rule out association with the inn, it suggests a residential setting.

Table 4.3 Food-related Bottles from Unit 2.

Bottle Type	Quantity
aerated water/condiment	19
aerated water	8
alcohol	40
beer/wine	54
champagne	24
condiment	7
gin/schnapps	34
pickle/chutney	1

Architectural elements are the second most frequent artefact category in the Unit 2 assemblage. Architectural debris consist of nails (139 MIC) and window glass (9 MIC) and brick (7 MIC). While

relative high frequencies of nails and glass within an architectural group often suggests repair and maintenance to structures, in this instance could also be associated with the demolition of buildings, including the outbuildings likely to be present at the rear of any substantial inn.

Artefacts from other functional categories represent small items, those typically lost in gardens or yards through casual discard or unintentional discard, including:

- miscellaneous hardware elements – padlocks, screws, bolts and wire.
- one child's marble.
- One gun flint, gun cartridges and shot gun shells
- Clothing related items – buttons and buckles
- Personal items –a key, tobacco pipes, pencils and school slates, jewellery parts

Results of functional analysis suggest that this area of the site could have been used for residential activities as well as associated with activities at the Woolpack Inn. Furthermore, some artefacts are most likely resulted from casual or incidental discard activities in the late nineteenth century and early twentieth century when the community was in decline.

Unit 2 Summary

Analysis of artefacts recovered from the top soil layer located at the rear of the Woolpack Inn yielded a wide variety of residential-related artefacts. Results of temporal analysis suggest that the majority of artefacts recovered from the top soil layer at the rear of the Woolpack Inn are contemporaneous with the documented date for the inn. Results of functional analysis are inconclusive and most likely represent a mix of residential, commercial and post abandonment activities.

4.1.2 Unit 3

Unit 3 was located in an area approximately from Squares 238/594 to 240/600 and is the deposit that underlies Unit 2. The Unit 3 assemblage contains 4471 artefacts and 491 MIC. Nearly 50 percent of the artefacts are from two squares – 236/598 and 240/598.

Temporal Analysis

Approximately 63 percent (312) of artefacts provided temporal information. The majority of date specific information was derived from use popularity date ranges and/or documented technological advancements. Most of the use popularity date ranges, such as those for ceramic decorative design techniques, are so broad that they encompass most of the nineteenth century and do little to further refine temporal placement for this deposit. Manufacturers' and product manufacturer's date range served to narrow this date range. There were four marked tobacco pipes (Table 5.3) that collectively provide an adjusted date range of 1839 – 1864. Furthermore, George Whybrow oil / vinegar bottle date from the 1840s. Whybrow was a London oil importer who exported his products world wide by the 1840s until 1910.

Table 4.4 Chronological and Location Information for Tobacco Pipes from Unit 3.

Manufacturer/Merchants	**Country**	Date Range
Hugh Dixson	Australia	1839 - 1904
T. H. White	Scotland	1832 - 1864
McDougall	Scotland	1810-1967

A few other datable items also serve to narrow the date range:

- A vulcanite comb, manufactured by Boot & Co., would have been manufactured after 1843 – the year vulcanite was first patented.
- There are two glass club sauce type stoppers which have an 1840s *TPQ*.
- There are six panelled press-moulded tumblers that have an 1830s *TPQ*.

Results of temporal analysis indicate an 1840s *terminus post quem* for Unit 3. *Terminus anti quem* (*TAQ*) is not easily determined, because items were not used and then immediately discarded. Furthermore, the wide use-popularity date ranges only provide temporal information on when the item was most popular, not its manufacturing date range. Documented manufacturers' and product manufacturers' dates are few, however only one has *TAQ* that extends beyond the first quarter of the twentieth century.

Functional Analysis

Functional analysis classified approximately 80 percent of the assemblage into eight identified groups (Figure 4.2). The majority of artefacts are food related (53.2%), which includes food preparation, service and storage. Also beverage and alcohol related artefacts were classified separately because they have the potential to demonstrate a separate food-consumption pattern (Table 4.5). General observations on food-related items include:

- Food preparation items are a knife blade and haft and the rim of a cast iron cooking pot.
- Food service items include a variety of ceramic and glass tableware, cutlery and serving vessels. Ceramic tableware are refined white earthenware and porcelain and consist of bowls (2), cups (14), plates (13) and saucers (1). Glassware includes tumblers and stemware. The one cutlery item is a 4-tined fork. Also there is one large transfer-printed serving bowl.
- Food storage items consist of condiment bottles and associated stoppers and the lid from a large coarse redware storage vessel.
- Beverage containers are aerated water bottles (9) and one ceramic barrel/water filter vessel.
- The variety of alcohol bottles are typical of a nineteenth century assemblage and include gin/schnapps(9), champagne (16) beer/wine (28) and unspecified alcohol (2).

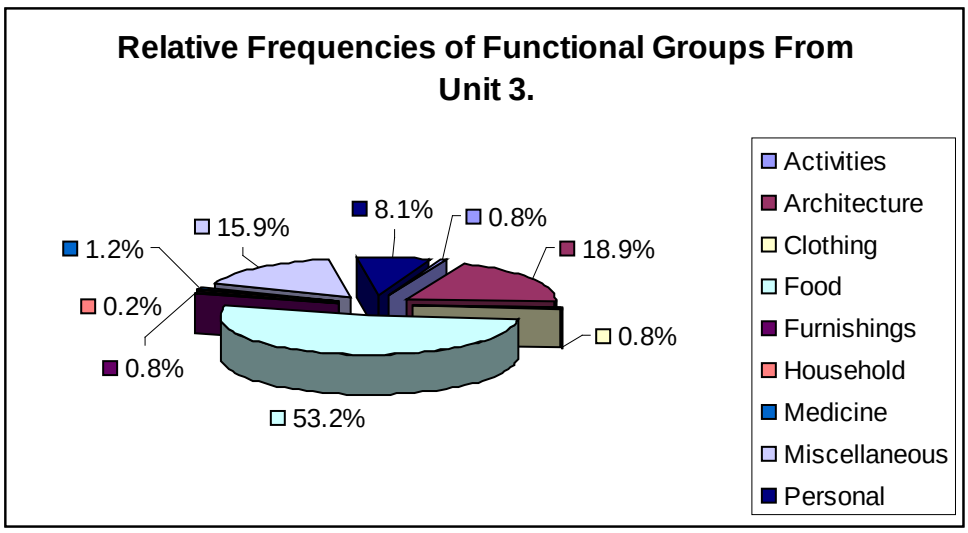


Figure 4.2 Relative Frequencies of Functional Groups From Unit 3.

Table 4.5 Food-related Subcategories from Unit 3	
	MIC
Alcohol	57
Beverage	10
Food preparation	2
Food service	175
Food storage	7
Miscellaneous	10

Architecture-related artefacts (93 MIC) are the second most frequent artefact category in the Unit 3 assemblage. Architectural debris consist of nails (82 MIC), window glass (6 MIC), a cast door latch and fragments of mortar, render and brick. The low relative frequency of window glass could indicate that any associated structure(s) were utilitarian in nature, such as sheds.

Observations on other functional groups include:

- Activities-relate artefacts consist of miscellaneous hardware element and a pair of scissors.
- Clothing-related artefacts consist of fasteners, such as buttons and buckles and one thimble.
- Medicine-related artefacts are all generic bottles used by chemists and for patent and proprietary medicines.
- Personal items include hygiene-related items, tobacco pipes, adornment and pencils. Hygiene items include parts of a tooth paste pot lid (2) (fragments from one lid were also recovered from Units 15, 5, and 18), perfume bottles (3) and chamber pots (3). Personal adornment artefacts consist of one bead and a partial vulcanite ladies hair comb.

Results of functional analysis demonstrate a typical back yard or garden assemblage of artefacts. The architectural debris is indicative of repair or maintenance of a structure. The associated structure was most likely as an auxiliary building, such as a shed. The small finds (buttons, pipes, beads and comb) resulted from casual or unintentional discard.

Ceramic decoration

Over 81 percent of ceramic tableware is decorated in transfer print. For the purpose of this study, transfer-print patterns are included as a possible manner to distinguish individual household assemblages. Willow and Rhine are the two identified transfer-print patterns from Unit 3. Both are common patterns that are frequently found on archaeological sites. However, neither was the dominant pattern from the Woolpack Inn cesspit assemblage (See Unit 41).

Unit 3 Summary

The artefacts from Unit 3 indicate an association with the 1840s to late nineteenth century occupation of the site. Results of functional analysis suggest this area to be a back garden or yard with a typical early to mid-nineteenth century scattered refuse disposal pattern. A study of ceramic decorative designs show a preference for transfer-printed wares, however, the patterns preference differs from that of the Woolpack Inn.

4.1.3 Unit 4

The Unit 4 assemblage contains 4893 artefacts and 362 MICs. This context is thought to be a tree through or possibly a filled in low area approximately 2 x 2 m that extended from 236/598 to 238/600.

Approximately 67 percent of artefacts (224) provided temporal information that contributed to temporal placement of Unit 4. Use-popularity patterning suggests an 1860 to 1900s date range. Manufacturers and product manufacturers' marks also contributed to temporal placement (Table 4.6). Observation on artefacts dated by use popularity patterns include, a 4:1 ratio of cut nails to wire nails indicated that associated structures were constructed between 1810s and 1870 and all glass tableware is press moulded (1830). Date range information from documented manufacturers includes dates for alcohol bottles made by Cooper & Wood, Portobello, Scotland (1859-1928), a tobacco pipe made by McDougall, Glasgow, Scotland (1810-1967), and a ceramic plate made by Ralph Hammersley (& Son), Burslem, England (1860-1905). Results of temporal analysis indicate an 1860s to 1900 date range for this unit.

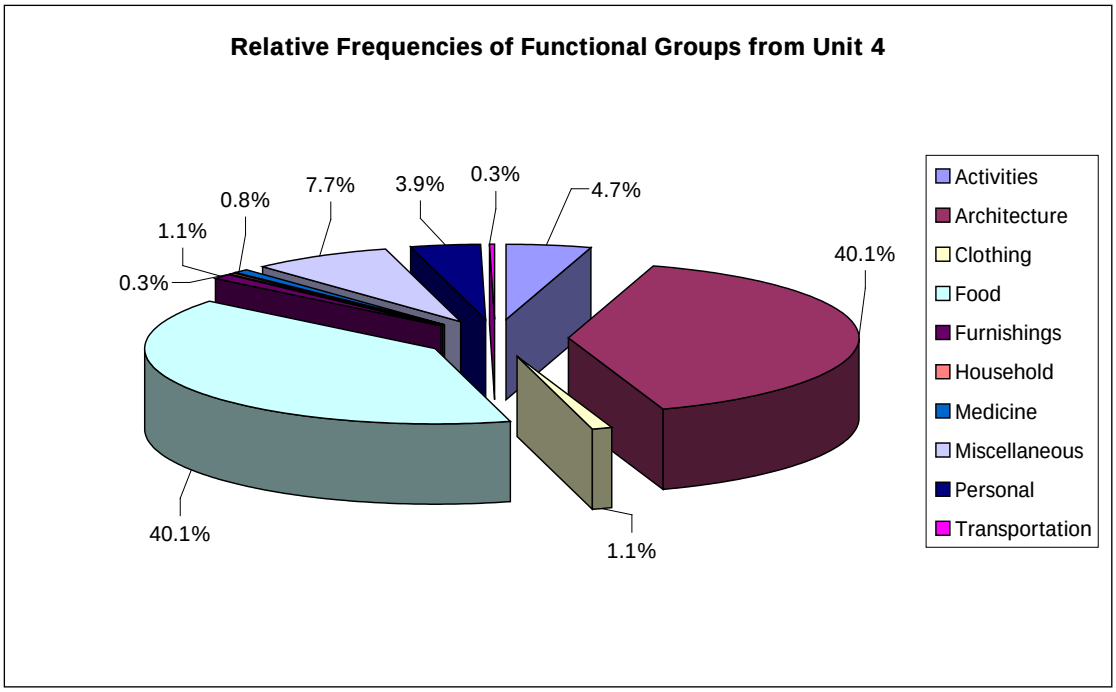
Table 4.6 Chronological Information for Manufacturers from Unit 4.

Shape	Material	Begin Date	End Date	Manufacturer	Country	Qty
Bottle, beer/wine	Glass	1859	1928	Cooper & Wood	Scotland	2
Pipe, tobacco	Ceramic	1810	1967	McDougall	Scotland	1
Plate	Ceramic	1860	1905	Ralph Hammersley	England	1

Functional Analysis

Functional analysis classified 92 percent of the artefacts into nine identified groups (Figure 4.3). For eight percent (28), no function could be assigned. Food-related artefacts represent approximately 40 percent of the Unit 4 assemblage (145) and include food preparation, food service, food storage, alcohol and beverage items. Food service represent the majority of food-related artefacts (58%), including ceramic tableware, such as bowls, cups, plates and saucer, and glass tumblers. The high relative frequency of alcohol bottles and associated drinking vessels, is consistent with document services associated with the Woolpack Inn.

Architectural debris also represents 40 percent of the assemblage, consisting mostly of nails (136). Other architectural elements include a brick, fence staple, render and window glass. The high relative frequency of nails is not uncommon on sites where buildings were dismantled for salvage. Nails are discarded while other materials, such as building stone and brick are recycled.



4.3 Relative Frequencies of Functional Groups from Unit 4.

Observations on other functional groups include:

- Evidence of children is noted by toys (marbles) and school slates
- The presence of a horseshoe nail suggests that horses were present in this backyard area, which might have included a stabling area.
- A hair comb indicates a female presence and tobacco pipes are indicative of male smoking activities.

Results of functional analysis are consistent with a secondary rubbish deposit. The high relative frequency of nails suggests that discarded nails might have been gathered from a demolition area and deposited in this low refuse disposal area. The small finds such as marbles, hair combs and tobacco pipes are easily broken or lost items that typically find their way into rubbish deposits.

Ceramic decoration

Approximately 54 percent of ceramic tableware is decorated in transfer print. Willow, the only identified pattern, represents only 10 percent of transfer-printed wares. Pattern identification for this assemblage was hindered by the fragmentary condition of most vessels. For this reason colour of transfer-print patterns was analysed. Blue was the most common colour (40%) with black a close second in preference (36%).

Unit 4 Summary

The artefacts from Unit 4 indicate an association with the 1860s to 1900 occupation of the site. Results of functional analysis suggest this low area was used as a secondary refuse disposal area. The study of ceramic decorative designs shows a preference for transfer-printed , however, the pattern preference is different from that of the Woolpack Inn [meaning the cess pit collection?].

4.1.4 Unit 5

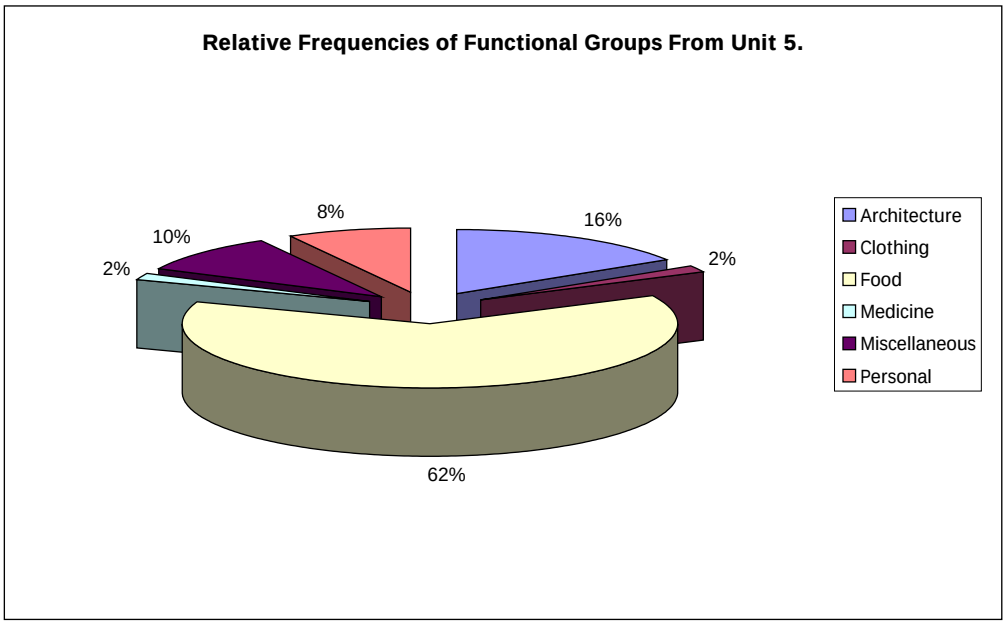
The Unit 5 assemblage contains 929 artefacts and 62 MICs. It is located from Squares 236/594 to 238/598 and is a crumbly mid-brown soil that is visually distinct from the surrounding units 2 and 3. It occurred as a localised patch of material extending about 3 metres across. It overlies or, more correctly, sits within Unit 2. It includes a noticeably high proportion of pieces of sandstock brick and charcoal in the matrix. It is interpreted as an introduced deposit [?secodary refuse] that was dumped to fill in an uneven depression in the soil surface. It does not appear to have a substantial depth. Approximately 92 percent of the artefacts were recovered from Square 238/598.

Temporal Analysis

Sixty-eight percent of the assemblage provided date specific information that contributed to temporal placement. Dates were derived from documented use-popularity date ranges based on manufacturers records. No manufacturers or product manufacturers' marks were evidenced in this assemblage, which in itself provide information, especially in regards to the bottle from this unit. It was not until the mid-nineteenth century that the practice of product and manufacturer embossments on commercial containers became common. Sixty-seven percent of datable artefacts had an 1820s TPQ. These items were alcohol bottles and refined white earthenwares. Press glass tableware (1830) also contributed to temporal placement All nails were cut (1780s –1860s), suggesting that associated structures were constructed prior to 1860. The paucity of specifically datable artefacts precluded in depth temporal analysis, however an 1830s to 1860s indicative date range is suggested for the deposit.

Functional Analysis

Functional analysis classified 90 precent of the assemblage into five identified groups (Figure 4.4). The majority of artefacts are food related (62%), which includes alcohol, food service and food storage items. Food-service items represent 39 percent of all artefacts from Unit 5. While individual food-service vessels (ceramic and glass) are the most numerous, all are too fragmentary for vessel form identification. The only identified food-service items are a table fork and a ceramic serving bowl. Alcohol bottles consist of beer/wine, champagne type, gin/schnapps and unspecified shapes. Food storage consisted of condiment bottles.



4.4 Relative Frequencies of Functional Groups From Unit 5.

Observations on other functional groups are as follows:

- All architectural elements were cut nails
- The one clothing items is a shoe part
- One toothpaste pot lid represents the Personal hygiene items
- There is a castor oil bottle in the Medicine category.
- One of the four bowl/stem tobacco pipe fragments was embossed with a thistle pattern

Results of functional analysis suggest the assemblage are associated primarily with food-service activities and possibly resulted from a household kitchen.

Ceramic decoration

All but one ceramic tableware vessel was decorated in transfer print (20). For the purpose of this study, transfer-print patterns are included as a possible manner to distinguish individual household assemblages. As previously mentioned ceramic vessels were too fragmented to identify form. They were also too fragmented to identify pattern. It should be noted that Willow is a highly recognisable pattern, even when fragmented, therefore it is certain that none was in this assemblage. All ceramic transfer-prints are blue (including flow blue). The dominance of blue transfer print in this unit suggests that it was not associated with of the other backyard and garden deposits.

Unit 5 Summary

Unit 5 appears to be a discrete deposit of 1830s to 1860s artefacts. Use-interpretation analysis suggests that the deposit resulted from food-related activities. Special analysis of ceramic vessels indicates that this deposit differs from neighbouring deposits, leading to the interpretation that this deposit was not associated with the Woolpack Inn.

4.1.5 Unit 15

Unit 15 is a burned tree throw. Since only two artefacts were burned, it is most likely that they were not associated with the burning of the tree. It was located in an area approximately from Squares 236/596 to 240/600. There are 8095 artefacts comprising 583 MICs in the Unit 15 assemblage.

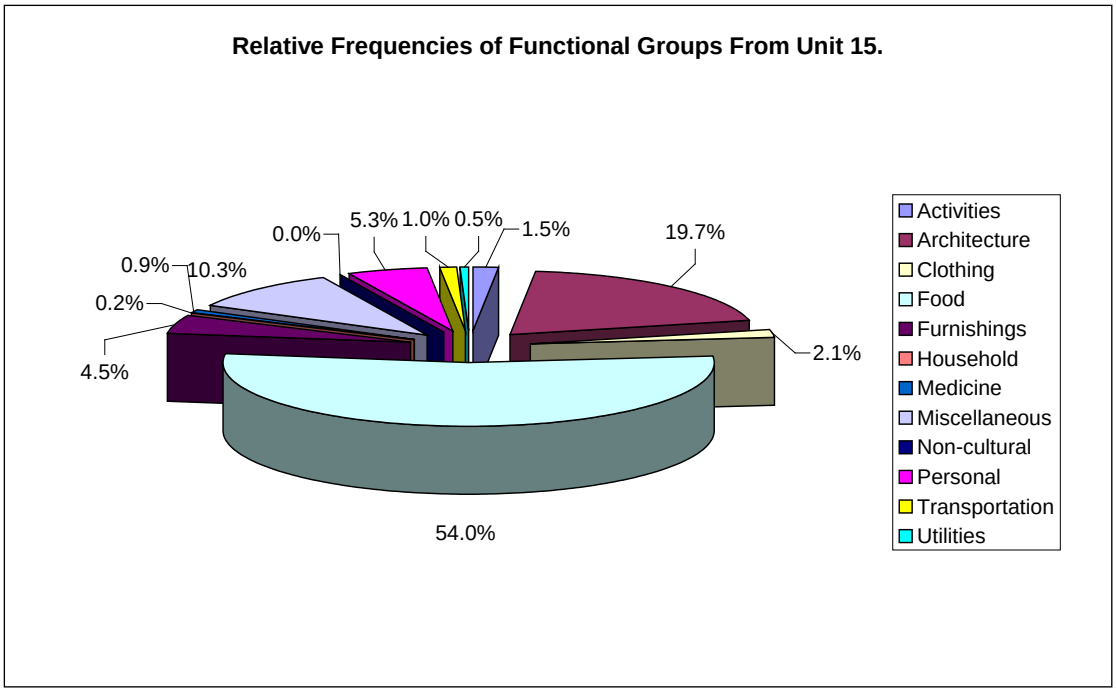
Temporal Analysis

Approximately 62 percent of the assemblage (364) provided information used in temporal placement for this deposit. Use-popularity pattern suggests an 1850s to 1880s date range. There is a shilling coin stamped 1835, bearing the image of William IV. A manufacturer's and a product manufacturer's documented dates also contributed to temporal placement. There is one Gosnell's toothpaste pot, with the profile of Queen Victoria. While Gosnell's has been in business since 1677, the Queen's image would have been used only after 1837. The firmest date for this assemblage comes from a marked ceramic plate made by Ralph Malkin, Fenton, England, that operated between 1863 and 1881. Also contributing to temporal placement is wire drawn nails, exclusively recovered from this deposit and which were not in common use in Australia until after 1860. Therefore, results of temporal analysis indicate an 1860s to 1880s date range for the deposit.

Functional Analysis

Functional analysis classified approximately 90 percent of the assemblage into ten identified groups (Figure 4.5). For ten percent no use could be determined. Food-related items represent 54 percent of the assemblage (315). And include beverage (alcohol and soft drink), preparation, service and storage items. Food-service items represent the majority (221) of food-related artefacts, including individual place service of ceramic and glass tableware, as well a large service vessel (teapot). The relative frequency of beverage bottles (69), in particular the alcohol bottles (58), is consistent with that of a household assemblage.

Architectural debris consists primarily of hardware fasteners, such as nails, screws and fence staples. A sample of bricks was also retained. The high relative frequency of nails (105) is not uncommon on sites where buildings were razed. While other building materials, such as cut stone and bricks were salvage for reuse, nails were discarded.



4.5 Relative Frequencies of Functional Groups From Unit 15.

The small finds in this assemblage provided significant information towards interpretation of use. Many are small personal items such as a jew's harp, hair combs, a jewellery part, a school slate and tobacco pipes that reflect day-to-day activities. There are clothing fasteners, such as buckles and buttons. In the variety of buttons most are common four-hole sew through trouser buttons. Of note is one button stamped HYAM & Co / 86 OXFORD ST - a suit company from London from the mid to late 19th century. A black button with ornate moulding suggests the wearer followed the fashion trend established by Queen Victoria after the death of Prince Albert in 1861. Castor oil bottles give insight into the health concerns of the site's occupants. There are a variety of hygiene items including combs, toothpaste pot lids and chamber pots that demonstrate a sophisticated concern for hygiene in this frontier community.

Results of functional analysis indicate a typical household assemblage. Items in the assemblage suggest that the individuals associated with this deposit were literate, well dressed individuals that were particular about their appearance and hygiene. They followed the latest fashion trends, wore imported clothing and were concerned about their hygiene and health.

Ceramic decoration

Approximately 80 percent of ceramic tableware is transfer-print decorated. There are five identified patterns, with Willow and Rhine patterns comprising the majority of identified patterns. Other patterns include Albion, Blond, and Cable. Since some units in this study have few or no identified patterns, due to fragmentation, colour is also included in this analysis. Blue is by far the most common colour for transfer-printed wares (97) followed by green (26), black (15), brown (8), purple (8), grey (1) and red (1). These statistics will be used later in this discussion in a comparison of backyard deposits.

4.1.6 Unit 41

Unit 41 represents the artefacts deposited within a structure interpreted to be a cesspit or privy (Unit 32) at the rear of the Woolpack Inn. Cesspits are often the recipients of accidental lost items, casually discarded items and intentional discard. While this cesspit most like contained items that were accidentally lost or casually discard, the highest relative frequency of complete (23%) and

near-complete (20%) artefacts suggests that the majority of the 3718 artefacts (661 MIC) were most likely deposited as part of a clean up process at some point after the Woolpack Inn was closed and the structure was abandoned. While the manner of deposition precludes analysis of the assemblage through time, high relative frequencies of recognisable forms (92%) and datable artefacts (63%) allow for more accurate accounting of the inn's activities.

Temporal Analysis

Approximately 63 percent of the assemblage contributed to temporal placement of the cesspit deposit (415). Firstly, there is the wide and varying range of use-popularity dates for ceramic types, late eighteenth-century pearlware to mid-nineteenth century graniteware. Most of the use popularity date ranges, such as those for ceramic decorative design techniques, are so broad that they encompass most of the nineteenth century and do little to further refine temporal placement for this deposit. Documented technological advancements in bottle glass have date ranges from the 1820s to the 1850s. The majority of nails (98%) are cut, which was the preferred construction fastener until the 1860s.

Dates for manufacturers (Table 4.7) and product manufacturers and distributors (Table 4.8) provided information that served to narrow the date range for this deposit. Documented information was established for bottle, ceramic tableware, tobacco pipe and ammunition manufacturers. Similarly, product manufacturers for bottles and jars were identified and dated, often through documented advertisements when company information is unavailable. Finally, there was one product distributor, who was a Sydney tobacco pipes merchant.

Table 4.7 Documented Manufactures for Artefacts from the Woolpack Cesspit (Unit 41)

Shape	Manufacturer	Country	Begin Date	End Date	MIC
Bottle, beer/wine	Cannington Shaw & Co.	England	1875	1915	1
Bottle, beer/wine	Cooper & Wood	Scotland	1859	1928	2
Bottle, beer/wine	H. Rickett	England	1820	1920	1
Bottle, beer/wine	R. Cooper & Co,	Scotland	1868	1928	3
Bottle, castor oil	York City Glass Co.	England	1860	1900	1
Bottle, medicine	York City Glass Co.	England	1860	1900	1
Bottle, stout	Port Dundas Pottery Co.	Scotland	1850s	1932	1
Dish cover	Copeland Late Spode	England	1850	1867	1
Pipe, tobacco	Charles Crop	England	1856	1924	1
Pipe, tobacco	McDougall	Scotland	1810	1967	3
Pipe, tobacco	Thomas White	Scotland	1832	1864	1
Pipe, tobacco	William Murray	Scotland	1830	1861	1
Plate	Francis Morley (& Co.)	England	1845	1858	11
Plate	Ralph Malkin	England	1863	1881	1
Plate, small	Francis Morley (& Co.)	England	1845	1858	1
Platter	J R Ridgway	England	1841	1855	1
Platter	Mellon & Venables & Co.	England	1834	1851	1

Table 4.7 Documented Manufactures for Artefacts from the Woolpack Cesspit (Unit 41)					
Shape	**Manufacturer**	**Country**	**Begin Date**	**End Date**	**MIC**
Platter	Reed & Taylor	England	1840	1856	1
Saucer	Alfred Shephard & Co.	England	1864	1870	1
Shotgun shell	Union Metalic Cartridge Co.	USA	1867		1

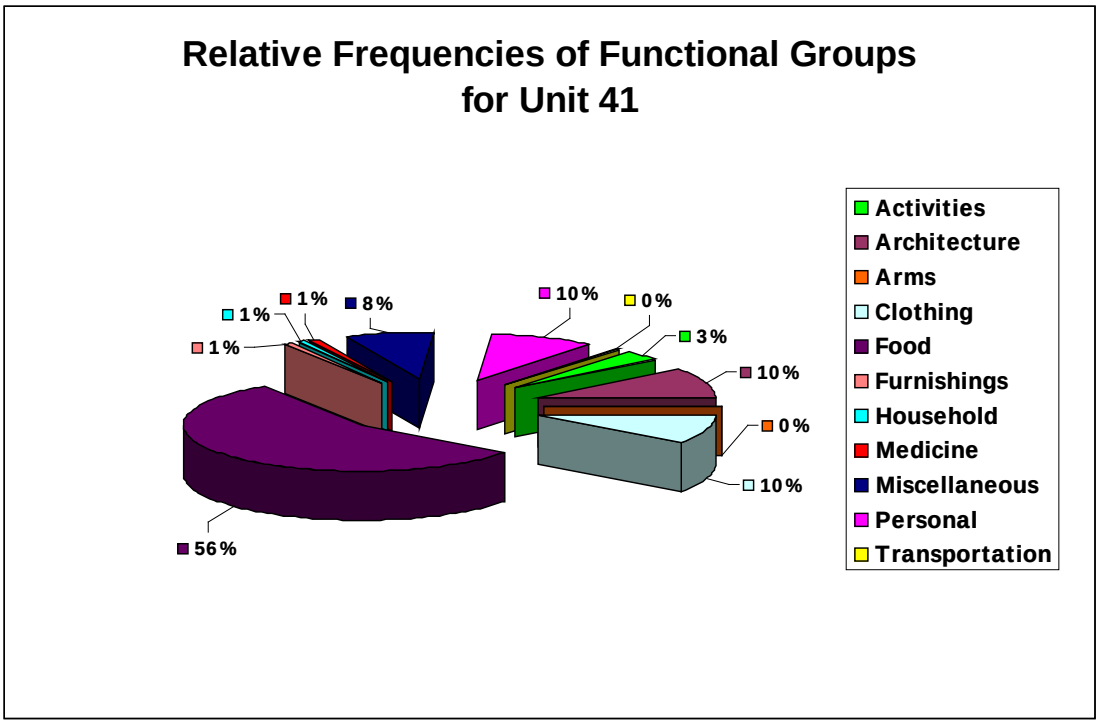
Table 4.8 Product Manufacturers for Artefacts from the Woolpack Inn Cesspit (Unit 41)					
Shape	**Product Manufacturer**	**Country**	**Begin Date**	**End Date**	**MIC**
Bottle, aerated water	J. H. Schweppe & Co.	Australia	1884	1920	1
Bottle, schnapps	Udolpho Wolfe's Aromatic Schnapps	Netherlands	1848	–	2
Pipe, tobacco	Hugh Dixson	Australia	1839	1904	2
Ointment pot lid	Josephson's Ointment	Australia	1866	1900	1

Document ceramic manufacturers' marks have an 1834 – 1870s date range and glass bottles manufacturers' information indicates an 1860 –1928 date range. Marked tobacco pipes suggest an 1830 *TPQ*. Dates for product manufacturers produced an 1848 – 1920 date range.

Results of temporal analysis suggest that artefacts deposited in the Woolpack Inn cesspit represent the 1830s – 1880s for this assemblage.

Functional Analysis

Unit 41's artefacts consist of 95 distinct shapes that are classified into ten identified functional groups (Figure 4.1). For eight percent of Unit 41's assemblage (53), no function could be assigned.



4.6 Functional Representation of Artefacts from Unit 41.

Food

Food-related artefacts represent 56% of the Unit 41 assemblage including food preparation, food service and food storage items.

Table 4.9 Food Group Subcategories

Function	Qty
Alcohol	145
Beverage	28
Food preparation	2
Food service	150
Food storage	35
Miscellaneous	10

There are 150 food service artefacts, but only two food preparation items – an European milk pan and an English cooking pot. There are several large serving ceramic serving vessels that are indicative of a commercial kitchen.

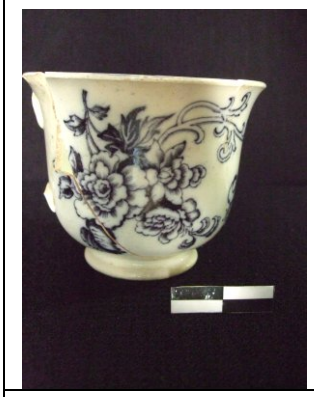
Alcohol-related artefacts consist of bottles, including beer/wine (75), champagne type (37), gin/schnapps (16), stout (4), a flask and unspecified alcohol bottles (9). Beverage bottles are mostly

aerated water bottles (25). There are also one stoneware ginger beer bottle and two bottles that are thought to be either alcohol or beverage containers. One aerated water bottle has a product embossment from J. H. Schweppe & Co, Sydney (1884 – 1930).

Food service items include 22 different ceramic and glass vessel forms. The majority of these items are ceramic individual service vessels such as cups (27), plates (41), bowls (18), etc. (Figure 4.7). Glass individual service items tumblers (2), stemware (4) and one open dish. The majority of ceramic vessels are refined white earthenware, including whiteware (87), pearlware (34) and graniteware (2). There are also nine porcelain items including plates (3), a cup, an egg cup and unspecified vessels (4). Transfer-printed wares are the most abundant in the food-service sub-assemblage, representing 75 percent (101) of all food service items. Within the assemblage there are 11 identified transfer-printed or flow black transfer-printed patterns. The most common pattern is a flow black pattern called Aliwal, which might have been designed to commemorate the 1846 Battle of Aliwal between the British and the Sikhs during the First Anglo-Sikh War, in which the South Staffordshire Regiment fought. A very similar pattern to this is Claredon. Other patterns include Willow, Wreath, Rhine, Blonde, Vienna, Pevane, Medici, Duncan Scenes, Chantilly, Cable, Byzantium and Beforte Castle.

There are also a number of large serving vessels, including platters, bowls, and jugs (see Figure??). Similar to individual service pieces, the majority of large service vessels are transfer printed. There is no predominant pattern among the large service pieces. They are decorated in Willow, Rhine, Medici and Duncan Scenes (or Priscilla Alden). While flow black appears to be the preferred tableware setting, the service pieces are blue, in patterns such as Willow and a triad of similar patterns – Rhine, Medici and Chantilly, which had in common scrolling vines on their rims.

The Duncan Scenes dish cover is an exceptionally-fine quality Copeland (Late Spode) item. The centre scenes in this series of rural scene are derived from watercolours by Edward Duncan, which were commissioned in 1849 by W. T. Copeland which inspired an extensive range of tableware that were registered the following year.[48] This same piece is part of a table setting on display at the Skaill House, the property of a laird on Orkney, near Skara Brae in Scotland.[49]

	
Claredon Pattern Flow Black Transfer-printed Cup	**Press-moulded Open Dish**

[48] Sussman 1979, p179.

[49] Winnett 2008 personal communication

	
Painted Porcelain Egg Cup	**Aliwal Pattern Flow Black Tranfer-printed Plate**
	
Rhine Pattern Transfer-printed Cup	**Willow Pattern, Transfer-printed Plate**

Figure 4.7 Examples of Individual Food Service Tableware from the Woolpack Inn Cesspit (Unit 41).

	
Copeland (Late Spode) Dish Cover	**Sprigged Decorated Jug**
	

Medici Pattern Platter	Rhine Pattern Service Bowl

Figure 4.8 Examples of Large Service Vessels from the Woolpack Inn Cesspit (Unit 41).

Food storage items consist of condiment bottles (18), associated stoppers(7) and tin cans (9). Condiment bottles are for oil/vinegar and pickle/chutney, all of which were typical condiments associated with "pub" meals.[50]

Observations on other functional class is as follows:

Architecture - Architectural debris (69) consists mostly of metal fastener hardware, such as nails (50), hinges (4), brackets (2) and spikes (2). Window glass (9) was also recovered from the cesspit. This range of artefacts is typically associated with repairs and maintenance of a structure.

Personal - Personal items (63) include a variety of writing, smoking and hygiene items. Writing related items consist of slate and graphite pencils (21) a lined school slate and an ink bottle. There are 29 ball clay (kaolin) pipes. Personal hygiene items consist of combs, a perfume bottle and a chamber pot.

Clothing – Clothing- related items consist of lost or discard clothing fasteners, such as buttons, buckles and hook & eyes, as well as a shoe and a pair of ladies sewing scissors.

Furnishings - Furnishing (5) consist of hardware elements such as a drawer pull, curtain hook, bed part, box nail and padlock.

Household – Household items are garden accessories (hoe and flower pot) and two vases, which collectively suggest these elements are associated with someone flower garden.

Arms – A metal powder flask and a shot gun shell . The metal powder flask was common after 1830. The shot gun shell was manufactured by Union Metallic Cartridge Co - Bridgeport, USA (1867).

Medicine – The majority of medicine-related items are generic bottles used by chemist and manufacturers of patent and proprietary medicines. One bottle, identified by shape and colour, is a castor oil bottle. There is also one ointment pot lid for Sydney chemist Josephson's Australian Ointment (for burns, chaffing and chapped hands).

Figure 4.9 1830s Metal Powder Flask.

[50] Coroneos et al 2001

There are numerous items in this assemblage that demonstrate its associations with the Woolpack Inn. These items form a pattern that has been noted in previous studies. These studies of typical late nineteenth-century hotel/ pub assemblages[51] created a model for typical hotel/pub assemblages (Table 4.10). The majority of these results was evidenced in the cesspit assemblage. One factor does not fit this model. The majority of ceramic tableware vessels from the cesspit were decorated. At first it was thought that this difference may be a temporal factor, since the other studies were conducted with late nineteenth-century assemblages. However, the overall high quality of these wares suggests that it is more likely that the Woolpack Inn was more than just a rural hotel. It would have catered to all classes of travellers and one would expect the in to have tableware appropriate for business travellers, merchants, etc. As such, the owner/publican would have made an effort to serve his patrons only the best and on the best table service he could provide.

Table 4.10 Model for Typical Hotel/pub Artefact Assemblages

High relative frequencies	Low Relative Frequencies
Alcohol bottles	Medicine bottles
Tobacco pipes	Personal-related items
Condiment bottles	Clothing-related items
Food remains	Furnishings and ornamentals
Undecorated ceramics	Juvenile-related items

Results of functional analysis indicate that artefacts from the cesspit represent refuse from the Woolpack Inn. The number and variety of large service vessels indicate a commercial dining facility. High relative frequencies of a number of artefact classes are typical of hotel/pub assemblages, as are the paucity of other artefact classes.

The high quality ware is consistent with other evidence that the publican, Joseph Peters, was aiming to cater, where possible, for important social figures such as major landowners and members of the squattocracy, as well as more regular local and travelling clientele. Presumably having high quality dinner sets reserved for important guests was part of serving that need and differentiating himself from the other inns in town.

Analysis Results for Unit 41 – The Woolpack Inn Cesspit

Temporal analysis results suggest that artefacts in the Woolpack Inn cesspit represent a 50 year period of time between 1830s and 1880s. Functional analysis results indicate that that the contents of the cesspit fit the results of a model created for studies of hotel and pub assemblages.

4.1.7 Discussion – Woolpack Inn Backyard, Garden and Cesspit

One of the main focuses of the artefact analysis was to determine the origin of the materials recovered from the cesspit located at the rear of the Woolpack Inn. The fact that the cesspit was directly associated with the inn did not necessarily mean that the rubbish (Unit 41) deposited in the cesspit was also associated with the inn. Results of temporal and functional analyses determined that the rubbish deposited in the cesspit. What follows here is a comparative analysis of surrounding contexts, discussing similarities and dissimilarities to Unit 41 and determining if these

[51] Coroneos et al. p 186, Blee, 1991

contexts represented areas of activity associated with the inn or if they represented other occupational activities in Marulan.

Comparative Temporal Analysis

The Woolpack Inn was built by Joseph Peters in 1835. By the early 1860s the inn was no longer in operation, and as the 1863-64 census rolls indicate Peter was no longer lived in Marulan. Temporal analysis of the cesspit deposit established an 1830s to 1880s date range for materials contained within.

Results of temporal analysis for Unit 2, Unit 5 and Unit 15 produced similar results, suggesting that like the cesspit these deposits represent refuse from the time period in which Marulan was an active and growing community. Unit 3 represents an backyard or garden deposit and while this deposit underlies Unit 2, it suggested a wider date range extending from 1840 to 1900, however, it should be noted that the end date for this occupation could not be firmly fixed due to the late of a firm *terminus anti quem* for any artefact other than one tobacco pipe that has an 1864 terminus anti quem. Unit 4 is a tree through or filled low area and the artefacts recovered from this deposit post date Marulan's main occupation.

Functional Analysis

Artefacts in the cesspit are for the most part consistent with studies of hotel/pub assemblages. There are a number of large serving vessels, including platters and tureens. The one exception is the high relative frequency of decorated ceramics. However, there is a high relative frequency of decorated ceramics, especially transfer printed wares for all of the Marulan deposits.

Unit 2's back yard deposit represents a mix of residential and inn-related artefacts, while the underlying deposit (Unit 3) is appears to be solely associated with a back yard activities with back yard refuse disposal pattern common before the advent of systematic rubbish collection introduced when the sanitation and health problems were recognized in the mid-to-late nineteenth century. The localised deposit (Unit 5) near Units 2 and 3 consists mostly of food-service items comparable to those in the cesspit.

The fill of the depression or tree through (Unit 4) is secondary deposition with architectural debris representing a major percentage of the assemblage.

Unit 15 is typical household rubbish. The functional diversity represented in nine identified groups is consistent with a residential setting as demonstrated by small finds – a musical instrument, jewellery part, hair comb, clothing fasteners, buttons, school slates and tobacco pipes.

Comparative Ceramic decoration

Nineteenth-century Australians loved their transfer-printed tableware, and Staffordshire potters readily supplied the colony with all manner of patterns, colours and quality wares. Patterns such as Willow, Asiatic Pheasant and Rhine were among the most popular patterns worldwide, however, it should be noted that the concept of matched sets is widely accepted as an invention of the mail-order catalogue industry that got its start in the late-nineteenth century. Prior to that time the consumer was limited by what the market provided and purchases were made on the basis of similarity of pattern and colour. A consumer might purchase an initial set of tableware, components of which may or may not have been of the same pattern. For example the plates and cups may have been Rhine pattern, while the saucers and bowls were the very similar Chantilly pattern. Quite often when replacement pieces were required neither pattern was available, at which point the colour became the principal factor in consumer choice.

Basically, the cost of ceramic tableware depended on two factors – the ware and the decoration and the level of effort to produce each. Simple transfer-printed earthenware table service is often considered to be a moderately expensive decoration, ranking above annual banded and sponge decorated and ranking below flow coloured transfer-printed and painted table service. However, there are several other factors to consider in the economic scaling of transfer-printed ceramics recovered from Marulan. By the 1830s, Willow pattern was considered the least expensive of all transfer-print patterns.[52] Furthermore, the quality of the craftsmanship also effected the cost.

During the cataloguing stage of this analysis, notations were made on indicators of low quality transfer-printed wares. These indicators include mismatch or pieced patterns, blurs and smudges. While the number of low quality items is only about four percent for the site at large, that percentage varies in different contexts.

For this study analysis of the transfer-printed table service from the cesspit (Unit 41) is discussed first and the table service from other contexts are compared to distinguish any similarities or differences that might denote association with the Woolpack Inn. There are 100 transfer-printed (88) or flow black (12) tableware vessels from the cesspit. There are 11 identified transfer-printed patterns, which will be discussed below.

- Willow and Rhine are the most common transfer-printed patterns. These two pattern also make up the majority of large serving vessels, such as platters and large bowls. There is one platter in the Medici pattern, a pattern very similar in rim decoration to Rhine. Another large serving piece is dish cover in the one of Copeland Spode's *Duncan Scene* patterns. This piece is the highest quality of any piece in the entire site assemblage. All flow black vessels are the Aliwal pattern and all Aliwal vessels are plates and small plates. Very similar to Aliwal is Claredon, a black transfer-printed pattern that is only found on saucers.

- Transfer-printed vessels came in a variety of colours (6). Blue is the most common colour (40) followed by black (30). While blue, black, brown, green and grey print was used on a variety of individual table service and large serving vessels, red/purple print was found only on small bowls.

- Eight percent of the cesspit printed vessels are noted as low quality

The top soil layer in the rear garden of the Woolpack Inn (Unit 2) yielded 305 printed vessels, including 273 transfer-printed, 12 flow black and 20 flow blue vessels. There are five pattern and like the cesspit Willow and Rhine are most abundant patterns. While flow black and flow blue were recovered from the top soil layer, most were too fragmented to determine vessel form beyond basic notations of hollow or flat. The variety of colours is similar to that observed for items from the cesspit. Only two percent of transfer-printed vessels are identified as low quality.

In the deposit underlying the top soil layer in the rear garden (Unit 3) there are 137 printed vessels, including 104 transfer-printed, 19 flow black and 14 flow blue vessels. Willow and Rhine are the only identified patterns. No patterns are identified flow decorated vessels. As with the top soil layer, the variety of colours is similar to observed results for the cesspit. Only two vessels (1.4%) are identified as low quality

The filled low area adjacent to the rear garden (Unit 4) yielded 45 printed vessels. Willow is the only identified pattern. The variety of colours is different in that no grey transfer-printed vessels

[52] Miller 1980, p 28

were recovered. Grey is most commonly associated with Rhine in this site's assemblage and the absence of both the pattern and the colour is indicative of a difference in the deposit in comparison to the cesspit and rear garden deposits. However, like those contexts blue is the most common colour with black a close second. The only low quality vessels noted are printed Willow vessels.

In the rear garden there is a localised deposit of crumbly soil (Unit 5) that is distinct from the surrounding deposits (Units 2 and 3). All but one talbeware items are printed (20) – 18 transfer-printed and two flow blue vessels. Due to fragmentation no patterns were recognized – not even Willow. All transfer print is blue and no low quality vessels were noted.

The burned tree throw (Unit 15) yielded 161 printed vessels - 136 transfer-printed, four flow black and 21 flow blue vessels. There are five identified patterns with Willow and Rhine representing the majority. No pattern was identified for flow blue or black. Here again a variety of printed colours are noted and again blue is the most common colour for transfer printed vessels. Low quality printed vessels represent approximately 3 percent of printed vessels.

Summary

The deposits in cesspit, rear garden deposits of the Woolpack Inn (Units 2, 3, 5) and the burned tree throw (Unit 15) are all contemporaneous with the main occupation of Marulan. Ceramic pattern analysis indicates that sheet midden areas (Unit 2 and Unit 3) were associated with the inn. These deposits represent distinct activity areas within the Woolpack Inn property. Items in the cesspit generally represent large used, broken and/or discard items associated with food-service at the Inn. The completeness of the ceramic vessels allows for interpretation of what manner of table service was used at the inn. The rear garden deposits denote the scatter refuse disposal of smaller items, as was the practice at the time. A localised area might have been a favourite dumping spot for the inn's kitchen rubbish or possibly its sweepings, which can explain the fragmentation of ceramic vessels.

While the artefacts recovered from the burned tree throw are contemporaneous with the main occupation of Marulan, its association with the Woolpack Inn is not confirmed. The dominant printed tableware patterns are the same, but the small finds and variety of functional representation may serve to indicate that this rubbish resulted from the Peters' household rather than the inn itself.

The low filled area (Unit 4), which post dates Marulan's main occupation. The high relative frequency of architectural debris suggests it is secondary deposition of some nature. The distinct differences between decorated ceramic vessels from this context and those other in the vicinity indicate that the table service was not the same and that the artefacts in this context, which again indicates its disassociation with the inn.

4.2 Unit 45

Unit 45 is rubbly deposit that is part of an unidentified feature that contains a mixture of stones brought to the site, evidence of burning or dumping of greasy residues and other activities. Artefacts are mixed throughout with a matrix of charcoal fragments. Unit 45 contained 1904 artefacts and 215 MICs.

Temporal Analysis

Sixty-two (62) percent of artefacts (133) provided temporal information that contributed to temporal placement of Unit 45. Use-popularity patterning imply a late-1820s *TPQ* and an 1860s *TAQ*, which is based of data provided from artefacts such as transfer-printed whiteware (1828+), yelloware (1830s-1900), cut nails (1770s-1860s), centrally knopped stemware (1850s+) and finish-forming tooled bottles (1820s-1920s). The only directly dated artefact in the Unit 45 assemblage is a 1799 English farthing and because coins can remain in circulation for decades, this date does little to

contribute to temporal placement for the context. No artefacts are marked with product labelling.[53] There are six wire-drawn nails in the assemblage that have an 1870s *TPQ*, however, the 11:1 ratio of cut to wire-drawn nails indicates that the structure associated with this context was constructed during the first three quarters of the nineteenth century and that the wire-drawn nails represent late-nineteenth century maintenance or repair to a possible associated structure. Also there is one soft mud, sand stock brick with a depth of only 60mm. These combined attributes are characteristic of early colonial bricks made until 1840s. This brick is distinct from the 'handsome' bricks made for the Woolpack in cesspit.

Results of temporal analysis indicate that Unit 45 is associated with early occupation of the site with a proposed 1830s –1860s date range, which coincides with the main period of Marulan's occupation as a township.

[53] Product labelling, such as embossments for bottles, did not become common until the 1850s when technological advancements made such labelling practical and affordable for the majority of product manufacturers.

Functional Analysis

Functional analysis classified approximately 94 percent of the assemblage into seven identified groups (Figure 4.10). For six percent no use could be determined. While the context had a high concentration of charcoal, less than three percent of the artefacts (6) exhibit any signs of heat alteration or burning. None of the nails exhibit evidence of heat alteration, which indicates that any associated structure(s) was not burned.

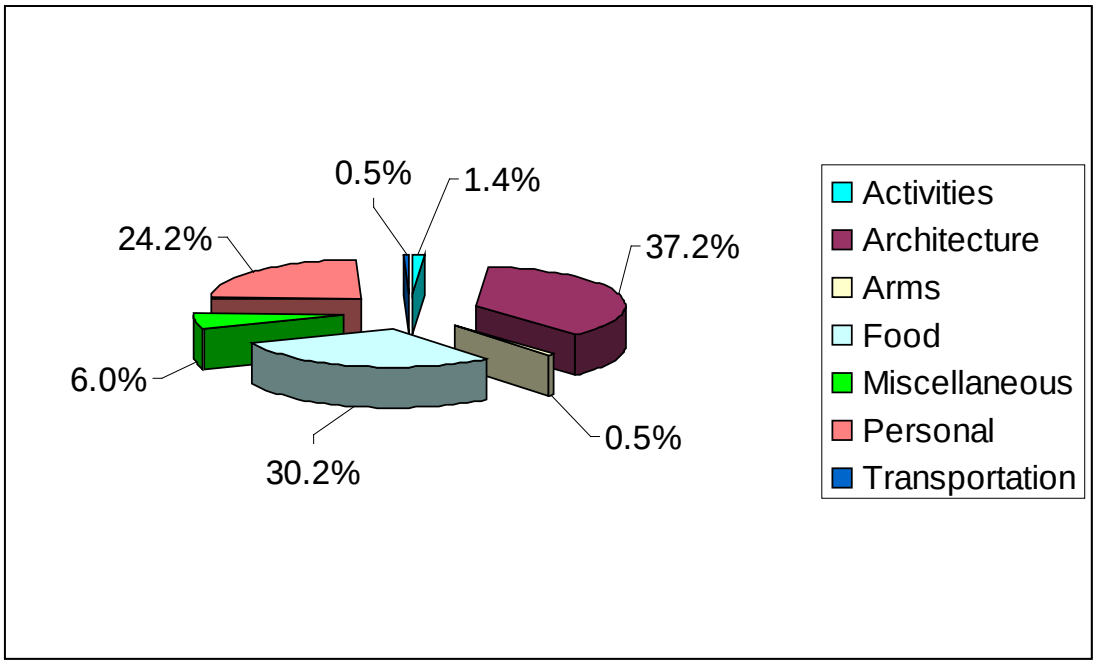


Figure 4.10 Relative Frequencies of Functional Groups for Unit 45.

One possible theory for the use of [45] was as an area where refuse from the inn was burned. This seems unlikely given the lack of evidence of burning of the artefacts. The assemblage also appears to differ significantly from the inn in both the frequency of different artefact categories and the types represented.

The artefacts from Unit 45 are an unusual grouping in that the majority are nails (73), food-service ceramic vessels (36) and tobacco pipes (46), which collectively represent 72 percent of the assemblage. Nails represent the majority of architectural debris. Other architectural elements include paving cobbles, a brick, window glass and a fence staple.

Food-related item consist of a variety of ceramic vessel forms, such as bowls, plates, saucers, a jug, a tureen, and an egg cup. Other food-service items include glass stemware and tumblers. There are 12 beer/wine bottles, a decanter and a foil bottle seal, as well as remnants of a cast iron cook pot.

The small finds serve to provide insight about the occupants context, lot or site. In the Unit 45 assemblage these items include children's toy dishes, a coin, jewellery – evidenced by beads and gemstones, and tobacco pipes, indicating that there were men, women and children associated with this unit. The relative high frequency of tobacco pipes is unusual. There were 428 ball clay pipe fragments, which represent an estimated 46 MIC. What is even more unusual is that not one of pipe bore a manufacturer's mark.

The Unit 45 assemblage does not appear to be an accumulation of rubbish. Rather it appears to be a deliberate deposition, possibly a secondary deposition, of residential rubbish possibly from the clean out of a structure when tenants or ownership changed. There is no other ready explanation for the high relative frequency of ball clay tobacco pipes. It is as if someone had a container in which they deposited all of their old pipes and the contents of that container were subsequently empty into a rubbish hole or depression. Similarly, the cut nails are 75 – 100 percent complete. While finding complete nails is not uncommon, the high relative frequency of complete or near complete nails could be indicative of a container of nails, possible recycled, that like the tobacco pipes were discarded in one episode.

4.3 Post Holes

A series of small features were excavated across the western extent of the site. Circular in profile, many of these features were postholes associated with nineteenth century structure in Old Marulan. Twelve feature yielded artefacts and as Table 5.10 shows the majority of datable artefacts have 1820-1830 TPQs. The majority of artefacts are food-related items, such as alcohol and condiment bottles, and ceramic vessels.

Table 4.11 Counts and Chronological Data for Artefacts from Post-hole Features.

North	East	Unit	Qty	MIC	Begin Date	End Date
380	600	124	7	2		
370	600	126	7	3	1868	1928
370	600	134	3	2	1830	1890
380	590	139	1	1		
380	590	140	1	1		
300	610	240	3	2		
290	610	249	6	4	1820	
300	600	261	3	3		
280	590	319	3	3	1850s	
290	600	322	3	2	1820	
300	600	323	11	8	1830	1900
280	600	327	8	3		

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6.0 Appendix One

6.1 Summary Data for All Contexts

North	East	Unit	Qty	MIC	Begin Date	End Date
0772976	6152846		1	1		
0773012	615287		4	3		
0773013	6152865		1	1		
0773019	6152875		3	1		
0773022	6152875		1	1		
0773032	6152868		1	1		
0773048	6152882		1	1		
266 - 268	588		8	4		
266-268	588		2	2		
246	596	01	6	3	1820	
248	594	01	4	2		
286	594	01	24	13	1820	
220	598	02	23	2		
220	600	02	3	3	1828	1870
222	600	02	55	11	1828	
226	596	02	3	2		
226	598	02	47	9	1820s	1920s
228	596	02	70	7	1835	1870
230	596	02	16	6		
230	598	02	17	4	1820	
236	592	02	419	35	1835	1870
236	594	02	673	47	1835	1870
236	596	02	2649	43	1862	1870
236	600	02	59	9	1820s	1920s
238	592	02	555	42	1835	1900
238	594	02	589	46	1835	1850
240	594	02	1	1		
240	596	02	2	2	1820	

North	East	Unit	Qty	MIC	Begin Date	End Date
242	596	02	4	4	1820	
242	598	02	23	11	1830	1900
244	594	02	1	1		
244	596	02	11	4	1835	
246	592	02	399	26	1870	
246	594	02	121	18	1870	1900
246	596	02	342	32	1859	1928
246	598	02	4	3		
248	592	02	204	18	1820s	1920s
248	594	02	7	2	1828	
248	596	02	270	16	1840	1920
248	598	02	527	18	1840	1920
248	670	02	1	1		
250	592	02	1	1		
250	594	02	2	2	1828	
250	596	02	9	5	1820	
250	598	02	2	2		
250	648	02	24	12	1820s	1920s
252	592	02	1	1		
252	594	02	11	2		
252	596	02	4	3		
252	598	02	8	4	1820	
252	608	02	4	1		
252	610	02	3	1		
252	624	02	1	1		
254	592	02	96	15	1850	
254	594	02	20	5	1820	
254	596	02	21	5	1820	
254	598	02	1	1		
254	608	02	28	5		
254	610	02	3	0		
254	624	02	1	1		

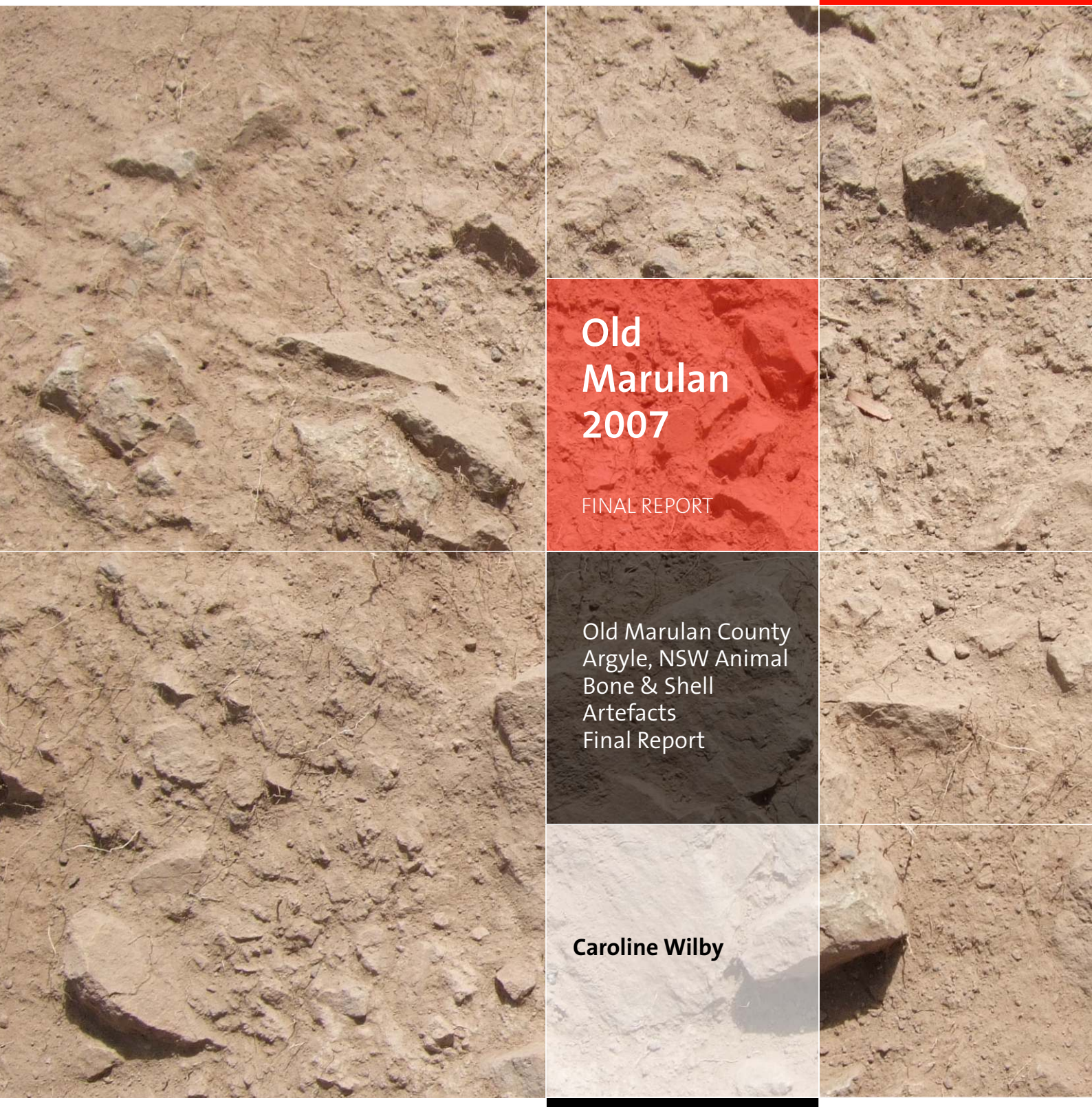
North	East	Unit	Qty	MIC	Begin Date	End Date
256	592	02	1294	43	1870	
256	594	02	132	19	1835	
256	596	02	112	13	1840	1870
256	598	02	19	5	1828	
256	633	02	16	8	1828	
256	637	02	1	1	1820	
258	592	02	1144	28	1914	
258	594	02	22	8	1820	
258	596	02	10	5	1820	
258	598	02	8	4	1870	
258	633	02	6	3	1820	
258	637	02	2	1		
260	590	02	257	14	1830	
266	590	02	208	24	1866	1900
268	590	02	78	15		1880s
270	590	02	8	4	1867	
274	612	02	25	10	1820	1870s
276	612	02	38	15	1835	1870s
286	594	02	416	63	1870	
286	596	02	604	116	1845	1910
286	598	02	679	100	1870	
288	596	02	7	4	1820	
288	598	02	2	2		
305	635	02	614	76	1830	1900
236	594	03	306	29	1870	1900
236	596	03	338	49	1835	1870
236	598	03	1146	54	1870	
238	594	03	466	33	1835	1870
238	596	03	289	56	1850s	1910
238	597	03	49	15	1835	
238	598	03	280	20	1835	
238	600	03	308	28	1830	

North	East	Unit	Qty	MIC	Begin Date	End Date
240	598	03	1088	167	1840	1900
240	600	03	201	40	1835	1870
236	593	04	47	47	1770s	1860s
236	598	04	1524	173	1859	1870
236	600	04	1576	86	1860	1905
238	598	04	783	43	1850	
238	600	04	963	13	1850	
236	594	05	3	2	1830	
236	596	05	16	5		
238	596	05	52	9	1820	
238	598	05	858	46	1835	
248	592	06	259	92	1845	1910
246	512	07	78	23	1830	1900
246	592	07	81	19	1830	1870
246	594	07	2	1	1828	
248	592	07	20	8	1820s	1920s
236	594	08	74	6		
238	594	08	106	47	1835	1870
246	588	1	27	6	1820	
236	596	10	159	15	1830	
256	598	11	25	5	1820	
246	594	12	22	10	1820	
		124	7	2		
		126	7	3		
236	598	13	1571	123	1868	1900
236	600	13	2277	151	1876	1900s
370	600	134	3	2	1830	1890
		139	1	1		
380	590	140	1	1		
236	596	15	599	32	1835	1880
236	598	15	503	58	1835	1880
236	600	15	1398	72	1840	1870

North	East	Unit	Qty	MIC	Begin Date	End Date
238	596	15	902	178	1885	
238	598	15	1618	110	1850	
238	600	15	2110	114	1840	1920
240	600	15	965	19	1850	
236	596	16	8	4	1820	
240	598	18	253	88	1840	1920
240	600	18	217	43	1835	
260	590	19	911	29	1850	
262	590	19	209	16		
264	588	19	2	2		
285	590	19	1135	31	1830	1900
266	588	19+24	16	13	1868	1928
310	601	222	1	1		
310	600	224	1	1		
300	600	231	1	1		
264	588	24	416	15	1840	1920
264	590	24	89	14	1820	
266	588	24	22	13	1828	
266	590	24	74	10	1820	
268	588	24	11	5	1770s	1860s
268	590	24	256	43	1840	1910
270	590	24	110	18	1830	
		240	3	2		
290	610	249	6	4	1820	
264	588	26	165	24	1830	
264	590	26	67	22	1770s	1860s
266	590	26	123	22	1770s	1860s
300	600	261	3	3		
266	590	27	70	13	1830	
268	590	27	29	9	1820	
264	590	28	6	4	1820	
266	590	28	34	9	1828	

North	East	Unit	Qty	MIC	Begin Date	End Date
268	590	28	24	4		
286	594	30	1	1	1830	
264	588	31	85	14	1770s	1860s
266	500	31	31	6		
266	588	31	41	21	1770s	1860s
268	588	31	30	18	1820	1870
280	590	319	3	3	1820	
290	600	322	3	2	1820	
300	600	323	11	8	1830	1900
280	600	327	8	3		
286	596	37	12	10	1830	
286	598	37	121	30	1828	
280	600	38	13	13	1770s	1860s
286	594	38	141	16	1830	1861
238	600	39	3	1		
274	610	40	124	21	1830	1900
274	612	40	221	28	1835	
276	610	40	46	14	1835	
276	612	40	108	58	1842	1910
266	588	41	1573	421		
268	588	41	2113	239	1834	1851
566	588	41	32	1		
286	598	44	1	1		
305	635	45	1904	215	1850s	
286	594	55	6	3	1820s	1920s
286	598	57	36	16	1850	
305	635	62	9	1		
305	610	67	14	8	1830	
305	635	68	38	10	1820	1870
		69	380	143		
310	620	70	96	5		
320	610	70	1050	38		

North	East	Unit	Qty	MIC	Begin Date	End Date
264	588	72	4	1		
244	618	85	49	1	1830	1900
244	618	86	364	48	1840	1900
Surface		West end	21	16		



Old Marulan 2007

FINAL REPORT

Old Marulan County Argyle, NSW Animal Bone & Shell Artefacts Final Report

Caroline Wilby

OLD MARULAN
COUNTY ARGYLE

ANIMAL BONE & SHELL ARTEFACTS
FINAL REPORT

Prepared by
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For
Banksia Heritage + Archaeology

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1 INTRODUCTION

The following report presents an examination of the faunal remains recovered during the excavation of Old Marulan township, Argyle County, NSW by Banksia Heritage + Archaeology in 2007 for Umwelt [Australia] and Cemex [Australia] Pty Ltd.

Two categories of artefacts are considered in this report:

- Unworked animal bones, including bones reflecting dietary refuse, as well as the bones of domestic pets / working animals, scavengers and natural death deposits, and;
- Unworked shell, including shell remains reflecting dietary refuse.

All unworked animal bone and shell artefacts retrieved during the excavation are included in this analysis.

Finished artefacts of worked animal bone and / or shell have not been considered in this report

The faunal assemblage analysed comprises 3,075 complete and fragmentary animal bones and 23 complete and fragmentary shells deriving from a total of 40 excavation squares & spits with 27 identified contextual units within the Old Marulan township.

The vast majority of the Old Marulan faunal assemblage derives from excavated deposits associated with the residential and commercial use and occupation of town land owned by Joseph Peters – in particular, the *Woolpack Inn* site (operating *c.* 1830s-1860s – demolition *c.* 1880s). The animal bone and shell retrieved during the 2007 excavations thus provides insight into the roles and uses of animals within Old Marulan township as well as the types of meals served to travellers stopping by at the *Woolpack Inn.*

This report is laid out in the following manner:

- Section 2.0 provides a discussion of the research objectives of the faunal analysis;
- Section 3.0 presents a description of the faunal cataloguing and analysis methodology;
- Section 4.0 presents the results of the faunal analysis, including an overview of the faunal assemblage as a whole (Section 4.2) and detailed examination of a selection of priority excavation units (Section 4.3);
- Section 5.0 provides an interpretation summary of the faunal analysis.

2 RESEARCH OBJECTIVES

The following Section provides an overview of the research objectives of the Old Marulan faunal analysis; including general zooarchaeological research themes and site specific research questions prepared by Banksia Heritage + Archaeology associated with the use, occupation and development of the Old Marulan township.

Taxonomic Composition – Meat Supply & Roles of Animals on Site

One of the most basic of questions to be addressed with regards to a faunal assemblage concerns the types of animals that are represented. The majority of animal bone and shell in NSW colonial archaeological sites derives from food or its preparation and an examination of the variety and relative quantities of animal, bird, fish and shellfish species can provide basic information on the meat supply of the site at different times in its development.

Information regarding attitudes towards meat sources and cultural adaptation in a colonial settlement can also be examined – e.g. does the majority of bone represent European domestic livestock or is there evidence of exploitation of native fauna for food procurement purposes? The presence of native fauna – including bones and shells – can also provide information regarding food procurement technologies and strategies – i.e. could the native species be obtained locally? What types of equipment would be required to obtain such resources?

An examination of taxonomic composition can also provide information regarding other roles and uses of animals within a colonial site – e.g. is there any evidence of non-dietary species, such as pets, working animals or local animal populations, either native or exotic, sharing the rural environment or nearby habitat?

Pets and other companion animals serve a variety of roles – beasts of burden, guard dogs, rodent controllers, therapeutic companionship – and the use that colonial people make of animals as companions may provide some insight into activities on site, social status or disposable wealth.

Animal bones and shell can also be used to infer details of the local natural environments. The presence of bones in occupation sites which do not represent food refuse or companion animals may provide information on how the local native animal populations are affected by colonial settlement and what animal populations – native or opportunistic commensal species – colonise rural environments alongside the human settlers.

Food Refuse Disposal Patterns & Issues of Sanitation

The location and characteristics of deposits of bone and shells can often provide information regarding the attitudes and tolerance of site occupants towards food refuse disposal and sanitation issues. Two lines of enquiry can be considered:

- The first is the spatial distribution of faunal remains. What types of excavation units within the Old Marulan site yielded faunal remains – i.e. location with regard to documented site structures and features? Is there evidence of organised rubbish disposal?
- The second involves various pre-depositional and post-depositional alterations to the faunal remains. Is there evidence of significant burning of bone, indicative of attempts to dispose of food refuse? Do the bones show evidence of significant rodent activity – i.e. through rodent gnawing on bones or the remains of rodents themselves?

Age at Death & Livestock Husbandry Regimes

The supply of meat to particular households or commercial premises was usually part of a wider pastoral economy and insights into these regimes may be extracted from a study of the age at death of the livestock found within a given site.

The initial premise is that the demographic profile for a livestock species will reflect the intended product and aspects of decision-making in husbandry management. Before culling animals to provide meat, the producer has to assess the future productivity of the animals – both in terms of products such as milk or wool and in terms of producing sufficient young to maintain numbers. Age at death information for animals found in the food supply provides information on such animal management

practices; the presence of younger animals or animals at the age when weight increase related to feed input reaches its peak indicates husbandry regimes directed primarily towards meat production, whereas the presence of older animals indicates regimes directed towards production of resources in addition to meat. Such data can provide information regarding the economy of the site or settlement – i.e. were animals kept and used for as much produce as possible (e.g. both meat and by-products) or were populations and resources sufficient to allow rearing of animals for meat only? More specific information regarding the economy of a given site may also be extracted – i.e. the types of food available or preferred by the occupants of the settlement site. This in turn may reflect levels of disposable wealth or social status; i.e. the ability to purchase meat from young animals reared exclusively for that purpose indicates a certain level of affluence.

Additional aspects that are somewhat related to animal age and husbandry practices are also worth examining – such as skeletal evidence of disease and injury. In the case of domestic livestock, the incidence of disease and injury will be related to the care with which these animals have been tended and the uses to which they have been put. The occurrence of pathological individuals in the food supply may also allow inferences regarding the attitudes towards meat production at a given time.

Body Part Frequencies & Meat Resources

Analysis of skeletal frequency is based on the concept of post-mortem disturbance and is often used to provide information on whether animals were present on the hoof and were subsequently slaughtered on site or were transported to the site as butchered joints. Within domestic and commercial sites, an examination of body part frequency can also be used to provide information regarding household provisioning – i.e. the types of meat utilised with regard to major meat-bearing elements of the carcass versus relatively poor meat-bearing or low-utility parts. The causes behind any patterning of body part representation may include a variety of economic or cultural influences acting upon the particular site or the wider settlement as a whole.

Information regarding the types of meat utilised, as well as the intensity of carcass utilisation, can also be extracted from an analysis of distribution and abundance of butchery marks on bones.

Butchery Practices & Utilisation of Meat Resources

An examination of the distribution of butchery marks on bones can often allow some interpretation regarding household provisioning – i.e. the types or joints of meat that were eventually cooked and eaten on site. Again, the causes behind any patterning in distribution of butchery may include various economic or cultural influences.

An analysis of any patterning in butchery marks can also provide information regarding consistency in butchery practices. This may allow an interpretation of whether animals were butchered to some extent by individual households or were butchered and sold on by specialist butchers, as well as an examination of the emergence of butchery and meat production as a standardised and regulated craft in the wider settlement. In turn, evidence of standardised butchery provides information concerning the development and regulation of marketing and consumption of meat, also reflecting increasing urbanisation and industrialisation in the wider community.

An examination of the abundance of butchery marks on bones can also provide information regarding the intensity of carcass utilisation – i.e. were joints, particularly poor meat-bearing joints, heavily butchered to salvage every scrap of meat? Such information may give an indication of how much potential resource the occupants of a site felt they could afford to waste and thus provide information on social stratification and levels of wealth within the site as well as broader attitudes towards carcass utilisation.

Additional Utilisation of Animal & Shell By-Products

An examination of bone modification indicative of the utilisation of animals for purposes other than food, for instance, the use of bone for making artefacts or the use of shell for making lime, can often provide information regarding the value that was placed on faunal remains as a resource at different times – again, often inferring levels of social stratification and wealth. While bone artefacts, such as implement handles and buttons, have been identified in the Old Marulan assemblage, these finished artefacts are examined elsewhere in this report (see Section **XXX**). However, any additional evidence of such utilisation found within the assemblage of primarily unworked animal bone and shell will be addressed here.

3 RECORDING & QUANTIFICATION METHODOLOGY

3.1 Excavation, Sampling & Recovery

The faunal material from the Old Marulan township site was retrieved predominantly via hand excavation (2m squares based on E/N coordinates) with a small percentage retrieved during mechanical excavation.

All manually excavated units were 100% sieved using 3mm nested dry sieves and all faunal remains identified during excavation and sieving were recovered and are subsequently included in the following analysis.

However, it must be noted that the faunal assemblage represents only a sample of the bone and shell likely to have been deposited within the Old Marulan township / lots owned by Peters during the years of European occupation. Firstly, the 2007 archaeological excavation obviously did not involve full recovery of all deposits across the entirety of the investigated properties. Secondly, a variety of cultural and natural – such as scavenger activities, subsequent land use and development, post-depositional weathering due to soil pH levels, water permeability etc – are likely to have affected the preservation of faunal remains across the site.

The recovered faunal assemblage also represents only a sample of the bone and shell that passed through the investigated properties. Some refuse generated by the occupants of the site may have been disposed of elsewhere – perhaps either through opportunistic fly-tipping on adjacent unoccupied lots or some form of organised method of rubbish collection and removal – or disposed of through the use of fire, likely, on occasion, to the extent that all organic materials are completely incinerated or burnt and fragmented beyond recognition. Some food refuse, including bones, may have been used as feed for pigs or dogs and some bones and shells are also likely to have been retained as raw materials for making buttons, cutlery handles and a range of other useful or decorative items.

Finally, the faunal assemblage recovered from the site represents only a sample of the animal resources or products that may have been utilised on the site – or more specifically, only a biased sample of what meat products the occupants ate. Many cuts of meat, particularly beef, hams and bacon, are likely to arrive on an urban site as boneless cuts and are thus without any archaeological markers. Some species of fish may have been eaten, bones and all, whereby the archaeological markers generally do not survive.

Ultimately, the assemblage represents a biased sample of a sample of a sample; however, not one that is without valuable information concerning the habits and lifestyles of the occupants of and visitors to the investigated properties within the Old Marulan township and possibly elements of the broader colonial economy and community.

3.2 General Approach to Recording

The faunal assemblage from the Old Marulan 2007 excavations was bagged during excavation and initial processing according to three provenance codes – Site / Area, Square (E and N coordinates) and Unit. Each bag was examined as a separate square / unit combination, with each individual specimen, or like specimens within the same bag, allocated individual catalogue numbers and subsequently labelled and re-bagged.

The identification and cataloguing of the animal bone and shell assemblages was conducted using private reference literature and collections.

3.3 Primary Data Recorded

In order to address the research questions presented in Section 2, the following attributes of the faunal assemblage were identified and recorded:

Animal Bone

- *Provenance*

The codes relating to artefact provenance utilised during the excavation (Area, Square and Unit

Numbers) were recorded for each specimen.

- *Taxonomic Identification*

Individual specimens were identified to the most specific taxonomic level (i.e. *species, genus, family, order* or *class*) possible on the basis of morphological features. For specimens which could only be identified to the higher categories, such as order or class, general size classifications were adopted; for instance, *small mammal, medium mammal* and *large mammal.*

- *Skeletal Element*

Vertebrate specimens were identified to specific skeletal element where possible. For elements such as vertebrae, general anatomical location (i.e. *cervical, thoracic, lumbar, caudal*), were also recorded. For fragments that could not be identified to a specific skeletal element, broad identification classes (such as *unidentified long bone fragment*), were utilised.

- *Breakage Unit*

Anatomical terminology was used to record the surviving portion of each skeletal element (e.g. *complete, proximal, distal, shaft portion* etc.). The percentage portion (using 10% increments) of each specimen was also recorded.

- *Specimen Count*

As like specimens within each excavation unit were grouped during the cataloguing process (i.e. not each entry necessarily denoted an individual specimen), the number of specimens or fragments was recorded for each entry. Fused and cross-mending specimens within identified units were counted as one piece. Mandible or maxilla and associated teeth in the same sample were also counted as one specimen.

- *Anatomical Features of Age*

Anatomical features reflecting an indication of stage of maturation (i.e. approximate age at death) were recorded for all specimens where possible. Features such as epiphyseal fusion and closure of cranial sutures were recorded based on standardised stages (e.g. *open / unfused, semi-fused, fused* etc.). The location of the feature on each element (eg. *proximal, distal* etc.) was also recorded. Tooth eruption, growth and replacement sequences and stages of tooth wear were recorded where applicable using standardised systems.

- *Butchery*

Evidence of butchery was documented according to its anatomical location on identified elements (e.g. *proximal, distal, midshaft* etc.). The orientation of the butchery mark was noted according to anatomical terminology (e.g. *medio-lateral, dorso-ventral, axial* etc.) and the number and depth (e.g. *superficial cut*) was noted. The type of butchery mark indicating technology or tool used (e.g. *cut, chop, saw mark* etc.) was also recorded.

- *Condition – burning, weathering etc.*

Evidence of bone alteration such as burning and weathering was recorded according to its anatomical location on identified elements (e.g. *complete, proximal, distal* etc.). The stage or type of alteration, (e.g. *charred, calcined, eroded, pitted etc.*), and the level of alteration using basic arbitrary stages (*slight, moderate* and *extreme*) were also recorded.

- *Scavenger Attrition*

Evidence of scavenger attrition such as gnawing and chewing marks was documented according to its anatomical location, type or assumed agent (e.g. *rodent gnawing, canid gnawing*) and severity.

- *Pathology*

Evidence of bone alteration through disease and / or trauma was documented according to its anatomical location, type (e.g. osteophytes, displacement) and assumed cause (e.g. osteoarthritis, fracture etc.).

Shell

- *Provenance*

The codes relating to artefact provenance utilised during the excavation (Area, Square and Unit Numbers) were recorded for each specimen.

- *Taxonomic Identification*

Individual specimens were identified to the most specific taxonomic level (i.e. *species, genus, family, order* or *class*) possible on the basis of morphological features. For specimens which could only be identified to the higher categories, such as order or class, general size classifications were adopted; for instance, *small gastropod* or *large bivalve*.

- *Breakage Unit*

Anatomical terminology was used to record the surviving portion of each shell specimen where possible (e.g. *complete, single valve, hinge, body fragment* etc.). The percentage portion (using a predetermined set of increments; <10%, <50%, 50-90%, 90-100%) of each specimen was also recorded. Where possible, the orientation (i.e. *left valve* or *right valve*) of shell specimens was also recorded.

- *Specimen Count*

As like specimens within each excavation unit were grouped during the cataloguing process (i.e. not each entry necessarily denoted an individual specimen), the number of specimens or fragments was recorded for each entry.

- *Condition – burning, weathering, articulation*

Evidence of alteration such as burning and weathering was recorded for each shell specimen where applicable. The occurrence of two articulating valves from the same specimen or two or more separate specimens attached to each other was also recorded.

3.4 Quantification of the Faunal Assemblage

Quantification of faunal assemblages is, in itself, a major topic of debate within zooarchaeological literature and will only be briefly introduced here. The most commonly used quantitative units include the observational NISP (Number of Identified Specimens Present), representing a simple count of identified specimens, and the calculated MNI (Minimum Number of Individuals), which refers to the minimum number of individual animals required to account for all the skeletal elements or specimens of a particular species found within an assemblage.

NISP is the simplest method of quantification and is used as a basic technique to illustrate the relative abundance of both different taxa and the skeletal elements of each taxa within an assemblage.

However, NISP methods implicitly treat each recorded specimen as a separate individual and as some of the bones in a sample may have derived from the same individual, some animals may be counted many times over in a set of NISP data. NISP counts are also greatly affected by differential fragmentation, preservation and / or retrieval of skeletal elements within an assemblage and differential numbers of elements, and easily identifiable elements, between different taxa. For instance, NISP calculations may over-represent taxa with highly fragmented elements or with relatively high numbers of skeletal elements and other hard parts that might preserve such as scales and otoliths in fish. This effect is more pronounced when NISP data are compared across widely differing taxonomic groupings. The MNI method (or a derivation of) is thus commonly used to complement NISP quantifications.

MNI is basically calculated through a count of the number of the most numerous skeletal element (reduced to left or right, percentage portion etc. in more detailed calculation) present for any given taxa and using the highest value as the estimated MNI. Variables produced by MNI are generally less affected by differential fragmentation and preservation of elements than NISP.

Nonetheless, MNI methods tend to over-represent rare species (i.e. taxon represented by only a few specimens) and are also affected by the way in which the material is grouped – i.e. such as arbitrary excavation units, natural or cultural units of stratification or the entire sample from a site. Moreover, MNI may serve to under-represent species that are present largely as small skeletal fragments; these specimens may not be included in MNI estimates as they are too small to orient.

Consequently, the value of MNI, when dealing with sites where much of the faunal material is arriving on site in the form of portioned meat cuts – such as the case with many urban and rural sites – is limited. Conversely, it has been argued that while NISP methods lack validity when attempting to examine the death assemblage from which a sample is derived, NISP can be more effective in describing the rank order of taxa within samples. Indeed, it has been suggested that interdependence may not be a significant problem as taphonomic attrition is so high in many urban

samples, thus reducing the probability of any one individual contributing more than one fragment to the recovered assemblage.[1]

Ultimately, for the Old Marulan faunal analysis, it is proposed that NISP would be the most useful means of quantifying the assemblage as a whole as well as the smaller aggregation units (i.e. when the assemblage is divided into units), in particular when addressing the introduced dietary species. Very basic MNI methods, however, will also be used to complement the analysis as an illustrative tool at a very broad level and also with regard to species that may have been present on site as complete individuals – e.g. non-dietary species.

It should be noted that specimen weight was not recorded for the Old Marulan faunal assemblage. Weight calculations are sometimes used in colonial assemblages in New South Wales, however, weight is rarely used directly to document relative frequency. Many extraneous variables, such as burning or weathering and adhering sediment, affect skeletal element weight and differential bone structure and density between animal species can greatly skew results unless properly accounted for. Moreover, there is no clear linear correlation between bone weight and meat weight. Bone calculations are generally only useful when quantifying specific aspects of a faunal collection, such as relative degrees of fragmentation or size of individual specimens.[2] As neither of these attributes is examined in this analysis, specimen weight was not recorded.

[1] See Grayson, D. K. (1984) *Quantitative Zooarchaeology: topics in the analysis of archaeological faunas.* Academic Press Inc, Orlando; Guatier, A. (1984) "How do I count you, let me count the ways? Problems of archaeozoological quantification." in C. Grigson & J. Clutton-Brock (eds) *Animals and archaeology: 4. Husbandry in Europe.* British Archaeological Reports International Series 227. 237-251; Lyman, R. L (1994) *Vertebrate Taphonomy.* Cambridge University Press, UK; O'Connor (2003); Winder, N.P. (1991) "How many bones make five? The art and science of guesstimation in archaeozoology." *International Journal of Osteoarchaeology.* 1: 111-126.

[2] See Jackson, H.E. (1989) " The trouble with transformations: the effects of sample size and sample composition on weight estimates based on skeletal mass allometry." *Journal of Archaeological Science.* 16: 601-610.

4 FAUNAL ANALYSIS – RESULTS & INTERPRETATION

4.1 Introduction

The following section presents a discussion of the characteristics of the faunal assemblage through an examination of primary and secondary data and presents possible interpretations and inferences relating to the relevant research themes.

Section 4.2 provides a general overview of the total faunal assemblage collected during the 2007 archaeological excavation of Old Marulan; Section 4.3 provides a series of more detailed analyses of selected priority units within the excavated areas of Old Marulan.

It should be noted that the following analysis is conducted at archaeological unit / context level – i.e. comparative analyses between spatial distinctions within each stratigraphic unit (e.g. excavation square locations) has not been conducted.

4.2 Site Overview

The faunal assemblage retrieved during the excavation of the Old Marulan site comprises 3,075 animal bone specimens and 23 shell specimens.

Of the catalogued animal bone specimens, 820 (26.7%) are complete or almost complete specimens (i.e. 90-100% intact), while the majority, 2,255 (73.3%) are fragmentary; a large number of which – 1263 or 41.1% of the total assemblage – are small fragments (i.e. measuring $\leq$ 10% of the identified skeletal element). Notwithstanding, the assemblage was dominated by a relatively high proportion of identifiable bones; 2738 (89%) bone specimens were identifiable to species or genus level and 2618 (85.1%) were identifiable to skeletal element. The remainder of bone specimens were largely identifiable to family or order – identification to species / genus level in these cases was generally precluded by high levels of fragmentation, high stages of weathering or absence of diagnostic attributes.

Of the catalogued shell specimens, 8 (34.8%) were identified as (50-90% complete) and 15 (65.2%) were identified as <50% complete. All shells were identifiable to taxon and portion.

The Animals –

Elements of at least thirteen mammal and birds species are represented within the Old Marulan faunal assemblage. The collection is vastly dominated in raw numbers by the introduced livestock sheep. While identified in much lower frequencies, cattle, rabbit, chicken, pig and cat comprise the next most prevalent faunas. A scattering of skeletal elements from goat, dog, horse, hare, rodent, kangaroo / wallaby, koala and fragments identifiable only as small-large mammal, carnivore or artiodactyla make up the remainder of the assemblage.

Table 4.1 below presents the range of animal and shell types respectively according to NISP and most basic MNI calculations.

TAXON	STATUS	EXPLANATORY NOTES	NISP	% NISP	MNI*
Sheep (*Ovis aries*)	Introduced	For most body parts, distinction between sheep & goat is near impossible – as such the "sheep" category may very well contain some goat specimens.	1788	58.15%	37
Cattle (*Bos taurus*)	Introduced		348	11.32%	6
Rabbit (*Oryctolagus cuniculus*)	Introduced		171	5.56%	5
Chicken (*Gallus gallus*)	Introduced		159	5.17%	6
Cat (*Felis cattus*)	Introduced		90	2.93%	6
Pig (*Sus scrofa*)	Introduced		58	1.89%	4

TAXON	STATUS	EXPLANATORY NOTES	NISP	% NISP	MNI*
Goat (*Capra hircus*)	Introduced	Includes only specimens that could be identified with confidence as *Capra* rather than *Ovis* (skull, metapodials etc & elements determined to be from same individuals) – additional goat elements may be included in "sheep."	47	1.50%	2
Kangaroo / wallaby (*Macropus* sp.)	Native		17	0.56%	2
Koala (*Phascolarctos cinereus*)	Native		38	1.24%	1
Brown Hare (*Lepus europaeus*)	Introduced		13	0.42%	1
Rodent – rats & mice (*Murinae* sp.)	Native & introduced		4	0.13%	2
Dog (*Canis familiaris*)	Introduced		3	0.10%	2
Horse (*Equus caballus*)	Introduced		2	0.07%	1
Small carnivore sp.	Introduced	Includes fragments clearly identifiable as small carnivore but not identifiable to a particular species – likely to include introduced carnivores only; i.e. dog & cat.	48	1.56%	2
Artiodactyla sp.	Introduced	Includes fragments identifiable as Artiodactyla sp. but to a particular species – likely to include sheep, goat & pig, many of which were young at death with bones not fully formed.	23	0.75%	2
Small mammal		Fragments of skeletal elements from mammals of large rodent – rabbit size.	48	1.56%	2
Medium mammal		Fragments of skeletal elements from mammals of dog – sheep / goat size.	120	3.90%	1
Medium-large mammal		Fragments of skeletal elements from mammals of pig-cattle size.	48	1.56%	1
Large mammal		Fragments of skeletal elements from mammals of cattle – horse size.	33	1.07%	1
Bird sp.	Not known	Bird bone fragments that could not be assigned a particular species – may include chicken and / or other introduced or native bird species.	17	0.56%	2
		Grand Total	**3075**	**100%**	**84**

Table 4.1: Taxonomic composition of the Old Marulan site animal bone assemblage.

* It should be kept in mind that the MNI calculations are of the most basic form and MNI figures are often not spectacularly meaningful with regard to the domesticates that commonly arrive on residential sites as joints rather than complete animals.

Within a rural residential / commercial site, this range of animal species is likely to represent a mix of:

- cultural deposits – primarily refuse deriving from food and its preparation by the site's human inhabitants, as well as burial / disposal of some companion / work animals, and, to a lesser extent;
- residual or natural death deposits of commensal species – i.e. "drop deads" – animals that have lived and died on or near the site, prior to, contemporary with, or after human occupation and whose remains have become incorporated with the cultural features and materials of the site.

The occurrence of some skeletal remains may also be due to scavenger activities, however, deposition by carnivores and scavengers rarely contributes significantly to colonial faunal assemblages in NSW – rather such agents are more likely to displace and remove elements from a rural residential site.

The vast bulk of animal remains within the Old Marulan assemblage derives from introduced livestock species. This is an almost universal feature of NSW colonial faunal assemblages and one that is demonstrative of the pattern of cultural conservatism and pervasive English dietary traditions or "cultural baggage" – often labelled as the "British Barnyard Complex" – that has characterised numerous colonial settlements throughout the New World.[3] All the exotic species present within the assemblage were first introduced to NSW in the earliest days of colonial settlement, being transported from Europe, Africa and India to supply food and labour to the developing colony in a land described by early explorers as providing native animals "who eat but ill."[4] Sheep, goats, cattle and pigs were all brought over for their multi-purpose values of meat, milk, hides and wool; rabbits and chicken provided meat, fur and eggs. Horses – and sometimes cattle – provided traction power and transportation, and dogs and cats served as working animals, pest control and companions.

The occurrence of skeletal remains from all these species within a rural residential / commercial NSW site, particularly a mid 19th century site such as Old Marulan, is not at all unusual and is almost certainly due to these species' dominant roles as dietary sources and working / companion animals.

Historical records indicate that the early livestock populations introduced to NSW in the 18th century did not flourish and meat supplies were scarce well into the 19th century. Salted meat products – primarily pork and beef – were imported from nearby British colonies and a trade agreement established with Tahiti in an attempt to keep up with growing demands. Settlers were expected to find or grow supplementary food supplies and various native animal and plant species were experimentally exploited to fill the gaps.[5]

By the 1820s, however, local livestock populations had developed and stabilised sufficiently that imports of salted meat were no longer necessary. [6] Indeed, by the 1830s – the period during which the Old Marulan township began to develop – livestock numbers within NSW had increased to a point that the colony actually began salting meat for export. Officials even began to comment on the immense and potentially injurious – to both health and personal beauty – quantities of meat consumed by NSW colonialists.[7] By the 1840s depression in NSW, the price of sheep and cattle had collapsed to a point that the Russian practice of boiling down animals for fat was established in NSW as a more economical practice – sheep at the time were selling for meat at as little as 6d to 8d each whereas each animal could be worth at least 6s if it were turned into hides and tallow.[8] Boiling down quickly decreased in importance during the 1850s when the demand for fresh meat again increased steeply with the growing population across NSW. It reappeared a decade later, however, when minimum livestock prices again fell. The 1860s economic condition, in conjunction with developing difficulties in England's domestic meat supply, also led to a rejuvenation of the meat preserving and exporting industry and the introduction of Australian canned meats.[9]

By the late 19th century, the later – final years of Old Marulan township occupation, ready meat supplies had enabled NSW colonists to become remarkable meat eaters by world standards; average weekly meat consumption per capita was 2.6kg (of which 60% was beef and 37% mutton) and the standard pastoral ration was 4.5kg a week. Whereas average weekly consumption in Britain was 1kg a week – less than half that of NSW – and figures were even lower for the United States and other European countries.[10]

The classic introduced dietary species within mid 19th century European colonial sites – sheep, cattle, pig, chicken and rabbit – are all present in the Old Marulan assemblage and in somewhat similar broad relative frequencies – i.e. sheep at top, followed by cattle and then rabbit, chicken and pig in lower numbers – to most NSW colonial assemblages of similar periods. These frequencies will be

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[3] Honerkamp, N & E. Reitz (1983) "18th Century British Colonial adaptations on the coast of Georgia – the faunal evidence." in A. E. Ward (ed.) *Forgotten places and things: Archaeological perspectives on American History.* Contributions to Anthropological Studies 3 – University of New Mexico, Albuquerque, USA. pp. 335-339.
[4] Beckett, R. (1984) *Convicted Tastes – Food in Australia.* George Allen & Unwin, Sydney, NSW.
[5] Beckett (1984); Symons, M. (1982) *One Continuous Picnic – A history of eating in Australia.* Duck Press, Adelaide, SA.
[6] Farrer, K. T. H. (1980) *A Settlement Amply Supplied: Food Technology in Nineteenth Century Australia.* Melbourne University Press, Victoria.
[7] Gollan, A. (1984) *The Tradition on Australian Cooking.* Australian National University Press, Canberra, ACT.
[8] Farrer, K. T. H. (1980)
[9] Farrer, K. T. H. (1980)
[10] Gollan, A. (1984); Walker, R. & D. Roberts (1988) *From Scarcity to Surfeit: a history of food and nutrition in New South Wales.* NSW University Press.

more closely examined in Section 4.3, however, it should be kept in mind that other than presenting broad patterns, the relative frequency of different species within the Old Marulan faunal assemblage does not necessarily reflect exactly how important each animal was to the colonial diet or lifestyle. Various factors can bias such interpretations, including:

- the inherent flaws of any faunal quantification method (see Section 2.4);
- differential survival and preservation rates of bones according to variables such as bone size, density, robustness and environmental factors;
- contrasting amounts of meat provided by different species. For instance, the average consumable meat weight for a cow is around 227 kg, whereas that for a sheep (aged over 12 months) is only around 36 kg[11] – i.e. it takes six sheep to the value in terms of consumable meat weight of one cow. Consequently, if the MNI ratio of sheep to cattle is near 6:1 in a given assemblage – as is actually the case with the very basic faunal calculations for Old Marulan – it may be argued that on the whole, cattle contributed almost as much to the diet as sheep, despite the vastly different NISP figures;
- varying butchery practices and bone retention within meat cuts across different species. For instance, ethnoarchaeological and historical studies conducted in NSW have determined that the slaughter and butchery of cattle carcasses during the 19th century likely involved a high degree of defleshing or deboning – i.e. meat was stripped from the bone during primary or secondary butchery and sold as boneless cuts. Sheep carcasses on the other hand, being of much smaller size and weight, underwent very little defleshing during butchery and the majority of bones were sold to consumers as part of retail cuts.[12] This means that many cattle meat products are likely to have entered a given site without archaeological markers. Consequently, the surviving faunal assemblage is likely to under-represent the actual amounts of beef consumed and give a comparatively over-valued impression of the dietary role of sheep.

Not all the remains of introduced species in the Old Marulan assemblage, however, are likely to represent refuse from the dinner table. The cat, dog and horse elements, for instance, are likely to represent the remains of working animals, companion animals or strays. Some of the rabbit and hare skeletal elements may actually be natural death deposits that have become mixed with cultural materials, occurring either during or after occupation of the township. Both animals – rabbits in particular – were repeatedly introduced into Australian environments since the late 18th century with wild rabbits numbers reaching plague proportions in NSW during the 1860s-1880s[13] (see Section 4.3.2.2 for further information). It is quite likely that local populations have inhabited areas in or near the Old Marulan site, indeed, some of the upper stratigraphic deposits exhibited indicators of rabbit burrowing.[14] The rodent elements – which may represent either native or introduced species (lack of diagnostic elements precluded differentiation) – are also likely to occur as natural death deposits of commensal or opportunistic species.

The remains of native animals – Macropod sp. and *Phascolarctos cinereus* – in the Old Marulan assemblage are of particular interest. The presence of a few elements from kangaroo / wallaby – deriving from at least two individuals – is not an entirely unusual occurrence in NSW colonial faunal assemblages and historical records show that macropods were quite often hunted by early colonists and persisted as a popular meal far longer than any other experimentation with native species. During the broad period of occupation of the Old Marulan township, kangaroo tail soup and kangaroo haunch often appeared on many dinner tables across Australia, with some writers judging the soup far superior to the oxtail soup of England and the roast meat joints comparable to venison.[15] The first complete cookery book published in Australia (dating to 1864) provides further recipes for kangaroo ham, kangaroo steamer, kangaroo pasty and kangaroo hash;[16] recipes that persisted, along with jugged kangaroo and sometimes even kangaroo brains (referred to as "slippery bob"), in cookery

[11] Lyman, R. L. (1979) "Available meat from faunal remains: a consideration of techniques." *American Antiquity.* Volume 44 (3), pp. 536-546.
[12] Piper, A. (1991) *Butchery Analysis in Australian Historical Archaeology.* Unpublished MA thesis, University of New England, NSW.
[13] Rolls, E. C. (1969) *They All Ran Wild: the story of pests on the land in Australia.* Angus & Robertson, Sydney, NSW; Walker, R. & D. Roberts (1988)
[14] Denis Gojak pers. com.
[15] Beckett, R. (1984); Rawson, L. (1897) *Australian Cook and Laundry Book.* J.W. Knapton & Co, Melbourne.
[16] Abbott, E. (1864) *The English and Australian Cookery Book: Cookery for the Many, as well as the 'Upper Ten Thousand.* Sampson Low, Son and Marston, London.

books well into the early 1900s.[17] There is, however, little if any clear archaeological evidence – such as butchery or processing marks – in NSW colonial assemblages of the exploitation of macropods. Certainly the specimens in the Old Marulan assemblage show no direct indication of cultural modification and it is quite possible that these remains represent natural death deposits.

The presence of koala remains within a colonial faunal assemblage, is however, quite unusual. The skeletal elements present include fragments of skull, mandible, vertebrae and metapodials, appearing to derive from only one individual. While there is no butchery, processing or cultural modification marks on the bones, their occurrence within the artefact rich fill of a cultural brick feature (1830s-1860s fill of a privy associated with the *Woolpack Inn*) certainly indicates the involvement of a cultural agent in their deposition. Despite the rigorous early colonial experimentation with native animals and the inclusion of recipes such as boiled or baked bandicoot, baked echidna, roasted or boiled flying fox, baked or stewed ibis, curried wattlebird and parrot pies in 19th century cookery books,[18] there almost no mention of koalas in culinary writings. An old Australian bush song records the last monition of the New England Cocky on his deathbed to his children as "Don't forget that I reared you on pumpkin and bear."[19] However, koala meat, while undoubtedly sampled, seems to have been dismissed as objectionable and unappetising – indeed 19th century writers appear to regard claims of eating koalas – along with wombats – as a colonial lunacy.[20]

Consequently, unless the *Woolpack Inn* catered for particularly unusual and experimental European palettes (which in fact may be a possibility given the presence of shellfish – see below), it seems somewhat unlikely that the koala remains derive from a menu item. The koala may represent a natural death deposit from surrounding eucalypt stands, a victim of curious local hunting dogs or even a novel pet.

The Shells –

Twenty three shells / shell fragments are present within the Old Marulan faunal assemblage – all Sydney rock oysters (*Saccostrea glomerate* – formerly known as *S. commercialis*) and deriving from at least fourteen individuals – refer to Table 4.2.

TAXON	DESCRIPTION	HABITAT	DISTRIBUTION	NISP	NISP %	MNI
Sydney rock oyster (*Saccostrea glomerata*)	Irregular, trapezoidal bivalve with unequal valves, grows up to 100mm high.	Cemented to a hard substrate in the intertidal & subtidal zone in sheltered coastal bays.	Eastern Australia - northern QLD to VIC.	23	100%	14
GRAND TOTAL				**23**	**100%**	**14**

Table 4.2: Taxonomic composition of the Old Marulan site shell assemblage.[21]

Oysters are a common feature in many Sydney archaeological contexts, being significantly utilised throughout the 19th century for consumption and a source of lime. The shells identified in the Old Marulan collection, however, show no evidence of burning or reduction for lime extraction. Marulan was also actually the location of some of the earliest natural limestone deposits exploited for construction lime, thus it is unlikely that shellfish would be imported into the region for such purposes.[22] Ultimately, it would appear that they represent a dietary element.

The Sydney rock oyster was particularly valued by early colonists, with oyster stands plentiful and easily accessible throughout Port Jackson and the shellfish representing a familiar culinary tradition.[23] Historical sources document the common sight of parties – of all social levels – setting off on "oyster

[17] Anon (1882) *Australian Plain Cookery.* Australasian-American Trading Co, Melbourne; Rutledge, J. R. Forster (1899) *The Goulburn Cookery Book.* Edwards Dunlop & Co., Sydney (Reprint)
[18] Abbott, E. (1864); Pearson, M. J. (1889) *Cookery Recipes for the People.* Australasian-American Trading Co, Melbourne; Rawson, L. (1897)
[19] Patterson, A. B. (1905) (ed.) *Old Bush Songs.* Angus & Robertson.
[20] Beckett, R. (1984)
[21] Wilson, B. (2002) *A Handbook to Australian Seashells on Seashores East to West and North to South.* New Holland Publishers (Australia) Pty Ltd.
[22] Denis Gojak pers. com.
[23] Lieutenant Colonel Godfrey Charles Mundy (1852) *Our Antipodes.* Referenced in Beckett, R. (1984)

picnics" armed with hammer and chisel, oyster knife, vinegar bottle and pepper pot.[24] Commercial fishing commenced in Botany Bay during the late 1700s and exploitation soon expanded along the vast intertidal and subtidal reefs of coastal NSW. By the 1860s, overfishing led to a virtual collapse of oyster populations and the introduction of legislation banning the burning of oyster shells for lime. The 1870s saw the first attempts to cultivate oysters with populations imported from Queensland and farmed on intertidal sticks, rocks and eventually organised racks and trays.[25]

However, the presence of oysters in a location such as Old Marulan township – which is around 70km as the crow flies, perhaps one-two days travel on horseback, to the closest coastal areas and environments of *Saccostrea* around Nowra-Jervis Bay – is rather interesting. Older local residents in Marulan claim that oysters could be collected live, wrapped and transported in wet hessian in a bucket, thus enabling them to keep for several days.[26] Notwithstanding, it seems rather a risky practice (to say the least) involving a good deal of effort and may shed light on the brave culinary nature of some of the occupants or visitors to the *Woolpack Inn.*

Faunal Distribution & Condition –

The Old Marulan faunal assemblage derives from a total of forty excavation squares / spits with twenty-four identified contextual units across the four areas of excavation (the main site of OM07, OM31, OM34b and OM34c). The vast majority of animal bone and shell occurred in the main site of OM07; the bulk of which – 2217 or 72.1% of the total assemblage – derived from Unit 41, the privy associated with the *Woolpack Inn.*

The broad pattern of distribution of animal bone and shell according to Unit is presented in Table 4.3.

AREA	UNIT	DESCRIPTION[27]	BONE NISP	SHELL NISP
OM07	2	General soil / topsoil level across the site representing gradual accumulation or deposition of material.	4.3% (n=133)	17.4% (n=4)
	3	General soil / topsoil level across the site, underlying [2] and representing gradual accumulation or deposition of material – early in site's European history.	2.9% (n=90)	13.1% (n=3)
	4	Refuse dumping as sheet midden material – late [1860s-1900ish – the very end of town occupation to occupation of *Woolpack Inn* after town abandoned] – may also incorporate [18] as part of more general material spread.	4.7% (n=144)	0
	5	Localised patch of material interpreted as an introduced secondary deposit used as levelling fill in an uneven depression within landscape of [2].	0.4% (n=12)	0
	6	Thin dump of probable fireplace / household refuse to fill in a depression, probably from removal of a tree.	0.2% (n=5)	0
	8	Naturally differentiated unit resulting from decaying exposed bedrock. Cultural material appears to be casual clustering of surface deposits associated with [2].	0.03% (n=1)	0
	13	Miscellaneous household refuse deposit to backfill pit [14] resulting from tree grubbed out and partially burnt *in situ, c.* 1850s-1880s (end of Marulan town period) – same as [15].	5.4% (n=166)	0
	15	Main content of [14] – general household refuse deposited as backfill of tree bole – same as [13].	3.5% (n=108)	13.1% (n=3)

[24] Gollan, A. (1984)
[25] Smith, G. S. (1985) *The Queensland Oyster Fishery. An Illustrated History.* Queensland Department of Primary Industries, Brisbane.; Kirby, M. X. (2004) "Fishing down the coast: Historical expansion and collapse of oyster fisheries along continental margins." Proceedings of National Academy of Sciences in the United States of America 101 (35): 13096-13099.; Malcolm, W.B. (1987) "The Sydney rock oyster." *Agfact* F3.1.1, Department of Agriculture, Sydney, NSW.; Nell, J.A (2001) "The History of Oyster Farming in Australia." *Marine Fisheries Review.*
[26] Denis Gojak pers com.
[27] Denis Gojak pers. com.

AREA	UNIT	DESCRIPTION[27]	BONE NISP	SHELL NISP
	18	Depositional layer located near burnt tree stump removal pit [14] & may form part of same deposit, however, [18] appears more closely related to [4] – surface sheet refused midden [1860s-1900ish – very end of town occupation to occupation of *Woolpack Inn* after town abandoned] and may form a more general spread of material.	1.07% (n=33)	4.3% (n=1)
	24	Surface sheet midden, forming as accumulation of material during occupation of *Woolpack Inn* on a part natural / part constructed cobbled outside surface – combined with [28].	0.29% (n=9)	13.1% (n=3)
	26	Material deposit overlying the demolition rubble [31] of the brick cesspit associated with the *Woolpack Inn*, and probably part of the overall scavenging / digging evidence.	0.5% (n=16)	0
	28	Surface sheet midden, forming as accumulation of material during occupation of *Woolpack Inn* on a part natural / part constructed cobbled outside surface – combined with [24].	0.03% (n=1)	0
	31	A collapse / demolition layer incorporating material from the brick superstructure of a privy associated with the *Woolpack Inn*, mixed with material that is most likely redeposited / post-depositionally disturbed [41] – fill of the brick privy, underlies [31]. Deposit includes mix of construction & occupation debris, appears to date from 1880s (demolition phase) and mix of earlier (1830s-1860s) artefacts.	0.09% (n=3)	0
	37	Part of the fill / backfill of rectangular pit associated with a substantial timber-post structure / complex of structures related to phase of Peter's ownership of the site – also relates to [38], [55] & [57].	0.72% (n=22)	21.8% (n=5)
	38	Part of the fill / backfill of rectangular pit associated with a substantial timber-post structure / complex of structures related to the phase of Peter's ownership of the site – also relates to [37], [55] & [57].	0.3% (n=9)	4.3% (n=1)
	40	Confined but fairly thick darker soil deposit – possibly in-floor deposit of a structure but more likely a deliberate dumping location.	1.1% (n=34)	4.3% (n=1)
	41	Gradually accumulated fill of brick cesspit associated with the *Woolpack Inn*, dating primarily to the duration of the town's occupation (1830s-1860s) and likely abandoned and capped with demolition rubble, [31] in the *c.* 1880s.	72.09% (n=2217)	4.3% (n=1)
	45	Secondary deposition of residential refuse, appears to represent imported fill / backfill of a small depression.	0.6% (n=18)	0
	55	Part of the fill / backfill of rectangular pit associated with a substantial timber-post structure / complex of structures related to phase of Peter's ownership of the site – also relates to [37], [38] & [57].	0.2% (n=6)	0
	57	Part of occupational deposit associated with timber structure – related to pit fill [55].	0.3% (n=8)	0
	67	Appears to represent episodic dumping of refuse associated with Peter's phase of occupation. [67] is co-located with [45], yet stratigraphically distinct / later than [45].	0.72% (n=22)	0
	69	A general unit number given to material from across the site collected from mechanical removal of turf [1], topsoil [2] and subsoil [3] to expose natural [66]. No provenance information.	0.1% (n=4)	0
	86	Lower fill of a pit [85] – likely to represent casual refuse dumping as backfill.	0.1% (n=3)	0
	327	Small, shallow dumping deposit occurring as backfill in a rectangular cut feature.	0.03% (n=1)	0
	Blank		0.1% (n=4)	0
OM31	Spits 1 & 2	Stage 1 testing - OM 31 was a strip graded in two spits [Spit 1 = Units [1] and [2]; Spit 2 = [3]. It may include some artefact material associated with Structure in [55], but broadly is comparable with the main surface [2] & [3].	0.1% (n=2)	4.3% (n=1)

AREA	UNIT	DESCRIPTION[27]	BONE NISP	SHELL NISP
OM34B	Trench	Mechanical excavator cuts to get cross-sections across a drainage feature that post-dates town occupation. All fill and fill contents appear to be either post-town abandonment or redeposited 1830s-60s material washed in.	0.03% (n=1)	0
OM34C		Mechanical excavator cuts to get cross-sections across a drainage feature that post-dates town occupation. All fill and fill contents appear to be either post-town abandonment or redeposited 1830s-60s material washed in.	0.1% (n=3)	0
	GRAND TOTAL		3075 (100%)	23 (100%)

Table 4.3: Broad distribution of faunal remains across the excavated areas of the Old Marulan site.

The faunal remains within each major unit will be discussed in Section 4.3. However, the distribution and condition of bone and shell – the bulk of which is likely to represent cultural refuse – across a site can often provide additional information regarding the attitudes and tolerances of site occupants towards food refuse disposal and sanitation issues.

The majority of faunal remains (over 70%) within the Old Marulan assemblage derive from Unit 41 – the gradually accumulated fill (*c.* 1830s-1860s) of a brick cesspit associated with the *Woolpack Inn.* The remainder occurred primarily within general refuse sheet middens / topsoil levels across the site, secondary backfill deposits of pits formed by grubbed out trees or posts (i.e. secondary site preparation / construction / demolition units) and patches of apparent episodic dumping of refuse. This broad pattern suggests the dominance of somewhat organised refuse disposal practices – i.e. through repeated use of a few small dumping locations and regular use of the cess pit as a rubbish dump. The relatively low frequencies of bone and shell within general sheet middens or backfill units (*c.* 20% of assemblage) indicates that simply throwing food refuse out the back window was not an overly common practice on Peter's lands. Colonial sites in NSW that show no organised system of rubbish disposal often contain 60-70% of faunal remains within topsoil units.

Aspects of the condition of the bones themselves – notably the near absence of rodent attrition – also suggests a level of care and control with regard to scavenging pests and food refuse disposal. Rodents have a single pair of upper and lower incisors that grow continuously throughout their lives. In order to maintain an effective biting length, rodents gnaw various objects with bone representing a favoured choice as it provides an added bonus of various minerals. Evidence of rodent gnaw marks within bone collections indicates not only that such pests were active on a site, but also that faunal food debris was accessible – i.e. exposed on the ground surface for a time. Conversely, the very low occurrence – only three examples – of rodent gnawing within the Old Marulan assemblage (in conjunction with the very low frequency of rodent remains) indicates that rodents were not a common pest on site and that food refuse was disposed of in a manner – e.g. burning, discrete burial / dumping (e.g. in the cess pit as a major refuse dump for the *Woolpack Inn*) – that would not overly attract such pest animals.

4.3 Faunal Analysis by Unit

The following section presents a more detailed analysis of the Old Marulan faunal assemblage according to identified excavation Units or groups of correlating Units as provided by excavation director, Denis Gojak. The discussion is broken into three main components; the general topsoil layers covering the bulk of the site (Section 4.3.1), a series of small, discrete deposits scattered throughout the township site (Section 4.3.2) and deposits associated directly with the occupation of the *Woolpack Inn* (Section 4.3.3).

4.3.1 General topsoils across Old Marulan town site – Units 2, 3, 8, 69 & OM31

Two general topsoil Units were encountered across a large portion of the Old Marulan township site – Unit [2]; upper topsoil horizon immediately below turf removal, and [3]; lower horizon directly underlying [2]. A third, naturally differentiated Unit resulting from decaying bedrock – Unit [8] – contained cultural material that appeared to form casual clustering of surface deposits associated with [2]. Two further areas – Units [69] and [OM31] – investigated via mechanical excavation, also yielded deposits similar to [2] and [3].

These topsoil deposits contained a wide temporal range of cultural material, from Aboriginal artefacts in [2] to 20th century material derived from highway use in [3]. However, when considered together, they form a coherent, gradually accumulating deposit that appears to be largely derived from Old Marulan township occupation.[28]

As such, the faunal remains derived from [2], [3], [8], [69] and [OM31] – *albeit* of relatively small sample size – have the potential to provide a general background indication of the use of animals and dietary habits of the broad township population.

In total, the excavated topsoil deposits contained 229 animal bone specimens and 8 marine shell specimens.

The bone collection is dominated by highly fragmented specimens – over 75% measuring ≤ 10% of the identified skeletal element and only around 7% surviving as complete or near complete (90-100% intact) specimens. The majority of these bone fragments exhibit a range of irregular, stepped and saw-toothed fracture or shatter marks characteristic of post-depositional breakage of dry bones (as opposed to green bone fracture). Various post-depositional and pre-burial / biostratinomic or post-burial factors can cause fracturing of bone assemblages; including both cultural and natural processes such as trampling, scavenger activity, construction or demolition activities involving movement of and impact to bone-bearing deposits, compression forces induced by overburden weight and factors related to climate.[29] The general fracture morphology exhibited on the topsoil bones tends to suggest that biostratinomic disturbance factors (e.g. trampling, soil disturbances etc) are the most likely causes of fragmentation.

Approximately 75% of the faunal assemblage also exhibits signs of weathering (staining, surface cracking / flaking, exfoliation etc) and plant activity (root etching). Although various physical and chemical agents can cause such affects, weathering is commonly interpreted as an indication that bones have been exposed to surface elements at some point in their taphonomic history. The presence of root etching also indicates that a given bone existed in a plant-supporting sedimentary environment, most likely within shallow soil zones, for a period of time.[30]

Considered together, the levels of fragmentation and surface condition of the faunal assemblage from Units [2], [3], [8], [69] and OM31 suggests a scenario whereby bones are deposited across open areas adjacent to domestic occupation – as an incrementally accumulating refuse deposit, subject to weathering, disturbance and breakage while exposed on the surface prior to final, gradual burial. This conforms to the general site formation interpretation of the topsoil Units.

In terms of taxa, the faunal collection from the Old Marulan topsoil deposits is dominated by introduced domesticates (sheep, cattle, pig and chicken). Small fragments of bones from

[28] Denis Gojak pers. com.
[29] See Lyman, R. L. (1994)
[30] See Behrensmeyer, A. K. (1978) "Taphonomic and ecologic information from bone weathering." in *Paleobiology.* Vol. 4., pp. 150-162

unidentifiable mammal species and one kangaroo / wallaby bone make up the remainder. The shell assemblage consists entirely of *Saccostrea* oyster. Refer to Table 4.4 below.

	TAXON	NISP	% NISP
Animal Bone	Sheep (*Ovis aries*)	108	47.16%
	Cattle (*Bos taurus*)	69	30.14%
	Pig (*Sus scrofa*)	5	2.18%
	Chicken (*Gallus gallus*)	1	0.44%
	Kangaroo / wallaby (Macro. sp.)	1	0.44%
	Medium mammal	41	17.90%
	Medium-large mammal	2	0.87%
	Large mammal	2	0.87%
	Total	**229**	**100%**
Shell	Sydney rock oyster (*Saccostrea glomerata*)	8	100%
	Total	**8**	**100%**

Table 4.4: Taxonomic composition of faunal assemblage in Units [2], [3], [8], [69] and [OM31]

Very little clear butchery evidence is apparent, with only three bones exhibiting marks from metal tools. However, given the range of species identified, it is likely that the faunal remains within the Old Marulan topsoils primarily represents the debris of human subsistence. No evidence of companion animals or opportunistic commensal species was identified. The one slightly unusual element – the kangaroo / wallaby metacarpal – shows no direct evidence of cultural modification (such as cut marks or burning), and may represent a natural death deposit deriving from residual topsoils, post-occupation deposits or a remnant of surrounding native fauna during town occupation whose remains have become mixed in with cultural deposits.

Information on the demographic profile for the livestock species within the topsoils is scarce (26 specimens). However, it does provide basic evidence for the presence of;

- cattle that were either in late adolescence (2-2.5 years old), were close to, or had reached, skeletal maturity (3-3.5 years old) – i.e. all defined as "beef cattle." Late adolescence in cattle (18-30 months old) is generally considered to be the time that gives the best returns in terms of the amount of meat provided (but not necessarily the perceived quality) in relationship to foodstuff consumed – i.e. continuing to feed the animal beyond this stage would not substantially increase its body weight or meat yield.[31] There is no evidence within the topsoil deposits of "vealers" or "yearling" cattle;
- sheep of various ages, including lamb-yearling lamb (3-18 months old), two-tooths (2-3 years old) and adults that have reached skeletal maturity (over 3-3.5 years old) – the meat from these animals is termed "lamb," "hogget" and "mutton" respectively. Physical maturity or optimum body weight in sheep is generally reached at between 18-24 months of age[32];
- pigs between 1.5-3.5 years of age – often termed "store pigs" or "butcher hogs". Pigs generally reach full bodily maturity (when the meat yield to fodder input ratio is maximised) at 2-3 years of age. However, when raised solely for meat production, pigs are usually (in 19th-20th century UK & Australian culture) slaughtered between 6-9 months (*c.* 6 months for a pork pig, 8-9 months for a bacon pig) as older pigs tend to have a great deal of fat.[33] There is no evidence within the topsoil deposits of suckling / sucking, pig or young piglets.

[31] Hagen, A. (2006) Anglo-Saxon Food and Drink – Production, Processing, Distribution and Consumption. Anglo-Saxon Books, United Kingdom; Piper, A. (1991) Butchery Analysis in Australian Historical Archaeology. Unpublished MA thesis, University of New England, NSW.
[32] Hagen, A. (2006); Hillson, S. (2005) *Teeth.* Cambridge Manuals in Archaeology, Cambridge University Press, UK; Piper, A. (1991)
[33] *Ibid*

As the sample size of bones providing age-at-death data is very small and the topsoil deposits contain materials of wide temporal and possibly spatial range, meaningful interpretations regarding the economy, husbandry systems and dietary preferences of Old Marulan township cannot be extracted. However, at a most basic level these bones do show that;

- some cattle were kept until they were close to skeletal maturity and others were kept at least well into their third year. All had reached an age of optimum meat yield and those that lived beyond late adolescence are likely to have been kept as breeding or dairying animals for a few years prior to being culled. There is no clear evidence of old cattle suggesting working animals;
- sheep were slaughtered at various ages, indicating a mixed regime of breeding directed towards the production of lambs-yearling lamb meat (suggesting a more prosperous economy) and the rearing of other sheep to physical maturity thus allowing optimum weight / meat yield to be reached and additional resources – such as breeding and dairying – to be utilised. However, there is no clear evidence of well aged sheep suggesting dedicated wool production;
- some pigs (including one identifiable female) were kept until they were approaching or had reached bodily maturity – indicating that quantity of meat or perhaps higher quantities of fat was perhaps more important than the tenderness of younger carcasses. These pigs may also be "backfatters" – older breeding pigs subsequently culled for meat. There is no evidence of suckling / sucking pig, or shoats / weaned piglets.

The livestock remains derived from the topsoil deposits also includes a variety of skeletal elements, with almost all body parts – certainly for sheep and cattle – present.

Body part frequencies and ratios of skeletal completeness are often used in colonial urban and rural sites to provide information on slaughter, butchery and processing activities and locations, as well as household provisioning and the types of joints utilised.

The amount and type of meat that can be obtained from an animal varies significantly across different parts of its body. For instance, the lower limbs and feet of domesticate livestock contain much less edible muscle or fat tissue than the upper limbs or trunk, and a higher ratio of bone to flesh. As such, the lower limbs and feet may be said to have a lesser food utility value, which in turn suggests that they generally would also have a lower economic value as food items. The amount of bone in body parts such as the feet can also often make such joints quite cumbersome and more effort is also generally required to process these parts – i.e. to extract the edible portion and prepare a meal. To quote the famous Mrs. Beeton, "joints with an undue proportion of bone are very unprofitable."[34] Indeed, with ungulates such as cattle and sheep, the low food utility of the heads and feet often lead to them being deposited close to the site of slaughter as butchery waste.

Consequently, within archaeological assemblages, a predominance of high food utility value portions is generally taken to infer a more prosperous economic position – particularly if found in conjunction with high numbers of juvenile animals. Conversely, high frequencies of low food utility portions (such as heads and feet) are generally assumed to indicate a collection of slaughter waste or evidence of more scrupulous making-do.

A simple method of dividing livestock bones from Australian historic sites into gross body portions with associated general food utility has been devised by Steele[35] and is used here to provide an approximate but meaningful interpretation of the dietary value of the livestock body parts identified in the Old Marulan topsoil contexts – refer to Table 4.5.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Hindquarter / hind leg & pelvis	High dietary value	23 (21.30%)	4 (5.80%)	2 (40%)
Forequarter / front leg & shoulder	Medium - high dietary value	18 (16.67%)	5 (7.25%)	0
Trunk / vertebrae & ribs	Medium – high dietary value	17 (15.74%)	7 (10.14%)	0

[34] Beeton, I. M. (1861) *Mrs. Beeton's Book of Household Management.* S.O. Beeton, London.
[35] Steele, D. (1999a) *Archaeology at Orange Court House – A Report on the Faunal Evidence.* Unpublished report.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Extremities / feet	Limited dietary value, primarily butchery waste	9 (8.33%)	10 (14.49%)	0
Cranial / skull & teeth	Low dietary value, primarily butchery waste	8 (7.41%)	16 (23.19%)	3 (60%)
Unidentified long bone fragment	Various / not known	33 (30.55%)	27 (39.13%)	0
TOTAL		**108 (100%)**	**69 (100%)**	**5 (100%)**

Table 4.5: Body part frequencies of the livestock elements within topsoil deposits.

These figures obviously cannot be read as a definitive calculation of the quality of meat consumed by the occupants of Old Marulan – particularly when taphonomic factors are taken into account. However, they do suggest patterns of behaviour whereby the bulk of livestock carcasses – from head to toe and low-high quality or value – were present on site and most likely utilised in some way.

As the topsoil deposits appear to represent incrementally accumulating refuse across much of the Old Marulan town area, it is possible that not all faunal remains represent domestic or household rubbish. Livestock and meat products tend to move around a town, not just into it, and most 19th century NSW urban and rural communities show the development of several slaughterhouses and specialist butchers within town limits. As such, the heads and feet within the topsoil layers may in fact represent scatterings of butchery waste instead of, or indeed as well as, evidence of tight household budgets or even food resources for companion animals. Unfortunately butchery evidence or contextual location information does not provide sufficient information for us to distinguish between these possibilities.

One of the three elements showing clear butchery, does however, provide a very basic indication of somewhat intense carcass utilisation or relatively high levels of energy expended to obtain full resources from livestock carcasses. The bone in question is a cattle long bone fragment exhibiting a transverse sawn shearface – i.e. the long bone was sawn into at least two segments. This is not a standard disarticulation mark – i.e. the result of processing via severing of convenient joints depending on skeletal and muscular anatomy and subsequent removal of meat into smaller cuts. Indeed, a substantial amount of effort is required to saw through cattle bones and it is certainly not the most convenient way to butcher a cow. There are, however, two functional reasons why a butcher would go to such efforts:

- to allow the direct extraction of marrow or the use of bone sections in soups and stews – behaviour that indicates a general need or desire to make full use of the available food resources, or;
- to break down cattle limbs into smaller pieces to provide cuts suitable for tight packing and preserving in large salt or brine barrels / containers – behaviour that indicates a desire to prepare longer-term meat supplies and to ensure full utilisation of meat resources.

A third reason why cattle long bones may have been divided into segments is the preparation of bone blanks for implement manufacture – another behaviour that suggests rather intensive utilisation of animal carcasses.

Ultimately, the faunal assemblage derived from the Old Marulan topsoil deposits appears to comprise a collection of background debris resulting from cultural subsistence activities that may represent a mix of domestic and butchery refuse or an indication of a range of economic domestic positions – put simply, from the wealthier households eating high quality roasting units to the poorer households eating trotters and marrow-bone stews. The age-at-death information indicates the presence of older animals, kept until they reached or passed physical maturity, thus suggesting a regime where at least some livestock were valued for the quantity of meat and other resources they provided rather than reared solely for tender young meat. The body portion data indicates that livestock (cattle, sheep and most likely pig) were present in Old Marulan township as complete individuals from time to time – most likely arriving or being present on the hoof and being slaughtered inside or in close proximity to town limits. The very limited butchery data suggests that livestock carcasses were also processed for more than just the stripping of fresh meat. The range of species present highlights the pervasive culinary traditions of colonial settlers and provides no direct evidence of exploitation of native vertebrate fauna.

In summary, this presents a somewhat middle-range faunal background debris, common to many 19th century NSW rural colonial sites. There is no evidence of overt expressions of wealth or intense indication of scrupulous subsistence behaviour and there are no extraordinary vertebrate species or bone modifications present.

The only unusual and rather remarkable element is the presence of marine oysters in such a location; 8 NISP, 4 MNI oysters. As discussed in Section 4.2, Old Marulan lies at least 70km from the nearest coastal environments and the transportation of rock oysters to the township would require a journey of at least one, if not two, days on horseback. Obviously somebody once felt it was worth the trip and the risk of consuming two-day old, un-refrigerated, oysters. However, the low numbers of oysters suggest that this behaviour did not occur frequently or to any great extent.

A final research avenue with regards to the topsoil deposits is the question of whether the pattern of material accumulation continues from [3] to [2] or if they are substantially different.

An examination of the faunal remains from these Units tends to indicate the former:

- both Units [2] and [3] contain a scatter of background subsistence debris dominated by livestock remains – [2] yielded 133 bones and [3] yielded 90;
- Sheep, cattle and pig take first, second and third place in frequency across both Units;
- The only variation in species present is one kangaroo / wallaby bone in [2] and one chicken bone in [3];
- Both units contain oyster shells – unit [2] yielded 4 fragments and unit [3] yielded 3;
- Bones from both units show high levels of fragmentation – around 71% of bones in [2] represented ≤10% of identified skeletal element, compared to around 83% in [3] and this slight difference in fragmentation may be due to the longer post-depositional period experienced by remains in [3];
- Bones from both units also show high proportions of uniform weathering – around 89% in [2] and 91% in [3] – again the slight difference may be due to length of time since deposition;
- Livestock skeletal frequency data shows the presence of all body parts in [2] and [3], with no distinct variation in patterning ; and
- Aging data reveals the same broad presence of more mature animals across both Units.

None of this should be taken to say that the use of or attitudes towards animals within the Old Marulan township did not change at all throughout the occupation of the town. Rather it simply appears that the limited sample size of faunal debris within the topsoil units does not provide evidence of substantial or distinct temporal change.

4.3.2 Various discrete deposits across the Old Marulan township site

The following section deals with a variety of somewhat discrete bone-bearing deposits across the Old Marulan township site, including more isolated surface sheet middens, small episodic dumping locations, pit backfills etc. These deposits were scattered throughout the site and appear to relate to general domestic activities. Deposits directly associated with the *Woolpack Inn* shall be discussed in Section 4.3.3.

4.3.2.1 Surface sheet midden near Crown Reserve, *c.* 1860s-1900 – Unit 4

Unit [4] represents a dense surface sheet midden that was identified near the boundary of the Crown Reserve. Artefact dating suggests that this midden was deposited between the 1860s-1900s, representing the period at the very end of Old Marulan town occupation through to people living in the *Woolpack Inn* after the town was abandoned. Unit [4] may represent filling in a shallow depression of the site, however, it seems more likely to be a gradually accumulating refuse deposit – perhaps intentional episodic disposal onto a convenient patch of unoccupied ground.[36]

In total, Unit [4] yielded 144 animal bone specimens. No shell specimens were present in this deposit.

[36] Denis Gojak pers. com.

The bone collection is dominated by highly fragmented specimens – almost 73% measuring ≤ 10% of the identified skeletal element and only around 9% surviving as complete or near complete (90-100% intact) specimens. The general morphology of fractures exhibited on these bones is consistent with that observed in the topsoil units. Over 80% of the bones also exhibited uniform weathering and / or root etching. These attributes are characteristic of faunal remains that have been deposited on the surface and undergone disturbance and gradual burial over time. Unfortunately, this information does not allow us to distinguish between an *in situ* incrementally accumulating surface deposit or a secondary levelling fill derived from surface deposits elsewhere across the site.

In terms of taxa, the faunal collection from Unit [4] is dominated by introduced domesticates (sheep, cattle, pig) – indeed these three represent the only identified species. The remainder of the assemblage (around 15%) is comprised of small fragments from unidentifiable medium-large mammal species. Refer to Table 4.6 below.

	TAXON	NISP	% NISP
Animal Bone	Sheep (*Ovis aries*)	87	60.42%
	Cattle (*Bos taurus*)	19	13.19%
	Pig (*Sus scrofa*)	16	11.11%
	Medium mammal	10	6.94%
	Medium-large mammal	7	4.86%
	Large mammal	5	3.47%
	Total	**144**	**100%**

Table 4.6: Taxonomic composition of faunal assemblage in Unit [4]

Information on the livestock demographic profile is again quite scarce (21 specimens), however, it provides basic evidence for the presence of:

- cattle that had reached skeletal maturity (3-3.5 years old) and lived beyond optimum body weight. There is no clear evidence of vealers or yearlings;
- sheep that lived for at least 9-18 months, and possibly longer, as well as sheep that lived well beyond optimum body weight and reached skeletal maturity (over 3.5 years of age). There is no clear evidence of the presence of sheep killed as lambs;
- pigs (including one adult male) that lived for at least 1.5-2.5 years, beyond what is often considered prime eating age. There is no clear evidence of suckling / sucking pig or young piglets.

Similar to the topsoil deposits, this information provides some indication of husbandry regimes whereby at least some livestock were kept beyond the age of most tender meat yield and appear to have been more valued for the higher quantity of meat and the additional resources (milk, breeding purposes etc) that adult livestock can provide.

General body part frequencies for the three livestock species within Unit [4] are presented in Table 4.7.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Hindquarter / hind leg & pelvis	High dietary value	23 (26.44%)	0	0
Forequarter / front leg & shoulder	Medium - high dietary value	16 (18.39%)	0	1 (6.25%)
Trunk / vertebrae & ribs	Medium – high dietary value	4 (4.6%)	10 (52.63%)	0
Extremities / feet	Limited dietary value, primarily butchery waste	8 (9.19%)	4 (21.05%)	1 (6.25%)
Cranial / skull & teeth	Low dietary value, primarily butchery waste	11 (12.64%)	0	14 (87.5%)
Unidentified long bone fragment	Various / not known	25 (28.74%)	5 (26.32%)	0
TOTAL		**87 (100%)**	**19 (100%)**	**16 (100%)**

Table 4.7: Body part frequencies of the livestock elements within Unit [4].

As with the topsoil deposits, it is difficult to extract substantial information from this patterning as Unit [4] may represent a mix of household or commercial refuse from various periods (1860s-1900s) and areas across the Old Marulan township. In general, this data appears to indicate a continuing trend from that observed in Units [2] and [3] – i.e. livestock – certainly sheep – were present within town limits as complete individuals and the bulk of carcasses were likely utilised in some fashion. Although the cattle and pig within Unit [4] show low skeletal completeness, this may be a product of very small sample sizes. The presence of "butchery waste" elements for both species certainly suggests that they were slaughtered in or near Old Marulan.

Four bones within Unit [4] show evidence of butchery:

- 2 cattle vertebrae showing cranio-caudal sawn shearfaces – such marks general result from midline longitudinal bisection of a cattle carcass, a standard primary butchery practice in 18th-20th century Australian meat industry;
- 1 cattle long bone showing transverse sawn shearface – likely resulting from either a desire to extract marrow, preparation for preservation or use of bone as a raw material, all indicative of careful and thorough utilisation of cattle carcasses;
- 1 sheep pelvis showing superficial cleaver / chop marks near the joint with the femur – likely resulting from meat removal / filleting of loin–leg; an area of a sheep that is considered a prime roasting / loin chop / steak unit .

Ultimately, the faunal assemblage derived from Unit [4] appears to represent a scatter of background subsistence debris. There is no evidence of introduced fauna other than traditional UK dietary species nor any indication of an exploitation of native fauna. Similar to the topsoil deposits, the bone refuse shows a range of low-high quality meat units. While these may not all be dinner tables scraps – e.g. the lower value elements may be butchery waste – the very limited butchery evidence does provide some suggestion of carcass utilisation from both ends of the spectrum; i.e. from obtaining prime mutton roasting units to extracting marrow and / or raw materials from cattle bones.

4.3.2.2 Introduced fill within depression in general topsoil level – Unit 5

Unit [5] represents a relatively shallow, localised cultural deposit situated within Unit [2] and interpreted as an introduced deposit / secondary refuse used as a levelling fill.[37]

Unit [5] yielded only 12 bones and no shells.

The bones include a mix of ten cattle long bone and vertebrae fragments, one adult (at least 2 years of age) pig skull fragment and one unidentifiable mammal long bone fragment. All bones within [5] showed high levels of fragmentation (all measuring $\leq$10% of element identified) and slight-moderate levels of weathering and root etching. The only butchery evidence includes two cattle long bones exhibiting transverse sawn shearfaces.

This collection constitutes a small scatter of background subsistence debris, similar to that identified within the topsoil units. There are no unusual or remarkable features about these twelve bones that would add any further information to the interpretation of Unit [5].

4.3.2.3 Household / fireplace refuse used as fill – Unit 6

Unit [6] represents a thin, compact deposit that appears to have been used to fill a small depression (possibly from the removal of a tree) and consists of household refuse; possibly fireplace sweepings as charcoal was present throughout.[38]

Only 5 bones were identified in Unit [6], including 3 sheep elements (calcaneus, femur and rib) and 2 unidentifiable mammal long bone fragments. Four of these bones exhibit relatively high levels of weathering that tends to suggest they were exposed to surface elements at some time – either during original deposition or secondary re-deposition. Only one bone showed evidence of being directly

[37] Denis Gojak pers. com.
[38] Denis Gojak pers. com.

exposed to high temperatures or fire (the sheep rib), suggesting that not all of Unit [6] deposits originally derive from a fireplace context.

These five bones provide little further information regarding Unit [6] – other than perhaps a general suggestion that the household from which these deposits originated once consumed a meal of mutton rack or breast!

4.3.2.4 Domestic backfill within tree bole, c. 1850s-1880s – Units 13 & 15

Units [13] and [15] represent backfill deposits within a substantial depression resulting from a tree being grubbed out and partly burnt *in situ*. Artefact information suggests that these Units contain typical household refuse (as opposed to commercial or hospitality / inn-type rubbish) and were deposited sometime between the 1850s-1880s – towards the end of the Old Marulan town period.[39]

As such, the faunal remains from these Units have the potential to provide some information on household provisioning and domestic dietary practices during the late period of Old Marulan occupation.

In total, 274 animal bone specimens and 3 shell specimens were identified in Units [13] and [15].

Again, the bone collection exhibits signs of post-depositional disturbance and exposure to surface elements with almost 73% comprising highly fragmented pieces (measuring ≤10 of the identified element) and over 55% exhibiting slight-moderate weathering and root etching. These attributes tend to correspond with the idea of the refuse within [13] and [15] representing miscellaneous backfill, possibly from surrounding surface areas and incorporating batches of household refuse.

However, the condition of the bone within these Units is distinguished from other surface sheet middens / refuse patches across the site through the relatively high proportion of burnt bone. Almost 39% of the animal bone from [13] and [15] show signs of charring and or calcination – indicating that they were subject to high temperatures as defleshed elements. Evidence of bone burning within 19th century domestic assemblages is often a sign of intentional refuse disposal – i.e. bones get chucked in the fire rather than out the window. However, given the context of these faunal remains, is it perhaps more likely that the burning identified occurred as a result of their proximity to a tree stump that was burnt *in situ* – i.e. either they were near the stump when it was burnt or the hole was backfilled with bone-bearing deposits while the stump was still smouldering.

In terms of taxa, the faunal material from Units [13] and [15] is dominated by introduced domesticates (sheep, cattle, pig) – again, these three actually represent the only identified species. The remainder of the assemblage is comprised of small fragments from unidentifiable small, medium and large mammal species. The shell collection consists entirely of *Saccostrea* oyster specimens. Refer to Table 4.8 below.

	TAXON	NISP	% NISP
Animal Bone	Cattle (*Bos taurus*)	100	36.5%
	Sheep (*Ovis aries*)	84	30.66%
	Pig (*Sus scrofa*)	7	2.55%
	Medium mammal	34	12.41%
	Medium-large mammal	28	10.22%
	Large mammal	20	7.30%
	Small mammal	1	0.36%
	Total	**274**	**100%**
Shell	Sydney rock oyster (*Saccostrea glomerata*)	3	100%
	Total	**3**	**100%**

Table 4.8: Taxonomic composition of faunal assemblage in Units [13] and [15]

[39] Denis Gojak pers. com.

Of some interest is the predominance of cattle remains in these contexts. Numerous factors other than dietary preference can affect relative frequency calculations with regard to taxa in an archaeological assemblage – such as flaws in quantification methods, small sample sizes, differential preservation, varying butchery techniques. Essentially, faunal collections may provide information on what people ate but are usually unlikely to give an accurate idea of exactly how much they ate. Nonetheless, broad patterns can often be extrapolated and a predominance of cattle in a mid-late 19th century NSW context is somewhat notable as most assemblages dating to this period tend to show much higher numbers of sheep elements.

Mutton was an all-pervading dish throughout mid-late 19th century in NSW, running through all regions and classes of society and often documented in historical sources as the main meat eaten.[40] However, the presence of high numbers of cattle elements within an assemblage indicates that beef contributed more to some colonial diets than the literature may suggest.

As mentioned above, it takes over six sheep to equate the value in terms of consumable meat weight of one cow and basic MNI calculations for these two species in Units [13] and [15] suggest a ratio of only two sheep present for each cow. Moreover, as has also been mentioned, ethnoarchaeological evidence suggests that cattle carcasses underwent much higher levels of deboning during butchery than sheep in 19th century food processing. Some studies indicate that up to 42% of bones from a cow carcass may have been discarded during butchery whereas the majority of sheep bones are retained within prepared meat joints or cuts.[41] What this means is that even more beef may have been consumed by a given household than is evident from their rubbish as boneless beef products contain no archaeological markers.

Ultimately it may be suggested that contrary to historical generalisations, the household/s responsible for the refuse in Units [13] and [15] dined on beef just as frequently, if not more so, than mutton.

Information on the demographic profile for the livestock species within Units [13] and [15] (30 specimens) provides basic evidence for the presence of;

- cattle that were in mid-late adolescence (1.5-2.5 years old) – towards the optimum fodder to meat yield ratio, and cattle at least a year beyond skeletal maturity (over 4 years of age). There is no evidence in of "vealers" or "yearling" cattle;
- sheep of various ages, from possible two-tooths (2-3 years old) to adults that have reached skeletal maturity (over 3-3.5 years old). There is no evidence of lamb;
- pigs of around 12-15 months of age – i.e. well before the age of physical maturity. There is no evidence of suckling pig or young piglets.

Similar to several other Units examined thus far, the age-at death dating in Units [13] and [15] indicates that at least some cattle and sheep were kept until optimum body weight age while others lived to full adulthood, suggesting they were valued for highest meat quantity and breeding or dairying. The aging data for pigs shows the presence of younger animals than identified in other contexts – not so young that they would be identified as suckling or juvenile piglets, but certainly some were killed when immature and not that far beyond what is often considered prime eating age. This may suggest either a cultural preference for younger pig meat and a certain level of economic prosperity and security in breeding stock to allow such tastes to be indulged; or conversely a period of shortage in sufficient feed that would have provided an economic motive to cull excess pigs.

Skeletal frequency data for the livestock within Units [13] and [15] indicates a presence of almost all body parts for each species – refer to Table 4.9.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Hindquarter / hind leg & pelvis	High dietary value	20 (23.81%)	7 (7%)	2 (28.57%)
Forequarter / front leg & shoulder	Medium – high dietary value	15 (17.86%)	4 (4%)	1 (14.29%)
Trunk / vertebrae & ribs	Medium – high dietary value	16 (19.05%)	27 (27%)	1 (14.29%)

[40] Beckett (1984); Gollan, A. (1984)
[41] Piper, A. (1991) *Butchery Analysis in Australian Historical Archaeology.* Unpublished MA thesis, University of New England, NSW.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Extremities / feet	Limited dietary value, primarily butchery waste	7 (8.33%)	16 (16%)	0
Cranial / skull & teeth	Low dietary value, primarily butchery waste	18 (21.43%)	2 (2%)	2 (28.57%)
Unidentified long bone fragment	Various / not known	8 (9.52%)	44 (44%)	1 (14.29%)
TOTAL		**84 (100%)**	**100 (100%)**	**7 (100%)**

Table 4.9: Body part frequencies of the livestock elements within Units [13] and [15].

The general artefact analysis for these Units has shown that they comprise typical household refuse, thus suggesting the faunal remains also result from domestic activities (as opposed to a more general scatter that may include commercial / butchery refuse). Based on such an assumption, the body part representation in [13] and [15] tends to imply rather intense carcass utilisation within or across various households in Old Marulan during the 1850s-1880s – i.e. meat dishes ranging from high to low / limited dietary value were consumed. On a basic level this may suggest a range of economic positions across different households; beef steak and roast loin for the richer and cow heel or scrag stew for the poorer. However, it may also simply indicate a communal desire to make full use of available meat resources. Indeed, although ungulate heads and feet are often given bad press, being labelled "butchery waste," several 19th century British and Australian cook books written for the middle-upper classes include quite extravagant recipes for fried ox-feet, baked ox cheek, boiled marrow bones, sheep's trotter, pig's head brawn etc. [42]

The butchery evidence within Units [13] and [15] (20 examples) provides a little more information on the types of meat cuts utilised. Much of the marks identified result from standard primary butchery (such as longitudinal midline division of carcasses) and secondary jointing (e.g. secondary transverse bisection). However, there is some evidence of particular portioning including preparation of:

- beef aitchbone cuts, generally used as a boiling piece – ranked 3rd class according to Mrs. Beeton[43];
- beef shin and hock cuts or segmented marrow bones, generally used for making stews – ranked 5th class;
- beef fore, middle or chuck rib, ranging from prime roasting units to second quality steaks;
- beef middle or chuck rib, regarded as the more economical steak or roasting joints;
- beef brisket or flank, regarded as middle range boiling units; and
- mutton hind shanks, generally used for braising or stewing.

This data should not be read as implying a predominance of such meals, only a snapshot of what may have once been served in Old Marulan households during the mid-late 19th century.

A final note of interest is again the presence of oyster shells in these Units; 3 NISP and all of which are left valves which means an MNI of 3. It would appear that members of the households (*c.* 1850s-1880s) from which the debris in Units [13] and [15] derived, participated in the somewhat mad practice of consuming well-travelled oysters.

4.3.2.5 High density refuse patch – Unit 18

Unit [18] represents a high density refuse layer situated near [13]–[15] (the backfilled depression left by a grubbed out, burnt tree stump). [18] may actually form part of the same deposit, however, excavation suggested that it may be more closely related to Unit [4] – a surface sheet midden also located near the burnt out tree.[44]

In total, Unit [18] yielded 33 animal bones specimens and 1 shell.

[42] See Beeton, I. M. (1861)
[43] Ibid
[44] Denis Gojak pers. com.

The faunal assemblage is dominated by highly fragmented specimens, with almost 88% measuring ≤10% of identified skeletal element and absolutely no bones being more than 60% complete. Almost 42% exhibit slight-moderate weathering and over 33% show extreme calcination.

In terms of taxa, the only identifiable animal species within Unit [18] include the three domesticates (sheep, cattle and pig). The shell specimen is a *Saccostrea* oyster fragment – refer to Table 4.10.

	TAXON	NISP	% NISP
Animal Bone	Sheep (*Ovis aries*)	9	27.27%
	Cattle (*Bos taurus*)	6	18.18%
	Pig (*Sus scrofa*)	4	12.12%
	Medium mammal	6	18.18%
	Medium-large mammal	5	15.15%
	Large mammal	3	9.09%
	Total	**33**	**100%**
Shell	Sydney rock oyster (*Saccostrea glomerata*)	1	100%
	Total	**1**	**100%**

Table 4.10: Taxonomic composition of faunal assemblage in Unit [18]

This taxonomic composition is characteristic of 19th century colonial food debris – again, however, with the exception of the unusual presence of oyster shell in a site so far inland.

The age at death information indicates the presence of adult sheep (over 3.5 years old) and pigs around 1.5-2 years of age – again, suggestive of a meat and milk regime whereby livestock are kept until they reach optimum weight.

The body part frequencies show the presence of a range of elements for all three domesticates; cattle trunk, forelimb, hindlimb and feet, sheep trunk, forelimb and hindlimb and pig forelimb, hindlimb and feet. Similar to other Units so far described, this indicates a rather thorough utilisation of animal carcasses within Old Marulan township.

Little more information regarding the occupants of Old Marulan can be extracted from the animal bone and shell within Unit [18], however, the faunal remains may contribute to site formation interpretation.

In broad terms, this collection is quite similar to both Units [4] and [13] – [15], forming a general background faunal debris. However, two features stand out that suggest a closer correlation to Units [13] and [15]:

- Similar to [13] – [15], Unit [18] yielded oyster shell (albeit only one), whereas [4] contained no shell;
- Perhaps more convincing – over 33% of the bone from Unit [18] showed extreme calcination, comparable to the 39% in [13]-[15]. Whereas only just over 2% of the faunal assemblage from Unit [4] exhibited evidence of burning. While there are several cultural activities that may result in bones being burned (cooking, fuel for fires, disposal of food waste etc.), it has been proposed that the bones in [13]-[15] show higher than site average levels of calcination due to their association with the burnt tree stump – i.e. they were either in close proximity to the stump when it was set alight or were deposited into the hole while the stump was still smouldering. As such, the similarly high proportion of calcined bones in [18] may also be a result of the same burning event, thus indicating that Unit [18] forms a disturbed component of the general [13]-[15] deposit.

4.3.2.6 Occupational deposits associated with timber structure/s NE of *Woolpack Inn* – Units 37, 38 & 55 & 57

Units [37], [38], [55] and [57] are all associated with a substantial timber post structure situated to the north-east of the *Woolpack Inn* site. Units [37] and [55] represent the fill of rectangular post holes; Units [38] and [57] represent somewhat ephemeral deposits, associated with either the construction or occupation of the timber structure.[45] All four Units shall be analysed as a group. However, it should be noted that as several of these Units represent foundation fills, some of the faunal remains within are likely to be residual deposits – i.e. formed prior to or during construction, rather than relating to the occupation of the structure itself.

In total, these Units contained 45 animal bone specimens and 6 shell specimens. The faunal assemblage was relatively highly fragmented (almost 69% measured ≤ 10% of the identified element) and over 53% exhibited slight to moderate weathering and root etching. The general fracture morphology and bone condition suggests that the faunal remains were exposed to disturbance and surface elements at some point in their taphonomic history – for instance, being deposited on the surface prior to included in posthole packing fill.

Almost 18% of the faunal remains showed extreme calcination – higher than most other Units across the Old Marulan site but lower than [13]-[15] and [18]. This burning evidence indicates the bones were exposed to high temperatures while defleshed and this may have occurred as a result of intentional disposal of food waste / fuel for fire or unintentional burning – e.g. through association with dumped hot ash deposits.

In terms of taxa, the faunal assemblage from Units [37], [38], [55] and [57] is dominated by the three livestock species (sheep, cattle and pig) and small fragments from unidentified mammals of medium-large size – characteristic of 19th colonial food refuse. However, an additional species that is unlikely to represent food debris occurs in these units; domestic cat. The shell collection consists entirely of *Saccostrea* oyster. Refer to Table 4.11.

	TAXON	NISP	% NISP
Animal Bone	Sheep (*Ovis aries*)	17	37.78%
	Cattle (*Bos taurus*)	12	26.67%
	Pig (*Sus scrofa*)	2	4.44%
	Cat (*Felis cattus*)	1	2.22%
	Medium mammal	12	26.67%
	Large mammal	1	2.22%
	Total	**45**	**100%**
Shell	Sydney rock oyster (*Saccostrea glomerata*)	6	100%
	Total	**6**	**100%**

Table 4.11: Taxonomic composition of faunal assemblage in Units [37], [38], [55], and [57]

The livestock remains in Units [37], [38], [55] and [57] include a range of all sheep body parts, all cattle body parts with the exception of cranial elements, and pig cranial elements only. As with all other Units discussed thus far, this suggests a thorough utilisation of livestock carcasses in Old Marulan township.

The age-at-death data indicates the presence of adolescent-adult livestock – cattle over 2 years old, sheep over 2.5 years old, pigs over 1.5-2 years old – suggesting that many animals were not culled until they had reached optimum weight and / or provided some additional resources (such as milk or breeding).

[45] Denis Gojak pers. com.

Butchery evidence (3 examples) shows evidence for standard primary cattle butchery practices (such as longitudinal and transverse bisection), portioning or jointing (such as division between cattle rump and aitchbone cuts) and division of cattle long bones into segments – possibly to extract marrow and / or facilitate packing for preservation.

Ultimately, the faunal collection from the group of Units associated with the timber structure is comparable to several other deposits across the site. Two components are of further interest however.

The first is the presence of more oyster shell (6 specimens, 3 MNI), providing further evidence of the quite risky dietary indulgences of some occupants of Old Marulan. It may be that these shells derive from the occupation of the timber structure itself, consequently indicating that oyster-eating occurred through several households within the town. However, it is just as likely that these oysters are residual deposits and were originally deposited with other shells in some of the surface sheet middens across the site.

The second is the presence of domestic cat in this group of Units – a single metapodial from an adult cat. The occurrence of cat remains within 19th century NSW colonial sites is by no means unusual, however, it is the first evidence in this analysis of introduced rural non-dietary fauna in Old Marulan.

Domestic cats first arrived in NSW during the late 18th century, some no doubt simply forming the role of companion animals. By the early 19th century, however, many cats were either kept in urban or rural areas or released into surrounding bushlands to serve the role of rodent catchers. By the 1880s, NSW Government sanctioned programs of breeding, transportation and release of cats were also conducted in the forlorn hope that they would control the rabbit plague.[46]

Within an urban context, the presence of domestic cats is sometimes used to make inferences regarding economic status – i.e. occupants of a household must have some level of disposable wealth to provide food for companion animals. In a rural context, however, cats are more likely to serve a working role as well as, or instead of, being simply pets and may have primarily fended for themselves. Unfortunately, the deposition context does not provide any hint as to whether this cat was valued as a pet, a rat catcher or was just a stray animal living within town limits.

4.3.2.7 Small refuse dump – Unit 40

Unit [40] represents a confined, artefact rich deposit. Interpretation suggests that it may form an in-floor deposit of a structure but is more likely to represent a small, deliberate dumping location.[47]

In total, Unit [40] yielded 34 animal bones and 1 shell specimen.

The animal bones in Unit [40] are much less fragmented than other deposits across the Old Marulan site, with only around 38% measuring ≤10% of the identified element and almost 21% surviving as intact elements. The general levels of fracture suggests that these bones were subject to less post-depositional disturbance than those in more dispersed surface midden deposits or secondary deposits. As such, Unit [40] may in fact form a primary deposition of one or several batches of refuse; certainly the condition of this assemblage does not conform to that expected in an in-floor deposit. Over 94% also show slight-moderate weathering and root etching, as would be expected in refuse deposited on open ground.

The only species identified in the Unit [40] deposits are the three livestock (sheep, cattle and pig) – the remainder constitutes small fragments of an unidentifiable mammal of medium size. Characteristic of many 19th century NSW colonial assemblages, sheep numbers the highest, followed by cattle and pig. The shell specimen is a *Saccostrea* oyster fragment. Refer to Table 4.12.

[46] Rolls, E. C. (1969); Symons, M. (1982); Walker, R. & D. Roberts (1988)
[47] Denis Gojak pers. com.

	TAXON	NISP	% NISP
Animal Bone	Sheep (*Ovis aries*)	22	64.71%
	Cattle (*Bos taurus*)	7	20.59%
	Pig (*Sus scrofa*)	1	2.94%
	Medium mammal	4	11.76%
	Total	**34**	**100%**
Shell	Sydney rock oyster (*Saccostrea glomerata*)	1	100%
	Total	**1**	**100%**

Table 4.12: Taxonomic composition of faunal assemblage in Unit [40]

The aging information for the livestock in Unit [40] indicates the presence of older animals – sheep over 2 years of age, cattle over 2-2.5 years of age and pigs over 1.5 years of age – again suggesting a meat and dairying regime within which animals were valued for quantity of meat and other resources prior to being culled for consumption.

Body part frequency data shows the presence of all sheep body parts, cattle hindlimb, forelimb and feet and pig cranial elements. Only one element exhibiting butchery evidence was identified, a sheep humerus showing standard secondary portioning or jointing marks – i.e. separation of the shank from the shoulder – and indicating the presence of mutton fore shanks.

Ultimately, the faunal assemblage in Unit [40] appears to form background debris of food refuse, comparable to other Units across the site. Again, however, with one unusual exception – the presence of yet more oyster (1 NISP, 1 MNI).

4.3.2.8 Secondary residential refuse / imported fill – Unit 45

Based on stratigraphic interpretation and artefact analysis, Unit [45] appears to represent a deliberate, secondary deposition of residential rubbish in either a dedicated refuse pit or as a levelling fill in a depression on site. The Unit is rather unique due to the inclusion of high numbers of ball clay tobacco pipes and it has been suggested that it represents a single deposition of a cluster of household refuse, imported from another location.[48]

Unit [45] yielded a total of 18 bones. No shell specimens were identified in this deposit.

The faunal remains are rather highly fragmented with over 72% measuring ≤10% of the identified skeletal element. Around 55% show slight-moderate weathering and root etching, suggesting some exposure to the elements and shallow burial, possibly in the original location of deposition. Over 22% exhibit extreme calcination, suggesting that some remains may have derived from a fireplace deposit or were associated with a hot ash deposit at some point.

Only two animal species were identified in Unit [45] – sheep and cattle; the remainder comprised small fragments from unidentified mammal species of medium size; see Table 4.13.

	TAXON	NISP	% NISP
Animal	Sheep (*Ovis aries*)	10	55.55%
	Cattle (*Bos taurus*)	3	16.67%
	Medium mammal	5	27.78%
	Total	**18**	**100%**

Table 4.13: Taxonomic composition of faunal assemblage in Unit [45]

[48] Denis Gojak pers. com.

Age-at-death information indicates the presence of sheep at least two years old – two-tooths / hogget or mutton. Skeletal frequency shows the occurrence of cattle trunk and forelimb and sheep trunk, forelimb and skull fragments – body parts ranked medium-limited in terms of food utility value. No butchery evidence was identified within Unit [45].

Ultimately, the bones within Unit [45] form a fairly standard background collection of 19th century colonial food debris and unlike the other artefact classes in this Unit, do not appear to be of unique character within the Old Marulan site.

4.3.2.9 Episodic dumping location – Unit 67

Unit [67] is a deposit underlying Unit [2] situated in the same location as Unit [45]. However, [67] and [45] were stratigraphically distinct, with [67] representing a separate, and seemingly later, episodic dumping of refuse.[49]

In total, Unit [67] yielded 22 animal bones. No shell specimens were identified in this deposit.

The bones are rather highly fragmented, with over 77% measuring ≤10% of the identified skeletal element. Over 81% also show slight-moderate weathering and root etching, suggesting these bones were exposed to surface elements at some point in time.

Only two species were identified in Unit [67] – cattle (59.09%) and sheep (40.91%).

As with Units [13] and [15], Unit [67] shows cattle as the predominant taxa – however, with such small sample size it is difficult to draw meaningful interpretation from these figures.

The aging data indicates the presence of adolescent-adult animals – cattle over 3.5-4 years of age and sheep over 2-2.5 years of age. The skeletal frequency data shows the occurrence of cattle trunk and hindlimb elements and sheep hindlimb, forelimb and skull fragments. No evidence of butchery was identified within Unit [67].

Ultimately, the faunal assemblage from Unit [67] is characteristic of 19th century colonial food debris and while the small sample sizes preclude any real comparison, no obvious or remarkable differences between Units [67] and [45] that would add to their interpretation stand out.

4.3.2.10 Pit backfill – Unit 86

Unit [86] is the lower layer of contents of a discrete pit and appears to represent general refuse deposited in order to backfill a depression on site.[50]

Unit [86] yielded only 3 bones – 1 cattle pelvis fragment and 2 unidentifiable medium mammal fragments. No shell specimens were identified in [86].

All three of the bones are relatively small fragments, measuring *c.* ≤10% of the skeletal element. The cattle pelvis exhibits a dorso-ventral sawn shearface through the acetabulum; characteristic of standard secondary portioning or jointing, dividing the beef rump cut (prime roasting or steak piece) from the aitchbone cut (3rd class boiling piece). The pelvis fragment identified may have been included in either cut.

These remains from Unit [86] can provide little further information towards the interpretation of the occupation of Old Marulan.

4.3.2.11 Small dumping deposit – 327

Unit [327] represents a backfill deposit within a rectangular feature cut into natural clay.

Only one single bone was identified within Unit [327] – a highly calcined, unidentifiable fragment from a medium-sized mammal. Other than indicating the general presence of a dead animal and a fire, this specimen can add no real information to the interpretation of Unit [327].

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[49] Denis Gojak pers. com.
[50] Denis Gojak pers. com.

4.3.2.12 Fill within post-town drainage feature – OM34b & OM34c

OM34b and OM34c represent mechanically excavated test pits across a drainage feature running at right angles to the road that was ultimately determined to be post-town in date. The fill and fill contents of the drainage feature appear to be either post-town abandonment or redeposited 1830s-1860s material washed in.[51]

4 bones in total were retrieved from OM34b and OM34c, including 3 sheep elements (2 tibia fragments and 1 humerus fragment) and 1 cattle element (metapodial). No shell specimens were identified in these Units.

The bones show varying degrees of fragmentation (ranging from ≤10% ≤70% of skeletal element) and all exhibit slight-moderate weathering, suggesting some exposure to surface elements.

Aging data shows the presence of at least one sheep less than 12-15 months old – indicating some sheep were culled as yearling lambs.

Little more information regarding the occupation of Old Marulan, however, can be extracted from the faunal remains in OM34b and OM34c.

4.3.3 Deposits directly associated with the *Woolpack Inn, c.* 1840s-1900s

The following sections discuss three groups of deposits that are directly associated with the occupation of the *Woolpack Inn.* As such, the faunal remains recovered from these Units may provide an insight into the types of meals served to travellers stopping by at the inn and subsequently allow a comparison between the hotel food and the general town food.

4.3.3.1 Surface sheet midden, *Woolpack Inn* yard, c. 1840s-1900s – Units 24 & 28

Units [24] and [28] are part of a surface sheet midden that formed as a gradual accumulation during the occupation of the *Woolpack Inn* on a part natural / part constructed, cobbled yard surface.[52]

In total, Units [24] and [28] yielded 10 animal bones and 3 shell specimens.

80% of the animal bones occur as highly fragmented pieces, measuring ≤10% of the identified element. Two specimens are near complete, however, both are compact, dense elements (carpal and phalange) that in general have much higher rates of survival. The shell specimens are all fragmentary, measuring ≤25% of an individual mollusc. Almost all the bones and shells also show moderate levels of weathering. These attributes indicate that the assemblage was exposed to surface elements and disturbance (such as trampling) at some point in their taphonomic history – corresponding to a scenario of deposition on an outside walking surface.

In terms of taxa, the assemblage from Units [24] and [28] includes seven sheep bone fragments (all long bones), one cattle bone (carpal) fragment, one small carnivore – likely cat or dog – bone fragment (phalange) and one fragment from an unidentifiable mammal of medium size.

There is no age-at-death evidence (i.e. bone fusion data / tooth eruption & wear etc.) in this collection, and no evidence of butchery.

The shell specimens are all *Saccostrea* oyster fragments.

This faunal collection from Units [24] and [28] is characteristic of 19th century colonial food debris (not unlike several other bone-bearing Units across the Old Marulan site), with the added indication of an introduced carnivore – canine or feline. Again, the only usual element is the presence of oysters in such a landscape.

[51] Denis Gojak pers. com.
[52] Denis Gojak pers. com.

4.3.3.2 Collapse on top of *Woolpack Inn* cesspit, *c.* 1880s – Units 26 & 31

Unit [31] represents the collapse or demolition rubble associated with the superstructure of a privy from the *Woolpack Inn.* Unit [26] represents an interface layer overlying [31] and most likely forming part of the same overall deposit. These two Units appear to date to *c.* 1880 (approximate date of demolition), however, they also contain disturbed / redeposited older materials deriving from the underlying fill deposit in the subsurface cess pit (Unit [41] – see Section 4.3.3.3).[53]

In total, Units [26] and [31] yielded 19 animal bones. No shell specimens were identified in these Units.

The bones are rather highly fragmented, with almost 74% measuring ≤10% of the identified skeletal element. Almost 58% also exhibit slight weathering and root etching. These attributes support an interpretation of post-depositional disturbance of these deposits.

In terms of taxa, the faunal assemblage from Units [26] and [31] includes cattle, sheep, domestic cat and fragments from unidentifiable mammals of medium-large size. In raw numbers, cattle dominates this collection, however, with such small a sample size, it is difficult to draw meaningful interpretation. Refer to Table 4.14.

TAXON	NISP	% NISP
Cattle (*Bos taurus*)	6	31.58%
Sheep (*Ovis aries*)	1	5.26%
Cat (*Felis cattus*)	3	15.79%
Medium-large mammal	6	31.58%
Medium mammal	3	15.79%
Total	**19**	**100%**

Table 4.14: Taxonomic composition of faunal assemblage in Units [26] and [31]

The single sheep element is a femur fragment, ranked in the high food utility level. The cattle elements include trunk, forelimb and extremities (feet & tail vertebrae), ranked from medium/high to limited. No age-at-death evidence was identified and only one example of butchery – a cattle scapula with a transverse sawn shearface. This mark could indicate portioning into shoulder beef cuts (3rd class), creation of Y-bone steaks or represent a bone that has been defleshed and then sawn into portions to be used as soup or broth bones.

This small bone collection is characteristic of standard 19th century colonial food debris. The livestock body parts present point towards mid-level "quality" and are rather similar to several other faunal deposits across the Old Marulan site.

The domestic cat remains, however, are worth noting. These include a femur, an ulna and a section of mandible. All elements are very small in size, epiphyseal ends are porous and unfused and the mandible shows deciduous dentition – indicating a kitten aged between 5-10 weeks.[54] This may be evidence of the classic scenario of unwanted kittens being put in a sack and thrown down the well (or cesspit in this case). Or maybe nothing more sinister than a kitten dying of natural causes and being disposed of in the cesspit afterwards.

4.3.3.2 Fill of *Woolpack Inn* cesspit, *c.* 1830s-1880s – Unit 41

Unit [41] is the main fill / backfill within the subsurface brick cesspit of the *Woolpack Inn* privy. This deposit appears to have formed as a gradual accumulation of material throughout the occupation of Old Marulan town (1830s-1860s), with the structure being abandoned and capped with demolition rubble in *c.* 1880.

[53] Denis Gojak pers. com.
[54] Based on suggested stages by Silver, I. A. (1969) "The ageing of domestic animals." Brothwell, D. & E. S. Higgs (eds) *Science in Archaeology.* Thames & Hudson, London; 250-268.

Unit [41] also contains, by far, the highest number of faunal remains in all excavated Units across the Old Marulan site.

In total, Unit [41] yielded 2217 animal bone specimens and 1 shell specimen.

The faunal assemblage from Unit [41] is comparatively well preserved. Only just over 2% of the faunal remains exhibit evidence of slight-moderate weathering – indicating that the majority of these bones have not been exposed to surface elements for any substantial period of time.

Only around 28% of the bones are small fragments measuring ≤10% of the identified skeletal element and over 33% survive as complete or almost complete (90-100% intact) specimens. Several relatively fragile faunal remains – such as chicken skulls or sternums, mammal skulls, fibula or scapula, small bones from juvenile individuals etc. – also survive in a recognisable, and sometimes near intact, state.

These observations point to a faunal collection that has accumulated in a somewhat secure depositional environment – i.e. where the remains have not been subject to substantial post-depositional movement, disturbance or damage (such as trampling, cultural re-deposition etc). Some levels of disturbance possibly resulting from faunalturbation (e.g. rabbit burrowing) were noted in the upper levels of Unit [41], however, while such activities may cause bones to move through a deposit they rarely cause significant fragmentation – especially with regards to bones from medium-large mammal species.

Furthermore, little evidence of scavenger attrition was identified on the faunal remains in Unit [41]. While some of the fragmentation observed could be due to scavenger activity, no clear indication of canid chewing or gnawing was identified and only three bones showed evidence of rodent gnawing. Again, this suggests primary deposition in a relatively secure environment, generally inaccessible to scavengers. This, in turn, indicates a certain level of care and control with regard to food refuse disposal at the *Woolpack Inn* – i.e. the largest associated bone-bearing deposit (and presumably the main location of food refuse disposal) was essentially a well contained, brick-lined rubbish pit.

In terms of taxa, the faunal assemblage from Unit [41] is vastly dominated by sheep (64.25% NISP), followed by rabbit (7.71%) and chicken (7.13%). Other livestock species occur in much lower numbers, including cattle (4.42%), goat (2.12%) and pig (0.99%). Companion animals and / or working animals are present, including domestic cat, dog and horse and a scattering of native fauna including kangaroo / wallaby and most curiously, koala, also occur. The remainder includes some brown hare elements, rodent elements and remains of unidentifiable small carnivore, artiodactyla sp. and bird species. The shell remains consist of one *Saccostrea* oyster specimen. Refer to Table 4.15.

	TAXON	NISP	% NISP	MNI
Animal Bone	Sheep (*Ovis aries*) (may also include some goat)	1425	64.28%	16
	European rabbit (*Oryctolagus cuniculus*)	171	7.71%	5
	Chicken (*Gallus gallus*)	158	7.13%	6
	Cattle (*Bos taurus*)	98	4.42%	2
	Cat (*Felis cattus*)	86	3.88%	7
	Small carnivore sp. (likely to be introduced – dog or cat)	48	2.17%	2
	Goat (*Capra hircus*)	47	2.12%	2
	Small mammal	46	2.07%	2
	Koala (*Phascolarctos cinereus*)	38	1.71%	1
	Artiodactyla sp. (likely to be sheep, goat or pig)	23	1.04%	2
	Pig (*Sus scrofa*)	22	0.99%	1
	Bird sp.	17	0.77%	2
	Kangaroo / wallaby (*Macropus* sp.)	16	0.72%	2
	Brown Hare (*Lepus europaeus*)	13	0.59%	1
	Rodent sp. – rats & mice (*Murinae* sp.)	4	0.18%	2

	TAXON	NISP	% NISP	MNI
	Dog (*Canis familiaris*)	3	0.14%	2
	Horse (*Equus caballus*)	2	0.09%	1
	Total	**2217**	**100%**	
Shell	Sydney rock oyster (*Saccostrea glomerata*)	1	100%	1
	Total	**1**	**100%**	**1**

Table 4.15: Taxonomic composition of faunal assemblage in Unit [41].

With at least 12 mammal species and 2 bird species, the taxonomic composition in Unit [41] shows much greater variety than any other bone-bearing Unit across the Old Marulan site. Indeed, several species including rabbit, hare, goat, horse, rodent and koala do not appear in any other deposits.

As there is such a diverse range in Unit [41], these species will be dealt with separately in the following discussion.

Of the three common domesticates (sheep, cattle and pig – all of which are likely to represent food debris) NISP and MNI calculations suggest that sheep was a dominant contributor, followed by cattle and then pig. Indeed, NISP counts show there is almost twelve times more sheep elements than cattle and pig combined. However, before we blithely state that the *Woolpack Inn* served much more sheep meat than any other, several additional features must be taken into account.

Age-at-death data provides some interesting information on the demographic profile of the three livestock species within Unit [41];

- Most cattle for which aging information was present (18 specimens) were in late adolescence (at least 2-2.5 years old), or had reached skeletal maturity (over 3-3.5 years old). The remainder were slightly younger (mid adolescence) at between 1.5-2 years of age. There is no evidence of calves or vealers.

  This pattern indicates a regime whereby at least some cattle were kept until they reached optimum body weight but most were still relatively young when culled. Dairying and breeding may have provided additional resources from these cattle, but seemingly only to the point where the animals were slaughtered for the highest returns. There is no evidence of cattle that had lived to a full age (around 10-12 years) – indicative of dedicated dairying, breeding or labour regimes;

- Several pig elements for which aging data was present (10 specimens) were pre to early pubescent – i.e. less than 5-6 months old. While the bones within Unit [41] do not provide sufficient information to narrow down the age range, this certainly provides evidence of pigs being reared solely for meat and culled as "weaners," "piglets" or "shoats" – an age that provides choice roast and pork dishes. Three specimens also showed the presence of adolescent pigs over a year old, indicating that some pigs were reared until they reached greater body stature and would provide more mature pork or bacon products;

- Almost all sheep for which aging information was present (over 1350 specimens) were lambs, with only a handful of examples (<1%) representing hogget (sheep 1.5-2 years old). No evidence of adult sheep or mutton was observed.

  The age range of the lambs varies; however, there is no clear evidence of yearling lamb (1-1.5 years old). All of the lamb elements recorded derive from much younger animals with over 900 specimens representing "sucker lambs" / milk-fed lambs (<6-7 months of age). Although the range of sheep bones present in Unit [41] precludes more definitive aging for all specimens, several elements can be further narrowed down as representing "spring lamb" (3-6 months old) and "baby lamb" (6-8 weeks old). The presence of some young livestock sometimes infers the culling of runts or weaklings or excess animals in times of fodder shortage. However, when the demographic range of a collection shows a predominance of young animals with few adult individuals, it generally indicates intentional production and purchase of immature, tender meat products.

These patterns, particularly regarding sheep and pig within Unit [41], are indicators of comparative wealth – in both the broader economic catchment of the town as well as the proprietors and patronisers of the *Woolpack Inn.*

The livestock represented by the bone debris in Unit [41] are presumably what could be produced or spared by the husbandry regimes from which Old Marulan obtained its meat resources. The culling of lambs and piglets indicates a quite successful pastoral environment whereby breeding stock was high enough to allow cultural preferences for younger carcasses to be indulged. In turn, as lambs and piglets result from specialised production systems (i.e. animals raised solely for lean and tender meat rather than being slaughtered after they have served additional purposes or reached full body size), they are generally harder to obtain and are of higher economic value. Lambs and piglets have also been presented throughout 19th-20th century Australian literature as providing among the choicest, most delicious meats, further raising their economic value through sheer desirability.

A final point regarding the age of livestock concerns the relative frequencies of each species in Unit [41]. The high numbers of sheep bones superficially suggests that sheep were the dominant meat contributors. However, as mentioned above, one cow generally provides over 220 kilograms of consumable beef whereas lambs less than one year old provide between 10-25 kilograms. Given the MNI estimations of 8 sheep / lambs to each cow in Unit [41], and the variation in common butchery practices and bone retention between sheep and cattle (see Section 4.2), it is proposed that beef was consumed in comparable amounts to sheep / lamb meat.

Skeletal element frequencies indicate that almost all body parts for sheep, cattle and pig are present in Unit [41] – refer to Table 4.16.

GENERAL BODY PART	QUALITY / VALUE	SHEEP (NISP)	CATTLE (NISP)	PIG (NISP)
Hindquarter / hind leg & pelvis	High dietary value	85 (5.97%)	12 (12.24%)	3 (13.64%)
Forequarter / front leg & shoulder	Medium - high dietary value	124 (8.7%)	5 (5.1%)	1 (4.55%)
Trunk / vertebrae & ribs	Medium – high dietary value	536 (37.61%)	36 (36.73%)	1 (4.55%)
Extremities / feet	Limited dietary value, primarily butchery waste	245 (17.19%)	27 (27.55%)	0
Cranial / skull & teeth	Low dietary value, primarily butchery waste	378 (26.53%)	9 (9.19%)	17 (77.26%)
Unidentified long bone fragment	Various / not known	57 (4%)	9 (9.19%)	0
TOTAL		**1425 (100%)**	**98 (100%)**	**22 (100%)**

Table 4.16: Body part frequencies of the livestock elements within Units [41].

Although the data provided here represents very basic calculations (NISP totals), it would appear that some animals (particularly lamb and possibly piglet) arrived on site as complete or near complete individuals. For instance, during primary butchery, lamb carcasses are commonly divided into quarters and subsequently sold without heads or feet. However, evidence of all lamb skeletal elements occurs in Unit [41], suggesting that whole lamb carcasses were obtained and processed for food preparation within the grounds of the *Woolpack Inn.* This would in turn suggest that all portions of lamb were at times on the menu – from ribs, breast, shoulder, loin and leg; perhaps including dishes such as roast, braised or broiled fore-quarter, leg, saddle, shoulder, loin or rack, stewed or braised lamb shanks, and fried lamb chops or lamb cutlets. Such dishes could be carved and served as individual portions or provided as communal meals, serving perhaps 4-6 people.

This scenario would also somewhat account for the high proportions of heads and feet (as depicted in Table 4.16) – when complete carcasses are present, calculation of body part frequencies according to NISP counts are biased towards lower quality cuts due to the higher numbers of individual bones in these body portions.

The data for pig shows the presence of forelimb, hindlimb and skull elements from young piglets that also possibly arrived in the kitchens of the *Woolpack Inn* as complete or near complete individuals, being processed and prepared, perhaps as tender pork roast joints, therein. The bones from adolescent pigs include trunk and skull elements, perhaps indicating the presence of spare ribs or

prime back roasting units, cured ham or bacon and possibly even pig's cheek, pig's head brawn or collared pig's face.

All cattle general body parts are also present within Unit [41]. However, given the size of a standard, full grown cow, it is more unlikely that whole cattle were brought onto the grounds of the *Woolpack Inn* to be processed. Rather this data would seem to indicate that quite intensive utilisation of cattle carcasses was conducted whereby even the low-limited dietary value units were used for consumption purposes – similar to patterns noted in other deposits across the Old Marulan site. On a basic level, this may seem a contradiction to the high economic value and quality meat resources (lamb and piglet) identified in Unit [41]. However, the majority of cattle remains derive from medium-high dietary value units and as mentioned in Section 4.3.2.4, several 19th century British and Australian cook books written for the middle-upper classes include recipes for fried ox-feet or cow heel, baked or stewed ox cheek, boiled marrow bones and even marrow on toast.[55]

Based on the simple occurrence of different cattle skeletal elements, it would appear that various beef dishes were served at the *Woolpack Inn*, including;

- sirloin, fore-rib, middle rib and back rib beef cuts, most commonly roasted and considered 1st-2nd class quality;
- buttock, mound-round and aitch-bone, generally used as boiling or stewing pieces and considered 2nd-3rd class;
- clod, hock and shin, commonly used for making stews, gravies or stocks
- ox-tail and possibly ox-cheek, usually used as stewing pieces and while the most economical units, are sometimes considered delicacies.

The butchery evidence observed on the livestock bones within Unit [41] provides a little more information regarding the meat cuts consumed;

Sheep (all hogget) –

- presence of pelvis portions sawn into segments, suggesting individual portion "chump" chops – a somewhat uncommon but high quality dish;
- presence of metacarpal bones with superficial cut marks, indicative of meat removal and perhaps consumption of "sheeps trotters" – items of low food utility but often considered a delicacy in 19th century UK and Australian literature.

It is interesting to note that no evidence of butchery was identified on any of the lamb bones. This provides some support for the proposal that lambs were not obtained from a butcher as quarters or halves (i.e. there is no evidence of longitudinal or transverse carcass bisection) but were rather brought onto the grounds of the *Woolpack Inn* as complete or near complete individuals and portioned, processed and largely de-boned in the kitchen. Non-butchered intact livestock bones within archaeological assemblages are also commonly interpreted as indicative of units such as whole forelimb or shoulder joints that would have been prepared as large boiling or roasting joints. Such joints tend to represent communal meals – as may be expected in a commercial inn.

Cattle –

- presence of standard primary longitudinal bisection saw marks on vertebrae and ribs, indicating that unless the *Woolpack Inn* incorporated a large meat processing location, beef was obtained as pre-prepared units;
- presence of transverse division of the thoracic region, indicative of portioning into fore-rib, middle-rib or back / top-rib roasts (1st-2nd class);
- presence of tibia with superficial chop and cut marks, indicating meat removal of boneless cuts? Meat bearing unit for use in stews
- and suggesting the use of beef hocks for making of stews;
- presence of long bones sawn into segments, indicating reduction of marrow bones (likely after the boneless meat units from these portions have been removed) for boiling in a stock pot, enabling the release of liquid marrow and flavouring of stews;
- presence of femur and pelvis with medio-lateral or dorso-ventral sawn shearfaces, indicating portioning or jointing of rump and aitch-bone units – mid-upper quality boiling and steak cuts.

[55] See Beeton, I. M. (1861)

Pig –

- only one bone showed evidence of butchery, a rib from an adolescent pig exhibiting medio-lateral dorsal-mid shearface – a mark that may represent secondary division of rib and back units, perhaps in preparation for spare-rib units or cured, bacon cuts.

The fourth livestock species within Unit [41] that has so far been excluded from discussion is the goat.

Goats came to NSW with the first European settlers in the late 18th century (there is some indication that they were also introduced to some coastal areas of Australia in the 17th century by mariners). Over time, goats escaped or herds were abandoned, eventually leading to the feral bush goat populations that are now widely distributed throughout the arid and semi-arid zones of NSW, WA, SA and QLD.

Evidence of goats in colonial NSW comes mainly from documentary sources; due in part to the difficulties in distinguishing sheep and goat in archaeological assemblages. The literature indicates that goats were a common and quite important livestock in the Sydney colony throughout the 19th century. Being small and hardy and providing milk, meat, fibre and skins, goats proved themselves as a convenient livestock and many households and estates apparently kept one or several. As goats exploit different ecological niches to sheep and are able to thrive on scrub, they could be left to wander in search of their own food, returning to their owners in the evenings to be milked.[56]

Forty-seven specimens that could quite confidently be identified as *Capra* were documented in Unit [41], with a minimum calculation of two individuals. While some additional goat fragments may have been included with the *Ovis* collection, the identified goat remains show patterns quite distinct from those observed in the sheep specimens.

The skeletal element frequency for goats in Unit [41] shows the presence of:

- cranial elements conjoining or matching to form two almost complete adult goat skulls;
- adult metacarpals, metatarsals and phalanges;
- adult vertebral elements from atlas and axis (1st and 2nd neck vertebrae), through thoracic and lumbar to sacrum and caudal (tail) vertebrae (tail). Many of these vertebrae are of very similar size, shape and form and appear to fit together, forming at least one thoracic-sacral vertebral column,[57] and;
- adult hindlimb elements.

A comparison between the numbers and types of goat elements present with those occurring in a complete goat skeleton shows that the goats in Unit [41] – with an MNI of 2 – are significantly incomplete. However, a slightly more subjective examination suggests that the goat bones derive from two individuals that were at least partially intact when deposited – as opposed to a mix of elements from numerous goats that arrived on site as portioned joints. The presence of heads and feet (commonly regarded as slaughter waste) supports this notion and the lack of any primary or secondary butchery marks, particularly on the vertebral elements, provides some support that the goat remains do not represent standard portioned cuts. This in turn suggests that the goats arrived on site as complete individuals, possibly on the hoof; being reared and kept within town limits.

The bones providing age-at-death data present for goats (24 examples) in Unit [41] all derive from animals at least 1.5-2 years of age, if not much older. The metatarsal provide a minimum age of 2.5-3 years. The two goat skulls present include one individual at least five years of age, most likely a male based on horn shape and size, and one individual at least 6-7 years of age, most likely a female. Although neither individual is elderly or gummy, both lived long enough to wear their teeth quite heavily and may be even older than the 5-6 year estimate.

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[56] Hagen, A. (2006); Meredith, C. (1844) *Notes and Sketches of NSW during a Residence in the Colony from 1839-1844.* Ure Smith in association with NSW National Trust, Sydney; Lieutenant Colonel Godfrey Charles Mundy (1852) *Our Antipodes.* Sections reproduced in Beckett, R. (1984) *Convicted Tastes – Food in Australia.* George Allen & Unwin, Sydney, NSW.

[57] It should be noted that although vertebrae generally do not provide sufficient markers to distinguish between sheep and goat, various characteristics of these specimens including size, shape, aging and condition, strongly suggest that they belong with the goat rather than sheep collection.

The presence of at least two adult goats (possibly one doe/nanny and one wether or buck) in Unit [41] suggests these animals were kept for dairying and / or perhaps fibre and breeding purposes for several years, prior to be culled for meat and perhaps skin and hides. The absence of butchery evidence precludes any interpretation of how these animals may have been processed for consumption, other than a tentative suggestion that the complete vertebrae may indicate large roasting or boiling rack joints.

The remaining animals within Unit [41] that presumably represent dietary refuse includes rabbits, hares and chicken.

Chickens were brought to NSW in the earliest days of the Sydney colony and the occurrence of chicken remains within an urban or rural 19th century NSW assemblage is certainly not uncommon; indeed chickens generally form the most abundant bird remains within any given collection. Chickens often appear in deposits deriving from all social classes and poultry keeping and egg production also seems to have been quite a general practice throughout the 19th century.

Nonetheless, chickens and capon for consumption were usually quite expensive and infrequent luxuries in 19th century NSW households and high proportions of chicken remains in European assemblages – as is the case in Unit [41] with chickens ranking 3rd in NISP counts – is often taken as a sign of apparent wealth or prestige.[58] This corresponds particularly with the prevalence of lamb and piglets in [41], providing a picture of a rather opulent menu at the *Woolpack Inn.*

The presence of s in 19th century colonial assemblage throughout NSW is also not uncommon, however, it raises some interesting queries regarding supply of meat resources and feral vertebrate fauna.

Like all other exotic animals in the Unit [41] deposits, rabbits arrived in Australia with the early European colonists, however, they were certainly not initially intended as a general food resource. The First Fleet carried five rabbits, three belonging to Governor Phillip and two to the officers of the detachment – all most likely being domesticated silver-greys, the most popular rabbits for hutch-rearing in England at that time.[59] Historical accounts state that these rabbits, as well as other small groups arriving in the 1790s, were introduced to NSW as forms of "true game" (i.e. as an alterative to native animals) to satisfy the hunters within what was sometimes termed the "Bunyip Aristocracy."[60] They were kept in hutches on private properties of landed classes under seemingly well controlled conditions. Population numbers remained low and rabbit meat was not available as a food resource to the general public. It was apparently considered a prestige food and certainly not one provided to convicts or lower classes, especially as the notorious Game Laws were still in force in England and some convicts had actually been sentenced to transportation for poaching rabbits.[61] Certainly evidence of rabbits is scarce within the early colonial archaeological record in NSW – likely a factor of both low population numbers and their restricted status.

In 1806, Samuel Marsden attempted to establish an open warren in Parramatta but the venture failed primarily due to attacks on the warren by local dogs. For over twenty years it seems no-one else attempted to establish free-range populations – one historical source dating to 1827 notes that rabbits are "bred about houses but we have yet no wild ones in enclosures."[62] By the early 1830s, however, fenced rabbit "preserves" began to be established, the first being opened in Elizabeth Bay in 1831 with numerous others set up throughout urban and rural NSW by the end of the decade.[63] Rabbits seem to have lost their prestigious status soon after and began to appear as food items in general markets.

Some rabbits undoubtedly escaped (or were released) from hutches and enclosures during the early/mid 19th century and small populations of wild rabbits appear to have developed around several NSW urban centres. It was not until the 1860s-1870s, however, that large numbers of wild rabbits were documented across NSW, resulting from releases in western and southern Sydney, the Riverina district (Balranald and Wentworth) and New England. By the end of the 1870s, rabbits had

[58] See O'Connor, T. (2000) *The Archaeology of Animal Bones.* Sutton Publishing Ltd, UK; Hagen, A. (2006); Walker, R. & D. Roberts (1988)
[59] Andrew Miller, Commissary, *An Account of Live Stock in the Settlement* 1st May 1788.; Rolls, E. C. (1969) *They All Ran Wild: the story of pests on the land in Australia.* Angus & Robertson, Sydney, NSW.
[60] Beckett, R. (1984) *Convicted Tastes – Food in Australia.* George Allen & Unwin, Sydney, NSW.
[61] Rolls, E. C. (1969)
[62] Cunningham, P. (1827) *Two Years in New South Wales.* London.
[63] *Sydney Gazette* (28-05-1831); page 2; Rolls, E. C. (1969)

successfully spread throughout much of the Darling, Murrumbidgee and Murray River catchment areas, reaching pest proportions in some areas. Rabbit meat became an easily available and much more economical food resource and both historical and archaeological evidence indicates processing and marketing of rabbit meat in some areas of urban and rural NSW during the 1880s on a substantial commercial scale.[64] By the 1890s, rabbits had reached plague proportions in NSW, destroying millions of acres of established pasture and spreading to the QLD border. The western districts were particularly affected – one writer of 1892 describes western NSW as "one huge warren burrowed from the Victorian border to Queensland."[65]

European hares were also introduced to NSW during the early-mid 19th century, often in tandem with rabbit populations but in no where near comparable numbers to rabbits. The earliest documented releases into the wild occurred in the Mulgoa region in the 1860s. More substantial releases were conducted throughout the 1870s in rural regions north and south of Sydney as hare shooting and coursing became popular sports among Australian hunters. By the 1880s-1890s, hares were declared noxious in several sheep districts around Sydney, Wagga Wagga and Armidale, however, they never reached widespread plague proportions and were in fact wiped out in some regions due to the rabbit infestations.[66]

Unit [41] yielded 171 rabbit bones (MNI of 5) – ranking second in NISP counts of all species – and 13 hare bones (MNI of 1). Given the history of both rabbits and hares in NSW, these remains may represent food debris, obtained from either hutch populations or wild resources; or natural death deposits of local wild populations that have become mixed with cultural deposits – either concurrent with human occupation or deriving from groups that may have colonised the Old Marulan area after the town was abandoned.

Unfortunately, the faunal remains alone do not provide enough evidence to definitively distinguish between these possibilities. Nonetheless, several factors tend to indicate that the bulk of rabbit remains represent dinner table refuse.

Wild rabbit populations no doubt lived near or within Old Marulan town limits sometime during the 19th-20th centuries and some evidence of possible burrowing was indeed noted in the upper levels of Units [41] and [31]. However, the proposal that all, or indeed most, rabbit remains are natural death deposits is unlikely based on the following considerations:

- none of the rabbit remains show evidence of weathering or scavenger attrition, indicating that they were not exposed to surface elements or scavengers post-deposition. If they were natural deaths they must therefore have died and decomposed within the warren, yet this is an apparently uncommon occurrence for adult rabbits;
- the sheer number of rabbit remains tends to suggest the presence of several adult individuals within the brick-lined cess pit, however, no substantial evidence of burrowing was observed in Unit [41], and the deposit, containing many artefact inclusions, does not represent a particularly attractive substrate for rabbit warrens;
- skeletal element frequencies show the presence of all body parts for rabbits (only leg and feet elements occur for hares, however total NISP is only 13). This may seem to suggest natural deaths whereby complete rabbits where deposited where they fell. However, occurrence of nearly all body parts for such small animals may also be expected on a rural site where the remains represent food debris – i.e. rabbits are likely to have been obtained whole and prepared for consumption in the kitchens of the *Woolpack Inn*;
- the absence of butchery evidence on the rabbit remains may again seem to argue against cultural processing and deposition. However, animals of such size are rarely jointed in such a way that significantly marks their bones, and;
- if rabbits were living on the Old Marulan site in numbers large enough to leave 171 bones behind, it would be assumed that rabbit remains would also be present in other deposits across the site. However, not one single rabbit or hare bone was recovered from any other excavation Unit.

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[64] Rolls, E. C. (1969); Steele, D. (1999) "Animal Bone and Shell Artefacts Report." in Godden Mackay Logan *The Cumberland / Gloucester Streets Site, The Rocks – Archaeological Investigation Report.* Volume 4, Part 2: Specialist Artefact Reports.
[65] Keith, G. W. *The Brisbane Courier* (1892); Rolls, E. C. (1969)
[66] Rolls, E. C. (1969)

It thus seems much more likely that the rabbit and hare elements identified in Unit [41] represent the remains of meals eaten by Old Marulan townsfolk or visitors to the *Woolpack Inn* – indeed their confinement to Unit [41] suggests rabbits were not a common township meal but were restricted to dishes offered at the inn. It may be that they were consumed during the early years of town occupation (1850s-1860s) when these animals were prestige foods, thus adding to the picture of wealth already established by the high numbers of lamb, piglet and chicken in Unit [41]. Alternatively, these remains may date to later periods, when rabbits had lost their esteemed status.

Finally, the question of whether these animals were procured wild or represent farmed meat unfortunately cannot be determined based on the bones alone. The stratigraphy, context and estimated date of deposit of rabbit remains can often contribute to such investigations, however, this information is unavailable for Unit [41].

In summary, the vertebrate remains within Unit [41] that are likely to represent food debris include sheep, cattle, pig, goat, chicken, rabbit and possibly hare. Based on the location, formation and analysis of other artefacts within this deposit, it would also appear that the majority of these remains are associated with the operation of the *Woolpack Inn.* The patterns identified in this collection – including relative species frequencies, body part frequency, and age-at-death – are quite different from those observed in all the other bone-bearing deposits across the Old Marulan site and include some common indicators of comparative wealth in a 19th century NSW context. The range of meals served to travellers stopping by at the *Woolpack Inn* appears to have included various choice lamb and prime pork dishes, servings of chicken, rabbit and perhaps roast goat, and quality beef steaks or more communal beef stews or casseroles – an assortment of cuisine that largely does not appear to have been consumed by the general town population.

The remaining vertebrate fauna within Unit [41] includes companion or working animals, commensal species and native mammals.

The companion / working animals include domestic cat, domestic dog and horse.

Both dogs and cats were introduced to NSW in the late 18th century as companion animals and working animals with cats performing roles as rodent catchers and dogs serving as herding and hunting assistants. The occurrence of both species in 19th century NSW archaeological assemblages is quite common and they are often used to make inferences regarding economic status in urban communities – i.e. households must possess certain levels of disposable wealth to provide for companion animals. In a rural context, however, cats and dogs are perhaps more likely to serve working roles as well as, or instead of, simply being pets and owners therefore had an economic incentive to feed and keep them.

The cat remains in Unit [41] include 86 elements (MNI of 7). Almost all body parts are represented in varying degrees, with several matching pairs of elements, suggesting that at least some of these cats were deposited as complete or near complete individuals. Aging data indicates the presence of adult cats (at least two individuals) and kittens ranging in age from around 5-14 weeks (at least four individuals). The latter examples compare to the kitten identified in Units [26] / [31] – perhaps evidence of the disposal of unwanted, ill or weak kittens. The adult cats are likely to represent companion / working animals or even strays that were fed scraps from the *Woolpack Inn* kitchens and that were most likely disposed of in the cesspit after a natural death.

The dog remains in Unit [41] include three mandibles constituting and MNI of 2. Aging data indicates that both dogs were puppies around 2-3 months old at time of death. As with the kittens, this may indicate intentional disposal of unwanted or sickly puppies – perhaps offspring of valued working or companion dogs associated with the inn, or even stray litters – or puppies that had died of natural causes and were subsequently deposited in the cesspit.

The horse remains in Unit [41] include only one complete metacarpal from an adult (<1.5 years of age). Horses arrived in NSW aboard the First Fleet and were widely valued throughout the 19th century as transport or draught animals. The single horse bone within Unit [41] exhibits no cultural markings or remarkable characteristics and provides evidence of little more than the fact that horses were present within Old Marulan. Post-depositional disarticulation and perhaps secondary deposition is the most likely explanation for this element ending up in the brick cesspit.

The likely commensal species include 4 rodent elements (MNI of 2). These remains may represent native rodents or introduced species (such as black rats; *Rattus rattus*, brown rats; *Rattus norvegicus* or house mice; *Mus musculus*) – unfortunately the absence of diagnostic elements precludes identification to species. Both native and introduce rodents are common opportunistic survivors, often living near or within human settlements and it is likely that the remains in Unit [41] represent such behaviour. However, the low frequencies of rodent remains, in conjunction with the low occurrence of rodent gnawing on other bones, suggests that rodent populations were not substantial within Old Marulan town.

The final vertebrate remains within Unit [41] include 16 macropod – kangaroo / wallaby – elements (MNI of 2) and 38 koala elements (MNI of 1).

As discussed in Section 4.2, low frequencies of macropod remains are often recorded within 19th century archaeological sites in rural NSW. Historic documents record that kangaroo in particular was a rather popular, but perhaps not particularly common, dish throughout the 1800s, continuing to appear in cookery books well into the early 1900s. It is thus entirely possible that these macropod elements represent food debris, perhaps associated with an item on the specials board in the *Woolpack Inn.* However, clear archaeological evidence of the consumption of kangaroo in colonial contexts is generally lacking and the specimens in Unit [41] certainly show no direct indication of processing or preparation as food items. The macropod elements may alternatively represent natural death deposits or remains of food for the local dogs.

The presence of koala remains within Unit [41], all appearing to derive from a single individual, is perhaps the most curious of all. The occurrence of such animals in colonial cultural deposits is almost unheard of and as discussed in Section 4.2, it is possible that the koala represents a natural death deposit from surrounding eucalypt sands, the victim of curious local hunting dogs or a novel pet.

The shell remains within Unit [41] include a single *Saccostrea* oyster fragment. As mentioned several times, this provides evidence for a rather unusual and somewhat risky consumption of oysters that must have been carried for 1-2 days on horseback without refrigeration to arrive in Old Marulan. The occurrence of oyster in Unit [41] may indicate that the *Woolpack Inn* served these shellfish on occasion. However, oysters (23 specimens in total, with an MNI of 14) are also spread across nine other deposits within Old Marulan township. The question remains; does this represent one or two batches (requiring one or two trips to the coast) of oysters that have become dispersed after consumption and finally deposited in various locations? Or the remaining evidence of a much larger number of oysters (indicating numerous or perhaps regular trips to the coast) that were shared throughout the township?

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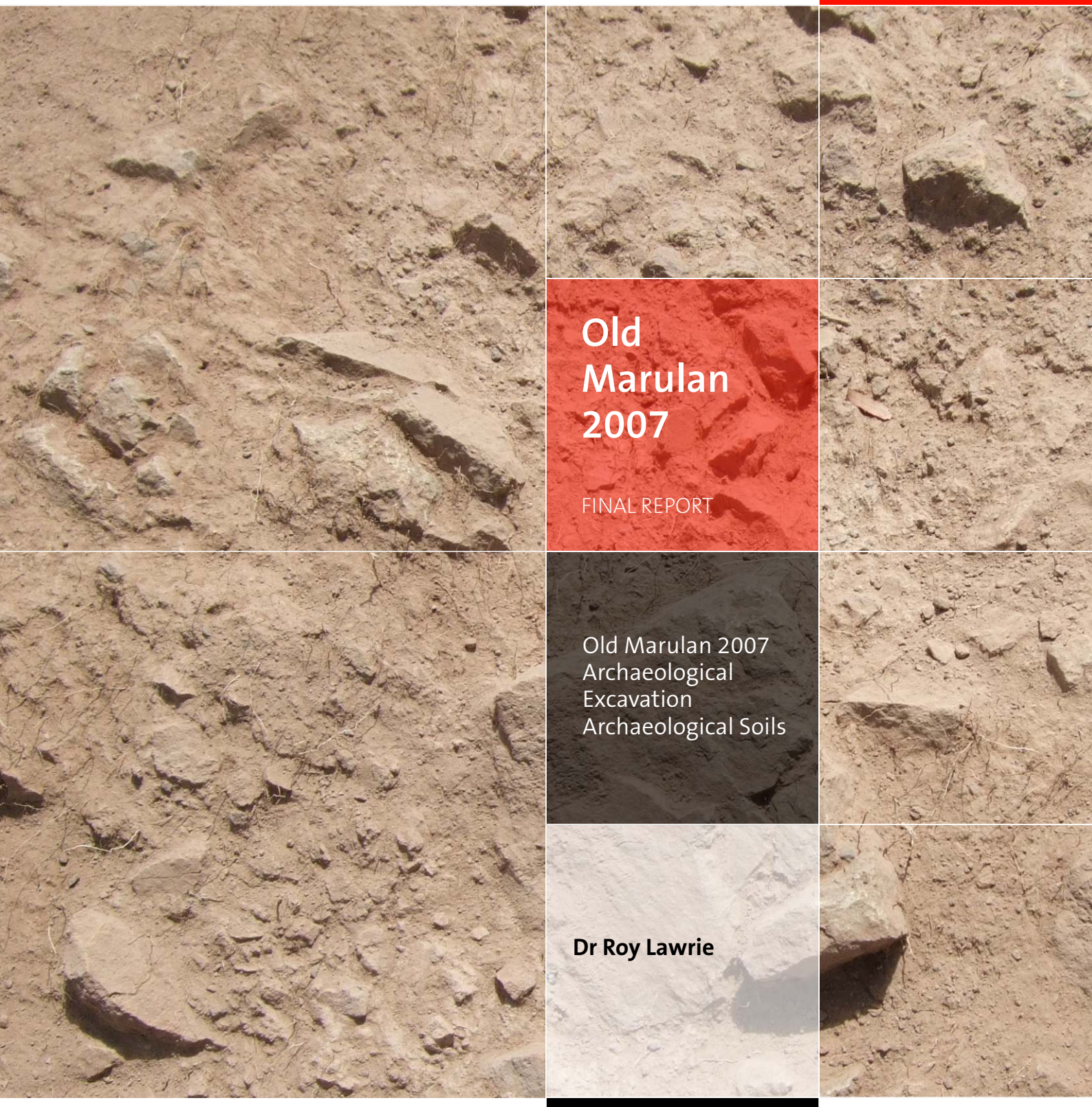

Old Marulan 2007

FINAL REPORT

Old Marulan 2007
Archaeological
Excavation
Archaeological Soils

Dr Roy Lawrie

POLLEN ANALYSIS OF SOIL SAMPLES FROM

OLD MARULAN, SOUTHERN TABLELANDS, N.S.W.

Mike Macphail

The surviving remains of Old Marulan are buried in the paddock on the left hand side of the fenceline extending northwards from the pine in the foreground. Orange plastic (middle distance) marks the site of a stone lined cesspit at the rear of the long-demolished 1830s *Woolpack Inn*. The remnants of the former dry sclerophyll forest cover (far left hand side) line the banks of a small creek downslope of the site

Palynological report prepared 25 September 2008 for
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1. INTRODUCTION

Much of what we know about past terrestrial environments, in particular vegetation and rainfall, is based on fossil pollen and spores (plant microfossils) preserved in organic-rich sediments.

Since 1987, numerous historical archaeological sites in Sydney and the adjacent Cumberland Plain have been sampled for pollen analysis (Macphail 1999, Macphail & Casey submitted, M.K. Macphail unpubl. data). Archaeological contexts range from late 18 $^{th.}$ century soils and postholes on sites occupied by convicts, to 19-20th century cesspits, drains, foundations, wells and waterholes on residential sites originally occupied by free settlers. Not all contexts preserve *in situ* organic remains but plant microfossil assemblages recovered to date archive the clearing of native sclerophyll vegetation, gardening for 'food and survival', and gardening for 'decoration' (see Bligh 1980), some of the edible plants stored and eaten by convicts and free settlers, grazing, the use of the Parramatta River as a source of domestic water and sediment to level building sites, the local extinction of at least one native aquatic herb, early Colonial burial practices, and the progressive spread of exotic weeds due to dumping of domestic waste on public and residential sites.

A number of early Colonial settlements have been excavated outside of the Sydney region, e.g. Kiandra on the Southern Highlands of N.S.W., but few, if any, of the cultural deposits have been systematically sampled for pollen analysis.

1.1 **This report**

The report discusses fossil spores and pollen preserved in soils on the site of Old Marulan, established in 1834-1835 on the Southern Tablelands some 150 km south of Sydney. The present-day village of Marulan (elevation 640 m asl) is located at about 1 km to the north of Old Marulan, on the same (western) side of the Hume Highway (Fig. 1). Other small settlements established about the same time in the district are Bungonia (1833) and Towrang (~1835). Australia's first inland city, Goulburn (~1830), is located ca. 30 km to the west. Archaeological investigation of Old Marulan has focused on the rear of the *Woolpack Inn*, Old Marulan's first public house built near the intersection of the Great South and Bungonia Roads (Fig. 2).

1.2 **Aims**:

The primary aim was to determine whether fossil pollen and spores were preserved in soil and associated sediments and, if so, to use these to identify past cultural activities on the site.

1.4 **Samples**:

Twelve soil samples were submitted for pollen analysis. Four of these came from Cesspit 32 – presumed to be the stone-lined cesspit located on the fence-line marking the eastern (Hume Highway) boundary of the site (see Figs. 2, 12). Other samples come from a posthole and infilled trenches, some of which may have been associated with agriculture. No data were available for the sample labelled 'NE corner of site' but it is noted that the pollen and spore content is similar to those recovered from other soil samples on the site.

Table 1: Samples

Sample	CoreLab	ACN	Context	Lithology	Inclusions
1	8105	32	upper deposit unit [24] in cesspit	light brown silty fine sand	rootlets
3	8106	32	soil in seepage channel of cesspit	mottled yellow-brown loam	rootlets
5	8107	32	lower deposit in cesspit	grey-brown silty sand	rootlets
4	8108	32	decayed bedrock at base of cesspit	pallid sandy clay	rootlets
6	8110	323	fill of probable agricultural trench	grey-brown silty fine sand	rootlets
7	8111	232	fill of probable agricultural trench	grey-brown silty fine sand	rootlets
8	8112	231	fill of probable agricultural trench	grey-brown silty clay loam	rootlets
9	8113	266	fill of posthole from primary fill	silty sand with clay pelletoids	rootlets
10	8114	266	fill of posthole – postpipe fill	medium brown sandy silt	rootlets
11	8115	313	possible decayed beam in trench/slot	decayed wood in silt loam	rootlets
14	8116	324	Fill in 'narrow' trench	dark grey charcoal silt loam	rootlets
-	8109	?	soil sample from NE corner of site	medium brown sandy loam	rootlets

Fig. 1: Locality Map showing Old and New Marulan in relation to other 1830s settlements and early Colonial Roads through the Southern Tablelands. The modern Hume Highway follows the line of Major Mitchell's Great South Road (from the NSW Road & Traffic Authority's *Self-Guided Tour of the Great South Road*: RTA/publ.o1.039)

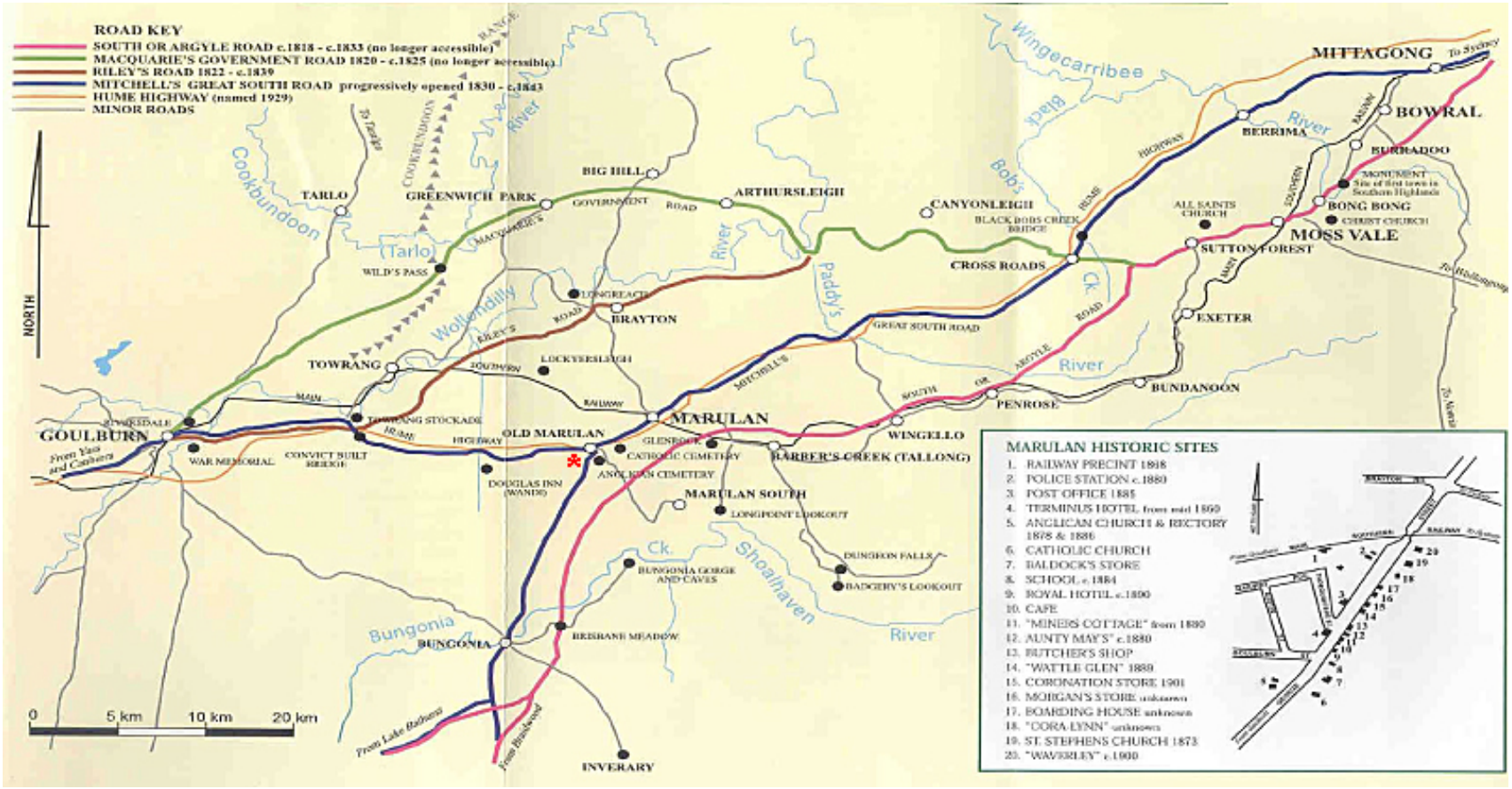

Fig. 2 View looking east over excavated area (August 2008)

2.0 SUMMARY

- Only two soil samples preserved fossil pollen and spore assemblages (microfloras) that are likely to date to period (1835-1860s) when the *Woolpack Inn*, Old Marulan, was a staging post on the Great South Road linking Sydney and Goulburn. These are:

  1. Sample 5, from the lower deposit in Cesspit 32. This sample preserved fossil pollen evidence of cereals (coarse breads?) and legumes being eaten by the mid 19th century residents (permanent and/or transient) of Old Marulan.

  2. Sample 11, from a slot/trench containing decayed wood (ACN 313). This sample preserved abundant hornwort spores and is unique in the study in lacking introduced pollen of definite and probable European exotic species. Similar microfloras in Parramatta represent clearance of the native vegetation using fire but a more prosaic explanation is that rainwater was draining into the slot/trench.

- A comparison of microfloras recovered from Cesspit 32 and from a broadly contemporary cesspit on the Parramatta Convict Hospitals site (Macphail 2006, unpubl. data) suggest that the rural inhabitants (transient and permanent) of the *Woolpack Inn* had a less diverse (impoverished?) diet compared to those living on fertile agricultural land closer to Sydney.

- Conditions on the site appear too dry to support ferns and spores of these cryptogams are likely to come from naturalized plants growing on damp brick- and stone work prior to or following the demolition of the *Wooolpack Inn* and other buildings in Old Marulan.

- The other ten soil samples from the Old Marulan site appear to preserve essentially recent microfloras derived from (1) herbs and cryptogams established on the (grazed) site sometime before its excavation and (2) pine (*Pinus*), casuarina (*Allocasuarina/Casuarina*) and wattle (*Acacia*) growing near the junction of the Hume Highway and Bungonia Road.

- Eucalypt (*Eucalyptus*) pollen occurs only in trace numbers in the soil samples despite remnants of the native *Eucalyptus* Dry Sclerophyll Forest growing along the ephemeral creek below Old Marulan and also in grazed pastureland on both sides of the Hume Highway. The reason for this is unknown. Casuarina may have been planted at the northeast corner of the site although when is unknown.

3. OLD MARULAN

3.1 Background

The Marulan-Bungonia district of the Southern Tablelands encompasses the area above 600 m elevation between Paddy's River to the north, the Shoalhaven River Escarpment to the east, the Goulburn Plains to south and Towrang and the Wollondilly River to the west (fig. 1).

Exploration of the country south of Sydney between 1798-1818 revealed the existence of extensive grasslands with good water supplies on the Southern Tablelands. This discovery, combined with the overgrazing of the Cumberland Plain, resulted in the granting of a number of 'Permits of Occupancy' to reside on or purchase tracts of land up to 3000 acres in the Bungonia-Marulan district in the 1820s. Examples of these early Colonial Estates are *Lumley Park* (1824), *Caarne* (1826), *Brisbane Meadows* (~1826), *Glenrock* (~1826), *Inverary Park* (~1831) and *Reevedale* (1830s) (see Roxburgh 1972).

The earliest access route onto the Southern Tablelands, the South or Argyle Road (ca. 1818-1833) followed the eastern (Shoalhaven escarpment) route taken by early explorers such as James Meehan, Hamilton Hume and Charles Throsby, and was designed to link the early Colonial Estates (Fig. 1). To facilitate movement of stock, Governor Macquarie authorized the construction of a second road, 'Government Road' (1820-ca. 1825) from Picton on the southern boundary of the Cumberland Plain through country on the western side of the Wollondilly River onto the Goulburn Plains (Fig. 2). Both roads became superseded following the progressive (1830-1836) construction of a third highway, the Great South Road (renamed the Hume Highway in 1922) along a route previously surveyed by Major (subsequently Sir) Thomas Mitchell.

Unlike Bungonia (and Goulburn), which also was established by Government decree in the 1830s, Old Marulan was not sited to take advantage of a reliable local water supply or open pasturelands. Rather its primary function seems to have been as a 'staging post/inn' at the junction of the existing road to Bungonia and Major Mitchell's 'new road' Goulburn, still under construction in 1836. In anticipation of the trade that was likely to follow completion of this road, the first innkeeper in the Bungonia-Marulan district (Joseph Peters) transferred his license from a site on the 'Government Road' to new premises named the *Woolpack Inn* in Old Marulan in 1835

Extension of the railway line from Sydney to Goulburn in the late 1860s resulted in the demise or contraction of many of the earlier settlements in the district – including Old Marulan whose surviving remains are now buried under pasture on the western side of the Hume Highway directly opposite the road junction to South Marulan and Bungonia (Title Page, Fig. 2).

3.2 Pre-settlement vegetation

Keith (2006: 92-93, 164-165) proposes that at the time of European settlement that native vegetation on the Southern Tablelands comprises two main formations: Grassy Woodland, growing on hilly to undulating terrain with moderately fertile soils derived from fine-grained sediments and granites, and Dry Sclerophyll Forest, growing on less fertile soils on stony ridges and ranges. Both formations are dominated by *Eucalyptus* spp., e.g. Blakely's red gum (*E. blakelyi*) and red stringy bark (*E. macrorhyncha*) and share numerous genera of understorey sclerophyll shrubs and herbs.

Not surprisingly the diversity of herbs, especially grasses, is greater in Southern Tablelands Grassy Woodland although few of the Indicative Species listed by Keith (*ibid*: Table 2) can be identified to genus or species level via their pollen or are routinely represented in the fossil pollen record. The only native fern recorded is bracken (*Pteridium esculentum*) and spores of other ferns recorded in this study can be presumed to come from naturalized plants growing on damp brick and stone work in Old Marulan.

Early descriptions (Throsby 1818: cited in Jervis 1946) indicate that the area around Marulan was covered in " a fine open forest called [by the Aborigines] *Moorooaulin*".

Table 2: Indicative species [* indicates species with pollen distinguishable at the generic level]

GRASSY WOODLANDS		**DRY SCLEROPHYLL FOREST**	
TREES			
Eucalyptus blakelyi	Blakely's red gum	*Eucalyptus albens*	white box
Eucalyptus bridgesiana	apple box	*Eucalyptus goniocalyx*	bundy
Eucalyptus macroryncha	red stringy bark	*Eucalyptus macroryncha*	red stringy bark
Eucalyptus melliodora	yellow box	*Eucalyptus nortonii*	large-flowered bundy
Eucalyptus nortonii	large-flowered bundy		
SHRUBS			
Acacia delabata *	silver wattle	*Acacia falciformis* *	broad-leaved hickory
Bursaria spinosa *	blackthorn	*Acacia obtusifolia* *	-
Cassinia longifolia	-	*Acacia terminalis* *	sunshine wattle
Exocarpos cupressiformis *	native cherry	*Amperea xiphoclada* *	broom spurge
Hibbertia obtusifolia *	-	*Banksia serrata* *	Old Man banksia
Lissanthe strigosa *	peach heath	*Banksia spinulosa* *	hairpin banksia
		Bossiaea obcordata	-
		Correa reflexa *	native fuchsia
		Epacris impressa *	pink heath
		Hibbertia empetrifolia *	trailing guinea flower
		Leptospermum trinervum *	flakily-barked teatree
		Leucopogon lanceolatus *	-
		Lomatia ilicifolia *	holly-leaved lomatia
		Monotoca scoparia *	prickly broom-heath
		Persoonia linearis *	narrow-leaved geebung
		Pimelea linifolia *	slender rice-flowers
		Platysace lanceolata *	-
		Podolobium ilicifolium	prickly shaggy pea
		Tetratheca thymifolia *	black-eyed Susan
		Xanthosia pilosa *	-
HERBS			
Aperula conferta *	common woodruff	*Dianella caerula* *	blue flax lily
Bulbine bulbosa *	bulbine lily	*Gonocarpus tetragynus* *	raspwort
Chrysocephalum aiculatum	common everlasting	*Gonocarpus teucrioide* *s	raspwort
Convolvulus erubescens *	Australian bindweed	*Lomandra confetfolia* *	-
Desmodium varians	slender tick trefoil	*Lomandra longifolia* *	spiny-head mat-rush
Dianella longifolia *	blue flax lily	*Lomandra multiflora* *	many-flowered mat-rush
Dichondra repens *	kidney weed	*Patersonia glabrata* *	leafy purple-flag
Geranium solandr *i	native geranium	*Stylidium graminifolium* *	grass trigger-plant
Glycine clandestina	-	*Viola hederaceae* *	ivy-leaved violet
Gonocarpus tetragynus *	raspwort		
Hypericum gramineum *	small St. John's wort		
Plantago varia *	variable plantain		
Ranunculus lappaceus *	common buttercup		
Rumex brownii *	swamp dock		
Stellaria pungen *s	prickly starwort		
Tricoryne elatior *	yellow autumn-lily		
GRASSY WOODLANDS		**DRY SCLEROPHYLL FOREST**	
GRAMINOIDS (including grasses)			
Austrodanthonia pilosa	smooth-flowered wallaby grass	*Caustis flexuosa*	curly wig
Austrodanthonia racemosa	-	*Entolasia stricta*	wiry panic
Austrostipa scabra	rough spear rass	*Gahnia radula*	-
Bothriochloa macra	red grass	*Joycea pallida*	silvertop
Echinopogon ovatus	forest hedgehog grass	*Lepidosperma laterale*	-
Elymus scaber	common wheat grass	*Poa meionectes*	-
Lomandra longifolia	spiny-heaeded mat-rush		
Microlaena stipoides	weeping grass		
Poa sieberiana	snow grass		
Schoenus	common bog-rush		
Themeda australis	kangaroo grass		
FERNS			
		Pteridium esculentum *	bracken

3.3 **Present-day vegetation**

Remnant or old regrowth stands of *Eucalyptus* Dry Sclerophyll Forest occur in grazed pastures bordering the excavated area , on the banks of the ephemeral creek downslope of the site and also along the roads to Bungonia and South Marulan (Figs. 3-5). Of particular significance to this study are:

1. The absence of casuarina (*Allocasuarina/Casuarina*) in remnant dry sclerophyll forest on the western (Marulan) side of the Hume Highway within 100-200 m of the site of Old Marulan.

2. The presence of casuarina, wattles (*Acacia* spp.) and mature pines in forest and pasturelands lining the Bungonia Road south of its junction with the Hume Highway (Figs. 6, 10).

3. The presence of a young, self-seeded pine (*Pinus radiata*) along the fence line some 30 m south of the excavated cess-pit (Fig. 7).

4. Colonization of the excavated area by introduced herbs, e.g. crowfoot (*Erodium* sp.) and Scots Thistle (*Onopordium acanthum*): The surrounding grazed pastureland supports grasses and the occasional shrub (*Leucopogon* sp.?) (Figs. 8-9, 11).

Fig. 3: Weed-infested pasture between the western boundary of the Old Marulan and ephemeral creek. The road sign to Marulan (see Title Page) is visible on the upper left hand side of the photograph

Fig. 4: Eucalypts lining the deeply incised creek downslope of Old Marulan.

Fig. 5: Brambles (*Rubus* sp.) growing in the dry creek bed downstream of Fig. 4.

Fig. 6: Understorey of young casuarina sp. in grazed woodland along Bungonia Road.

Fig. 7: *Pinus radiata* on the Hume Highway (east) boundary of the excavated area.

Fig. 8: Crowfoot (*Erodium* sp.) colonizing mineral soils on the excavated area. The stone is part of a foundation wall.

Fig. 9: Juvenile Scots Thistle established on mineral soil fertilised by sheep droppings on the excavated area.

Fig. 10: Wattles (foreground) and a mature pine (middle distance) in farmland near the Hume Highway/Bungonia Rd junction.

Fig. 11: Heath growing in grazed pastures on the western side of the creek

3.4 **Built Environment**

Historical records describing the settlement of Marulan and its Colonial occupants up to 1870 have been reviewed by Jervis (1946) and Roxburgh (1974) and summarized in various online publications, e.g. www.walkabout.com.au/locations/NSWGoulburn.shtml. Key developments are:

- 1834: The NSW Surveyor-General encloses a design for the "Village of Marulan" located at the turn-off of the roads to Goulburn and Bungonia and requests that streets and sections be marked off on the site of the proposed village. Approval of this plan was notified in the 11 March issue of the *Government Gazette*. By this date significant acreages of crops (wheat, maize) were being grown on the colonial estates centred around Bungonia: The first spirits to be distilled in Australia was produced at *Lumley Park* in 1831.

- 1835: On 20 June, Joseph Peters, Licensee of the *Woolpack Inn* at Darragh Forest on Governor Macquarie's (Government) Road, protests to the Surveyor General about the direction being taken by Major Mitchell's (Great South) Road, stating *inter alia* that he had 'purchased at "an exorbitant rate" 1½ acres of land at Marulan and had nearly completed a large brick house for the accommodation of the public, which had cost him about £400'. There is no evidence to suggest this or a subsequent complaint resulted in the re-direction of the road. On 23 June, an application to transfer Peter's license to the newly named *Woolpack Inn* at Marulan was approved by the Goulburn Magistrate.

- 1836: Peters advertises in the *Australian* (19 January) that he had 'removed to his new licensed house at Old Marulan. Major Mitchell's Great South Road appears to have been completed by convict labour gangs past the Marulan-Bungonia junction in the same year. Peters purchased additional lots in Old Marulan in 1837..

- 1845: Old Marulan is described as a 'small village with two inns, one store and a few bark huts. By this date, Bungonia included a courthouse/gaol, a store selling groceries, draperies, wines and spirits, eighteen houses and ninety eight residents. Local facilities included a 'commodious Chapel', a post-office and 'three or four stores procuring custom nobody knows how' by 1847. Nevertheless, from its earliest days Old Marulan seems to have become a staging post for bullock-teams and stage coaches travelling between Sydney and Goulburn. The 'open' cesspit (Fig. 12) and ceramic and glass sherds littering the surface of the excavated area (Figs. 13-14) are likely to date to this period.

- 1850: A property located opposite the *Woolpack Inn* (still licensed to Peters) and comprising 'a store, a school house', a disused brick-on-stone courthouse, and a blacksmith and wheelwright's shop' is advertised for sale in February.

- 1851: The second of the two inns in Old Marulan, the *Freemason's Tavern* built of stone and brick ca. 1847, is advertised for sale.

- 1867: Privately owned land for new 'township' named *Mooroowoolen* is subdivided around the site of the newly constructed railhead located ca. 1 km north of Old Marulan. Facilities in the township included an 'accommodation house' and a store.

- 1868: The Southern Railway Line from Sydney to the railway station at *Mooroowoolen* is opened on 6 August. The new township was the terminus for this railway and the staging post for horse-drawn coaches linking Marulan to Braidwood and Goulburn until about 1868 when the railway line to Goulburn was opened.

- 1870+: With the opening of the railway line to Goulburn and centring of commercial activity around the railway station (subsequently renamed Marulan in 1878), the population of the original village declined although the cemeteries continue to be used. When Old Marulan was finally abandoned (World War I?) is uncertain but duplication of the Hume Highway and construction of a new interchange to the Lynwood Quarry have, and will continue to impact on the site.

Fig. 12: Stone-lined cesspit at the rear of the long-demolished *Woolpack Inn* on the eastern boundary of the excavated area.

Fig. 13: Mid Victorian era shard of a transfer printed plate exposed on the surface of the excavated area, Old Marulan

Fig. 14: Fragments of sandstock brick and bottle glass exposed on the surface of the excavated area, Old Marulan

4. POLLEN ANALYSIS

4.1 Age Control

Pollen from introduced species, in particular pine (*Pinus*) and cereals (Poaceae pollen >60 µm in diameter), and widely naturalised weed taxa such as dandelions (Liguliflorae) and plantain (*Plantago lanceolata*-type) are routinely used to distinguish sediments deposited since European settlement of Australia in 1788 (Macphail 1999).

Samples yielding significant amounts of pine pollen are unlikely to pre-date the middle 19 $^{th.}$ century or younger, based on the date when pines first began to be widely planted as wind-breaks: They may be much younger, or contaminated if pines are growing close to the site. Cereals were established from the late 1780s onwards in many areas and significant relative abundances are evidence only that cereals were being grown, threshed, stored or (cesspits) eaten on the site. Other known sources of cereal pollen in historical archaeological deposits are stable waste (used as manure), straw (used to pack drains: see Wong 1999), or naturalised (self-sown) plants.

A necessary condition is that the exotic pollen accumulated at the same time as the deposit in which they are preserved, i.e. are *in situ*. This may or may not be the case with soil samples because of bioturbation by e.g. worms or cicada larvae. It is possible for pollen and spores to be washed into the soil profile down channels formed by the decay of dead roots.

4.2 Processing

Because of the sandy texture of the soils, approximately 15 grams were processed for each sample in order to maximize yields of fossil pollen and spores. Otherwise, the samples were processed using the standard mix of chemical, heavy liquid and sieving techniques developed by the author and colleagues to concentrate acid-resistant plant microfossils from soils (see Macphail 1999). Addition of a known number of exotic *Lycopodium* spores allowed to be estimated in absolute terms (numbers x 10^3 per gram of air-dried sediment).

4.3 Contamination

The depth of soil covering archaeological remains on the site is shallow (http:/projects.umwelt.com.au/lynwood-heritage/the-research-design) and most of the soil samples include rootlets of plants growing on the surface at the time of excavation. Whether pollen and spores have moved down into the soil profile along old root channels is unknown but low numbers of faunal microfossils indicate that the soil profile have been bioturbated by burrowing insects such as worms.

4.4 Casuarina & eucalypts

Allocasuarina/Casuarina (casuarina) and *Eucalyptus* (eucalypt) dominated microfloras are (and are likely to remain) difficult to interpret in historical archaeological contexts in Sydney and surrounding uplands such as the Southern Tablelands for three reasons:

1. Pollen produced by tall tree species growing in dry sclerophyll forest are ±identical to grains produced by trees lining riverbanks and growing in freshwater swamps [*Casuarina glauca*, *Eucalyptus robusta*] as well as by shrub species growing in heath and on cliffs.

2. All casuarina species (and many introduced pines) are wind-pollinated, produce pollen in astronomical numbers, and disperse these widely over long distances away from the parent plant. Although eucalypts are insect-pollinated, modern pollen trapping studies show their pollen are also dispersed in large numbers by wind over long distances in very large numbers.

3. Flowering branches of eucalypts and casuarina were widely used as kindling or fire-wood and both genera and wattles (*Acacia*) were widely as widely used as building material in the early Colonial period.

For this reason, casuarina and eucalypts almost always dominate fossil pollen assemblages on historical archaeological sites (including those accumulating in high density residential areas) *either* when the parent plants are growing on the site *or* when the pollen influx from other plants growing on the site is very low. The latter situation arises when the local flora is dominated by plants that produce/disperse pollen or spores in low numbers over short distances and also when the site is effectively devoid of vegetation (many archaeological contexts).

4.5 **Sclerophyll shrubs and herbs**

With few exceptions, e.g. broom heath (*Monotoca*), broom spurge (*Amperea xiphoclada*) and many native grasses (Poaceae pollen <50 µm in diameter), native sclerophyll shrubs and herbs, ferns, fern allies, hepatics and mosses (cryptogams) are under-represented in the fossil record since their pollen or (cryptogam) spores are produced in relatively small numbers and seldom dispersed far from the parent plant. For this reason, high relative abundances of their pollen or spores (collectively termed miospores) are usually reliable evidence that the parent plants were growing on the site. In a number of cases it is the identity of these plants is obscured by strong similarities between the pollen and spores of unrelated native and introduced genera. Examples are (angiosperm pollen) the native (*Microseris scapigera*) and European (*Taraxacum officinale*) dandelion, and (fern spores) the rough tree-fern (*Cyathea*) and screw fern (*Lindsaea*).

4.6 **Ferns and other cryptogams**

Conditions on the site appear too dry to support ferns and fern allies and spores of these cryptogams are likely to come from naturalized plants growing on damp brick- and stone work prior to, or following demolition of the *Woolpack Inn* and other buildings in Old Marulan.

Hornwort (Anthocerotae) and liverwort (Ricciaceae) spores are found in trace numbers on many historical archaeological sites but are most abundant on (1) damp mineral soils following clearance of the native vegetation using fire (ash bed effect), (2) below the drip lines of roofs and (3) on damp brick- and stonework in drains and wall foundations. Examples from early Colonial Parramatta are discussed in Macphail (1999) and Macphail & Casey (submitted). 1824 wall plaster from *Lumley Park* was found to preserve large numbers of Anthocerotae spores (from creek water?) and cereal pollen (M.K. Macphail unpubl. data).

5. RESULTS

5.1 **Yield and preservation**

All samples yielded low to moderate amounts of well-preserved to strongly humified organic matter in a matrix of organic? fines, and carbonized particles. All samples included macerated plant detritus, including apical meristem tissues and suberized cuticle derived from the grass? rootlets.

Yields of fossil pollen and spores were mostly low except for fungi. Preservation was good but all assemblages including some strongly biodegraded (corroded) and crumpled grains. This phenomenon, which is typical of soil profiles, usually indicates contamination or mixing of different aged assemblages has occurred.

For samples yielding in excess of 100 or more identifiable pollen and spores, relative abundance values (Table 3) are expressed as a percentage of the total pollen and spore count excluding algal fungal spores and cysts. For samples with lower yields, the data are given in parentheses as raw counts. A number of the more significant microfossils are illustrated in Appendix 1.

5.2 **Dominance and diversity**

Fungal spores excepted, the only common plant microfossil to occur in most samples were Anthocerotae (*Cingulatisporites*) and Ricciaceae (*Rudolphisporis rudolphi*), very robust trilete spores produced by hornworts and the liverwort family Ricciaceae, respectively. The parent plants are thalloid hepatics that typically are found on eroding creek flats and similar damp mineral soils, especially after wildfires. Archaeological contexts where these spore types have been found in high relative abundance include alluvial terraces cleared using fire, tilled soils, under the roof drip-lines of convict huts, on damp stone and brickwork in early Colonial drains and in wall plaster made using creek water (see Macphail 1999, Macphail & Casey submitted).

Other taxa that are sporadically common (>10%) in one or more samples include an alga cf. *Botryococcus*, pine (*Pinus*), casuarina (*Allocasuarina/Casuarina*), dandelions (Liguliflorae), grass (Poaceae), raspwort (*Gonocarpus*) and native and probable exotic members of the daisy (Asteraceae) and samphire (Chenopodiaceae) families. The only common pollen type representing an edible plant is cereal. Crucifer (Brassicaceae) and pea (*Pisum*) pollen in the same sample (Sample 5) almost certainly also represent an edible species given the cesspit context.

Eucalyptus pollen are very rare or absent although the reason for this is unknown (see Discussion). Pollen of sclerophyll shrubs are equally rare and the taxa that were recorded are mostly produced by plants whose pollen is widely dispersed by wind in low numbers, e.g. wattles (*Acacia*), broom heath (*Monotoca*), broom spurge (*Amperea*) and Gyrostemonaceae. Grazing is likely to be responsible. Crowfoot (*Erodium*), dandelion (Liguliflorae) and the high spine type of Asteraceae pollen almost certainly represent weed species and recently established juveniles of all three genera or families were found growing on the mineral soil surface of the site in late August.

5.3 **Results**

Soil sample 1

Context: upper deposit in Cesspit 32
Common taxa: *Cingulatisporites*, *Allocasuarina/Casuarina*
Frequent taxa: *Rudolphisporis*, *Pinus*, Cyperaceae, *Gonocarpus*, Liguliflorae, Poaceae, Asteraceae (high spine types), *Acacia*, *Stellaria*
Definite exotics: *Pinus*, Cerelia
Probable exotics: Asteraceae (high spine types), Brassicaceae, Chenopodiaceae, *Erodium*, Liguliflorae, *Stellari*a
Comment: The assemblage almost certainly is recent and resents a mix of pollen (1) transported by wind from the young pine growing adjacent to the fence line and wattle- and casuarina stands lining Bungonia Road, respectively, and (2) hepatics and herbaceous weeds colonizing mineral soils in and surrounding the cesspit structure. The soil was sufficiently damp to support sedges as well as horn- and liverworts.

Soil sample 3

Context: soil accumulating in the seepage channel of Cesspit 32
Common taxa: *Allocasuarina/Casuarina*, *Cingulatisporites*
Frequent taxa: *Rudolphisporis*, *Eucalyptus*, *Gonocarpus*, Poaceae, Liguliflorae,
Definite exotics: Cerelia (trace)
Probable exotics: Liguliflorae,
Comment: The assemblage is a depauperate version of this recovered from the upper fill in Cesspit 32 (Sample 1) but is likely to be older due to (1) the absence of pine and (2) significant (5-6%) relative abundance of eucalypt and grass pollen. How much earlier is unclear although the presence of trigger-plant (*Stylidium*) pollen is circumstantial evidence that the site was not being intensively grazed. The only evidence of human occupation is a single grain of cereal pollen. This may have been derived from sewage (see Sample 5).

Soil sample 5

Context: lower deposit in Cesspit 32
Common taxa: *Allocasuarina/Casuarina*, Cerelia, *Cingulatisporites*, Poaceae
Frequent taxa: Rudolphisporis, *Pinus*, *Eucalyptus*, Asteraceae (low spine types) Brassicaceae, *Gonocarpus*, trilete ferns
Definite exotics: *Pinus*, Cerelia, *Pisum, Polygonum aviculare*-type
Probable exotics: Brassicaceae, Liguliflorae, Oleaceae
Comment: High relative abundances of cereal pollen and low to trace numbers of pollen from the pea and cabbage are typical of assemblages recovered from other Colonial cesspits although the diversity is low (see Table 4). The data provide evidence of diet that included legumes and coarse breads during the early to middle 19$^{th.}$ century.

The high relative abundance of casuarina pollen is difficult to explain unless the privy above the brick-lined cesspit was open to the atmosphere, shaded by a planted casuarina, or the sample has been contaminated by recent pollen. Similarly grass values (suggesting a grassy sward) are inconsistent with the significant relative abundances of horn- and liverwort spores (typical of bare ground) unless the latter came from thalli growing on damp brickwork.. It is possible that grass was being used as de-facto toilet paper (cf. Table 4).

Soil sample 4

Context: decayed bedrock below cesspit
Common taxa: none
Frequent taxa: none
Definite exotics: *Polygonum aviculare*
Probable exotics: Brassicaceae

Comment: The extract was dominated by carbonized particles (from ash added to the cesspit?) and dispersed root tissues.

Soil sample 6

Context: Fill in probable agricultural trench [ACN 323]
Common taxa: *Cingulatisporites*, *Rudolphisporis*, Liguliflorae
Frequent taxa: Poaceae,
Definite exotics: none
Probable exotics: Asteraceae (high spine types), Brassicaceae, Chenopodiaceae, Liguliflorae, *Plantago*, *Stellaria*

Comment: The microflora, which is associated with abundant root tissues, is likely to be modern or mixed (bioturbated) with recently accumulated pollen types such as pine. Relative abundance values indicate horn- and liverworts and dandelions were growing on damp, charcoal-rich soils at the sample site: A more diverse agricultural weed flora appears to have been growing in the vicinity of this site (see also Sample 7). There is no pollen evidence that cereals or other vegetable species had been planted in the trench but, as in analogous sites in Sydney, such pollen types may have been destroyed by the act of tilling the ground. The virtual absence of casuarina and eucalypt pollen is difficult to explain but otherwise the microflora is typical of abandoned/over-grazed land.

Soil sample 7

Context: Fill in probable agricultural trench [ACN 232]
Common taxa: *Cingulatisporites*, *Pinus*, Liguliflorae, fungal spores
Frequent taxa: *Rudolphisporis*, *Allocasuarina/Casuarina*, Chenopodiaceae, *Erodium*, *Gonocarpus*, Malvaceae, Poaceae, *Polygonum aviculare*-type, *Rumex*, *Stellaria*
Definite exotics: *Pinus*
Probable exotics: Asteraceae (high spine types), Brassicaceae, Chenopodiaceae, Liguliflorae, *Plantago*, *Stellaria*

Comment: Unlike other samples of fill from probable agricultural trenches (Samples 6, 8), ACN 232 yielded large numbers of well-preserved fossil pollen, cryptogam and fungal spores and algal cysts in a matrix dominated by equally well-preserved plant detritus. The high relative abundance makes it likely that the microflora post-dates the establishment of the (young) pine seen growing on the fence-line south of the cesspit. .Alternatively, the assemblage is of mixed age, due to bioturbation, and in part represents plants established on the site following abandonment of Old Marulan. Nevertheless, Sample 7 is unusual in that it includes significant to very large numbers of fern and fungal spores and cysts of an unidentified alga resembling *Botryococcus*. Perennially damp conditions almost certainly explain why a diverse agricultural weed flora was able to flourish on the sample site. As for Sample 6, there is no pollen evidence for cultivation but it is possible that some of the plant detritus comes from organic waste used as manure.

Soil sample 8

Context: Fill in probable agricultural trench [ACN 231]
Common taxa: none
Frequent taxa: *Cingulatisporites*, *Rudolphisporis*
Definite exotics: *Pinus*
Probable exotics: Liguliflorae, Chenopodiaceae

Comment: The very sparse assemblage is probably modern, derived from horn- and liverworts growing on the sample site, and agricultural weed species such as dandelions growing further away from the site.

Soil sample 9

Context: Primary fill in a post hole.
Common taxa: none
Frequent taxa: none
Definite exotics: *Pinus*
Probable exotics: Liguliflorae

Comment: Little can be deduced from the very sparse microflora except that the soil used to pack the post came from the (barren) A_2 or B horizon.

Soil sample 10

Context: Post-pipe fill
Common taxa: Asteraceae (high and low spine types), Chenopodiaceae
Frequent taxa: *Cingulatisporites*, *Rudolphisporis*, *Allocasuarina/Casuarina*, Brassicaceae, Liguliflorae
Definite exotics: *Pinus*
Probable exotics: Asteraceae (high spine types), Brassicaceae, Chenopodiaceae, Liguliflorae, *Rumex*

Comment: It is reasonable to assume that the fossil pollen and spores recovered from the post-pipe fill accumulated relatively slowly following decay of the post despite the very low

representation of tree pollen types. Circumstantial support for this is provided by trace numbers of long distance transported pollen types, viz. *Dodonaea* (native hops), Gyrostemonaceae and *Monotoca* (broom heath). Salinity levels around the posthole were sufficiently high to support at least two genera of samphires although the reason for this is unclear.

The presence of at least three genera of mesic ferns (*Calochlaena*, Gleicheniaceae, *Pteris*) may be circumstantial evidence for damp or stone brickwork in the vicinity, i.e. part of the assemblage may date back to the time when the *Woolpack Inn* was as a staging post between Sydney and Goulburn.

Soil sample 11

Context: Possible decayed beam [ACN 313] in a slot trench
Common taxa: *Cingulatisporites*
Frequent taxa: *Rudolphisporis*, *Allocasuarina/Casuarina*, *Gonocarpus*, Poaceae
Definite exotics: none
Probable exotics: *Erodium*

Comment: Unlike previous samples, pollen of definite and probable European exotic species were not recorded. The very high relative abundance of *Cingulatisporites* spp. (73%) is unusual and the combined data suggest that the sample may represent either clearance of the site in the 1830s or rainwater was draining into the trench or slot. The sample yielded strongly humified plant debris, which is likely to have come from decayed wood, but the source could not be positively identified.

Soil sample 14

Context: fill in 'narrow' trench [ACN 324]
Common taxa: none
Frequent taxa: *Cingulatisporites*, *Rudolphisporis*, *Allocasuarina/Casuarina*, *Gonocarpus*, Poaceae
Definite exotics: *Pinus*
Probable exotics: Chenopodiaceae, Erodium, Liguliflorae,

Comment: Like Sample 11, the organic extract includes plant debris that might have come from decayed wood. Otherwise, the microfossil content broadly resembles that recovered from other soil samples except that pollen of a Permo-Triassic gymnosperm is present in trace numbers. Old Marulan is located to the south the geologic boundary between the Permo-Triassic Sydney Basin and surrounding, largely Ordovician, rocks. Accordingly the record hints that rocks used to build the foundations of the Woolpack Inn may have included some from the Hawkesbury Sandstone-Wianamatta Shale sequence. Aggregates of immature eucalypt pollen may have come from kindling used in domestic fires.

Soil sample northeast corner of excavated area

Context: (context, depth and ACN unknown).
Common taxa: *Cingulatisporites*, *Allocasuarina/Casuarina*, *Gonocarpus*
Frequent taxa: *Rudolphisporis*, Liguliflorae
Definite exotics: *Pinus*, Cerelia
Probable exotics: Brassicaceae, Liguliflorae

Comment: The microflora differs from previous samples in being dominated by *Allocasuarina/Casuarina* (47%), including pollen aggregates (2%). Since the relative abundance of other commonly occurring taxa, viz. horn- and liverwort spores and raspwort pollen, are similar to those recorded in the trench samples, it is probable that a casuarina had been planted in a stock yard? at the northeast corner of the site.

TABLE 1: **Relative pollen data expressed as a percentage of the total dryland pollen & spore excluding fungal, and bryophyte spores, and algal cysts. Edible plants shaded. + equals values less than 1%. Values in parentheses are raw counts.**

		Cesspit 32				Agricultural trenches?			posthole		trench		NE
Fossil Taxon	**Common Name**	**1**	**3**	**5**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**14**	**corner**
		upper	seepage	lower	base	ACN 323	ACN 232	ACN 231	fill	pipe	beam?	fill	**of site**
Define & probable exotics													
Asteraceae (high spine types)	daisy family	2%				(3)	+			12%			
Brassicaceae	cabbage family	+		2%	(1)	(1)	1%			5%			+
Cerelia (Poaceae >60 µm)	cereals	+	+	25%	(1)								+
Chenopodiaceae (small pore var.)	samphires		+	+		(2)		(3)		15%		(1)	
Chenopodiaceae (large pore var.)	samphire						+			3%			
Convolvulaceae	bindweed family												+
Erodium	crowfoot	+					3%				+	(1)	
Liguliflorae	dandelions	4%	2%	2%		(15)	13%	(2)		5%		(1)	2%
Malvaceae	malva family						+						
Oleaceae	olive family			+									
Pinus	pines	5%		1%		(3)	17%	(1)	(3)	3%		(2)	+
Pisum	pea			+									
Polygonum aviculare-type	wire-weed			+	(1)		2%						
Rumex	docks						+			1%			
Stellaria	starworts	+				(2)	2%						
Native trees & shrubs													
Acacia	wattles	1%		+		(1)	+					(3)	+
Allocasuarina/Casuarina	casuarina	27%	46%	31%	(1)	(3)	3%	(2)		7%	3%	(8)	47%
[anthers and pollen aggregates]	casuarina	+	+										2%
Amperea xiphoclada	broom spurge										+		
Banksia	banksia												
Dodonaea viscosa-type	native hops						+			1%			
Eucalyptus	eucalypts	+	5%	+		(1)			(1)	1%			
[anthers and pollen aggregates]	eucalypts	+	+	1%								(3)	+
Goodeniaceae	goodenia family		+			(1)	+				+		+
Gyrostemonaceae	-									1%			
Leucopogon	beard-heath		+										
Lomatia-type	crinkle-bush			+									
Monotoca	broom heath									1%			
Native herbs													
Asteraceae (low spine types)	daisy family	+	+	1%		(1)	2%	(1)		18%	2%		+
Cyperaceae	sedge family	8%	1%				6%			1%	+		+
Gonocarpus	raspwort	5%	6%	6%		(2)	3%	(2)		3%	12%	(9)	17%
Plantago	native plantain								(1)				
Poaceae (<50 µm)	native grasses	2%	6%	10%	(1)	(7)	4%			2%	4%	(7)	2%
[anthers and pollen aggregates]	native grasses	+	+				+				+		
Restionaceae	wire-rush family								(1)			(1)	+
Stylidium	trigger-plant		+										
unidentified tricolpate types	numerous genera	+		+		(1)	+			1%		(1)	
unidentified tricolporate types	numerous genera			+		(1)	+			1%			+

Table 3 (cont.)

		Cesspit				Agricultural? trenches			posthole		trench		NE
Fossil Taxon	**Common Name**	**1**	**3**	**5**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**14**	**corner**
		upper	seepage	lower	base	ACN 323	ACN 232	ACN 231	fill	pipe	beam?	fill	**of site**
Ferns & fern allies													
Calochlaena	rainbow fern			+		(2)	+			3%		(2)	
Davallia-type	hare's foot fern						+						
Gleicheniaceae	coral ferns						+			1%			
Lindsaea-type	screw ferns			+			+		(1)		+		
monolete types	incl. fishbone ferns			+						1%			
Pteris	tender brake						+						
trilete types	numerous genera	+	+	1%			2%			3%	+	(1)	
Hepatics & mosses													
Bryophyta	mosses	+	+	+		(18)	9%	(3)	(3)	8%	4%	(8)	+
Cingulatisporites (Anthocerotae)	hornworts	30%	28%	12%		(16)	25%	(8)	(2)	9%	73%	(10)	19%
Rudolphisporis (Ricciaceae)	liverworts	6%	4%	3%		(20)	5%	(10)	(2)	9%	2%	(11)	5%
Other plant microfossils													
Reworked Permo-Triassic						(2)							
cf. *Botryococcus*	Botryococcaceae?			+		(2)	20%					(1)	
Zygnemataceae		2%	2%	+		(2)	+	(1)	(1)		2%	(1)	+
faunal microfossils		+	+			(8)	+						
Concentration Fungal spores (x 10^{3} gram $^{-1}$)													
Carbonized particles (x 10^{3} gram $^{-1}$)													
POLLEN SUM		**332**	**286**	**344**	**5**	**84**	**343**	**29**	**11**	**100**	**181**	**60**	**312**

6. DISCUSSION AND CONCLUSIONS

The study was successful to the extent that statistically significant numbers of fossil pollen and spores were recovered from eight of the twelve soil samples (this is not always the case) but was unsuccessful in that only one sample preserved unequivocal evidence of human activity in Old Marulan (Sample 5).

Using fossil to place the samples into a relative chronostratigraphy was pre-empted by shallow soils and the presence of a young, naturally established pine (*Pinus radiata*) on the boundary of the excavated area and mature pines in farmland east of the Hume Highway. Nevertheless it is reasonable to assume that samples preserving large numbers of *Pinus* pollen are either very recent or have been extensively contaminated by e.g. bioturbation. The prime example is Sample 7 from one of the possible agricultural trenches although soil infilling the trench *per se* (ACN 232) may be older. Conversely, the absence of exotic pollen types such as pine and dandelion (Liguliflorae) in Sample 11 is circumstantial evidence that the infill (wooden beam?) has been effectively sealed since the slot/trench was dug.

As in Sydney and Parramatta (Macphail 1999, 2003, Macphail & Casey submitted), the absence of fossil pollen of edible plants is not reliable evidence that a site or context has not been cultivated. Reasons include: (1) Tillage *per se* may have resulted in the oxidative destruction of pollen produced by the cultigens. (2) The plants may have been harvested before setting flowers. (3) Sediments deposited at the time of cultivation may have been eroded from the context. As elsewhere, the fossil microfloras represent agricultural weed species that have invaded the context/site since its abandonment. Herbaceous 'weeds' such as crowfoot (*Erodium*) and Scots Thistle (*Onopordium acanthum*) are re-colonizing exposed mineral soils on the excavated area and mature individuals occur in the surrounding, grazed pastures.

For these reasons, deposits accumulating in storage areas and cesspits are likely to preserve the most reliable pollen evidence of food plants being grown in a particular district if not on a particular site. The microflora recovered from the lower deposit in Cesspit 32 (Sample 5) indicates the diet of those accommodated in the *Woolpack Inn* included cereals (coarse breads?) and legumes. The diversity is low compared to microfloras recovered from cesspit deposits in early Colonial Parramatta (Table 5) and it is tempting to speculate that the reason for this was the remote rural location of Old Marulan and the difficulty of establishing many vegetable species on shallow, infertile soils in a relatively low rainfall district.

Relative abundances of casuarina pollen, which are likely to be inversely correlated with the pollen influx from herbaceous plants growing on the site, hint that a tree? species of *Allocasuarina* or *Casuarina* was growing on the northeast corner of the excavated area at sometime in the past. If the low numbers of pine pollen in the same sample are due to contamination, then this 'tree' may have planted in a yard before Old Marulan was abandoned in the 1860s.

The virtual absence of *Eucalyptus* pollen in all samples remains a mystery whether or not the trees lining the ephemeral creek below the site post-date the abandonment of the Old Marulan (see Section 4.4). Eucalypt leaves are scattered across the excavated area (Figs. 11-14) and, at present, all that can be surmised is that the 'absence' of eucalypt pollen is unlikely to be due to intrinsically low pollen production and dispersal.

Table 5: Comparison of microfloras from Cesspit 32 and Parramatta Convict Hospital (PCH)

Fossil taxon	Common name	Cesspit 32	PCH	Comment
Definite & probable exotics				
Apiaceae	umbellifer family		3%	includes edible and ornamental species
Asteraceae (high spine)	daisy family		+	may include ornamental species
Brassicaceae	cabbage family	2%	15%	likely to represent cabbage or turnip
cf. *Calystegia*	bindweed	+	+	agricultural weed
Caryophyllaceae	carnation family		+	includes ornamental and weed species
Chenopodiaceae	samphires	+	2%	agricultural weed
Cerelia	cereals	25%	27%	from coarse grain bread?
Citrus	citrus		+	lemon trees widely planted since 1789
Fabaceae	pea-flower family		+	agricultural weed?
Liguliflorae	dandelions	2%	1%	agricultural weed
Ligustrum-type	privet		+	plant used for hedges
Mentha	mint		+	pollen type produced by bedstraw is similar
Mutisieae	daisy tribe		+	tribe endemic to South America
Pinus	pine	1%	+	widely planted for windbreaks
Pisum	pea	+	+	cleistogamous flowers
Plantago lanceolata-type	plantain		2%	agricultural weed
Polygonum aviculare-type	wire-weed	+	4%	agricultural weed
Prunus	prunus		+	includes edible and ornamental species
Rosa-type	rose		2%	similar to pollen of modern roses
Silene-type	silene		+	agricultural weed
cf. *Saxefraga*	saxifrage		3%	ornamental species?
Ulmus	elm		+	widely planted on Colonial estates
Native trees & shrubs				
Allocasuarina/Casuarina	casuarinas	31%	1%	PCH privy enclosed in roofed structure
Banksia	banksia		+	from flowers picked for decoration?
Eucalyptus	eucalypts	1%	5%	PCH privy enclosed in roofed structure
Lomatia-type	crinkle bush	+		from flowers picked for decoration?
Native herbs				
Asteraceae (low spine)	daisy family	1%	1%	includes shrubs and herbaceous species
Cyperaceae	sedge family		3%	indicates moist conditions
Gonocarpus	raspwort	6%		widespread in poorly maintained gardens
Poaceae	grass family	10%	21%	used as de facto toilet paper?
unidentified tricolpates	-		+	may include exotic spp.
unidentified tricolporates	-		2%	may include exotic spp.
Ferns & fern allies				
Calochlaena	rainbow fern	+		established on damp brick work?
Lindsaea-type	screw fern	+		established on damp brick work?
Monolete ferns	incl. fishbone fern	+		established on damp brick work?
Polypodiaceae	-		+	established on damp brick work?
Trilete ferns	numerous families		+	established on damp brick work?
Horn- and liverworts				
Cingulatisporites	hornworts	12%	+	established on damp brick work?
Rudolphisporis	liverworts	3%	+	established on damp brick work?
Other plant microfossils				
Botryococcus	botryococcus	+	+	indicates polluted water?
Fungal spores	fungi	140%	100%	indicative of damp conditions and organic refuse
POLLEN SUM		**344**	**275**	

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APPENDIX 1

Photomicrographs of selected fossil pollen spores and related plant microfossils

All photomicrographs taken at x788 magnification unless otherwise stated.

PLATE 1

Figs. 1-8 **Miscellaneous microfossils**

Fig. 1 Rootlet apical meristem showing root hairs. Cess pit 32 ;lower deposit' x12.5.

Fig. 2 Leaf cuticle. ACN 232. x312.

Fig. 3 Dental plate from an unidentified soil invertebrate. ACN 232.

Fig. 4 Fungal spore (*Tetraploa* sp.). Cess pit 32 'upper deposit' [the fungus producing this morphotype is typically found in grassland].

Fig. 5 Unidentified algal cyst or bryophyte spore. ACN 232.

Fig. 6 Colonial algal colony cf. *Botryococcus*. ACN 232.

Fig. 7 Soil algal cyst (*Debarya* sp.). Cesspit 32 'upper deposit'.

Fig. 8 Unidentified papillate algal cyst. Cesspit 32 'lower deposit'.

Fig. 9 Trilete spore of the type produced by the screw-fern (*Lindsaea* sp.) or rough tree-fern (*Cyathea* sp.). Cesspit 32 'lower deposit'. [if *Cyathea*, then the spore has been long-distance transported from wet forest types, e.g. around Robertson on the Southern Tablelands].

Figs. 9-10 **Probable long-distance transported pollen types**.

Fig. 10 Gyrostemonaceae. Post-pipe deposit [this pollen type has been long-distance transported from the Central or Southwestern Slopes].

Plate 1

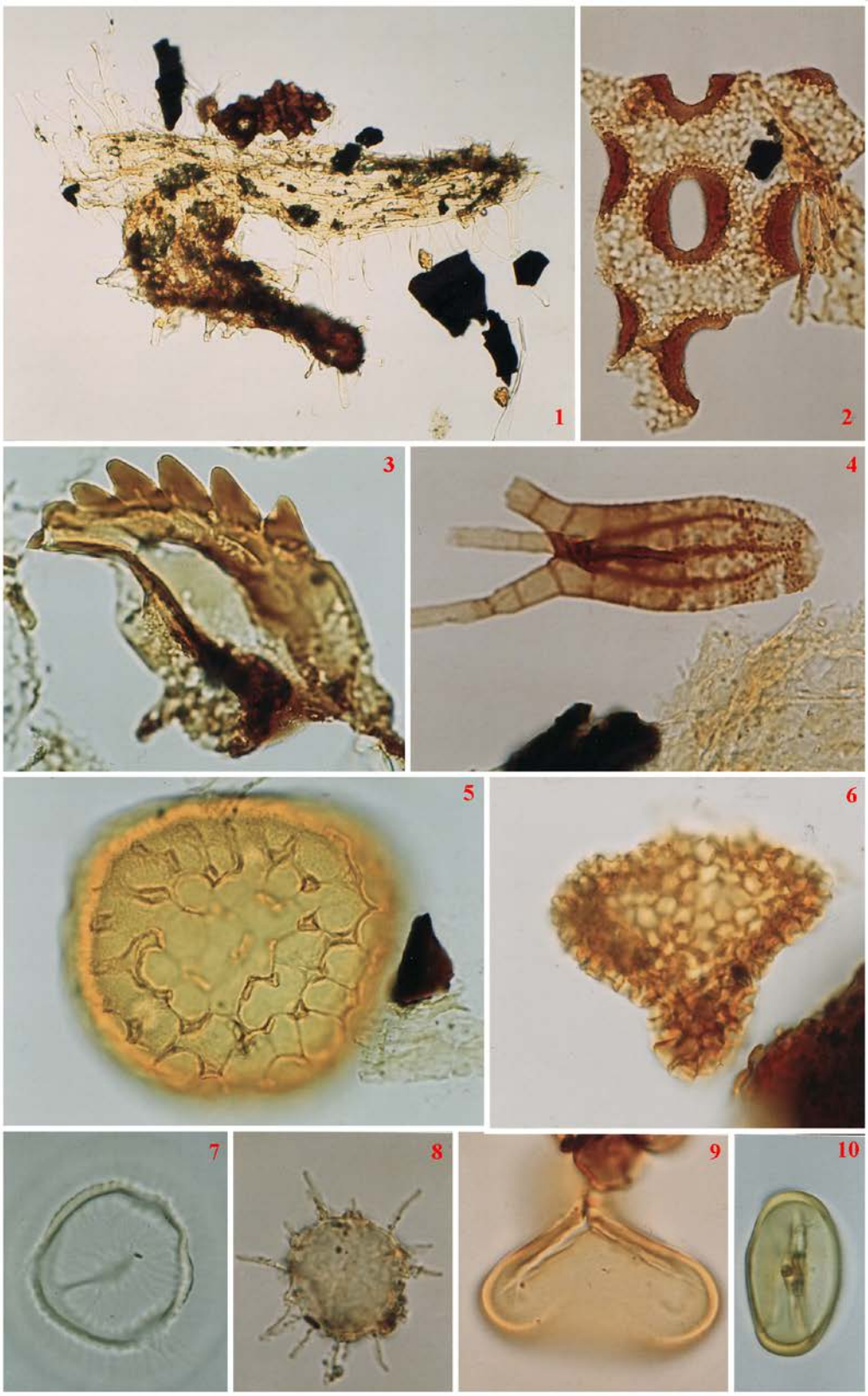


PLATE 2

Figs. 11-15 **Pollen representing edible plants**

Figs. 11-13 Cereal (Cerelia sp.). Cesspit 32 'lower deposit'.

Figs. 13 Pea (*Pisum* sp.). Cesspit 32 'lower deposit'.

Fig. 14 Cabbage family (Brassicaceae). Cesspit 32 'lower deposit'.

Figs. 15-20 **Pollen of definite and exotic plants**

Fig. 15 Pine (*Pinus radiata*). ACN 232.

Fig. 16 Crowfoot (*Erodium* sp.). ACN 232.

Fig. 17 Dandelion (Liguliflorae). ACN 323.

Fig. 18 Samphire (Chenopodiaceae). Post-pipe deposit.

Fig. 19 Starwort (*Stellaria* sp.). Post-pipe deposit.

Fig. 20 Daisy family (Asteraceae high spine type). ACN 232.

Figs. 21-28 **Pollen and spores of native trees, shrubs, herbs and cryptogams**

Fig. 21 Daisy family (Asteraceae low spine type). ACN 232.

Fig. 22 Grass (Poaceae). Cesspit 32 'upper deposit'.

Fig. 23 Portion of a eucalypt (*Eucalyptus* sp.) anther showing fused, immature pollen grains. Cesspit 32 'lower deposit'.

Fig. 24 Casuarina (*Allocasuarina/Casuarina* sp.). Cesspit 32 'lower deposit'.

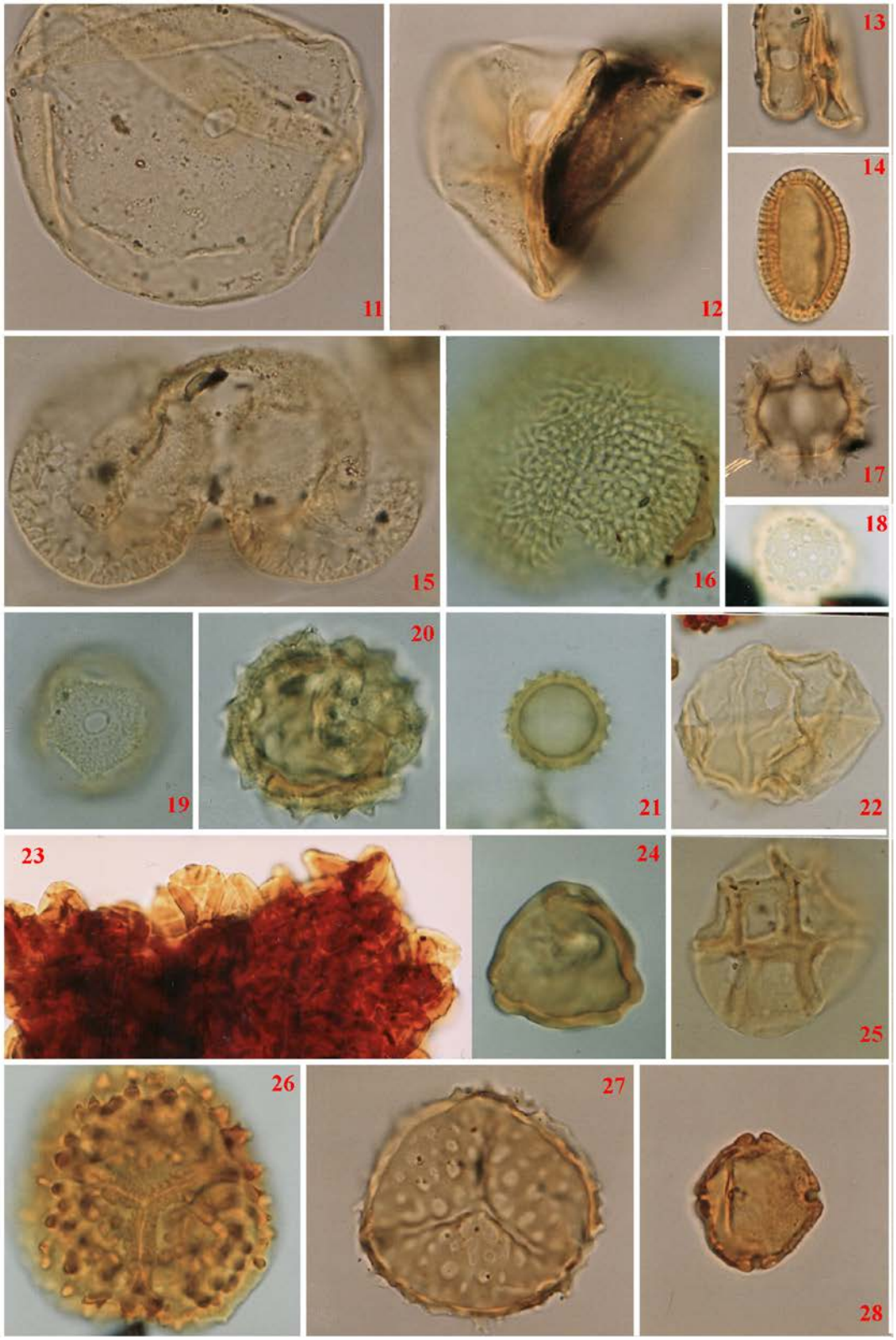
Fig. 25 Wattle (*Acacia*). ACN 232.

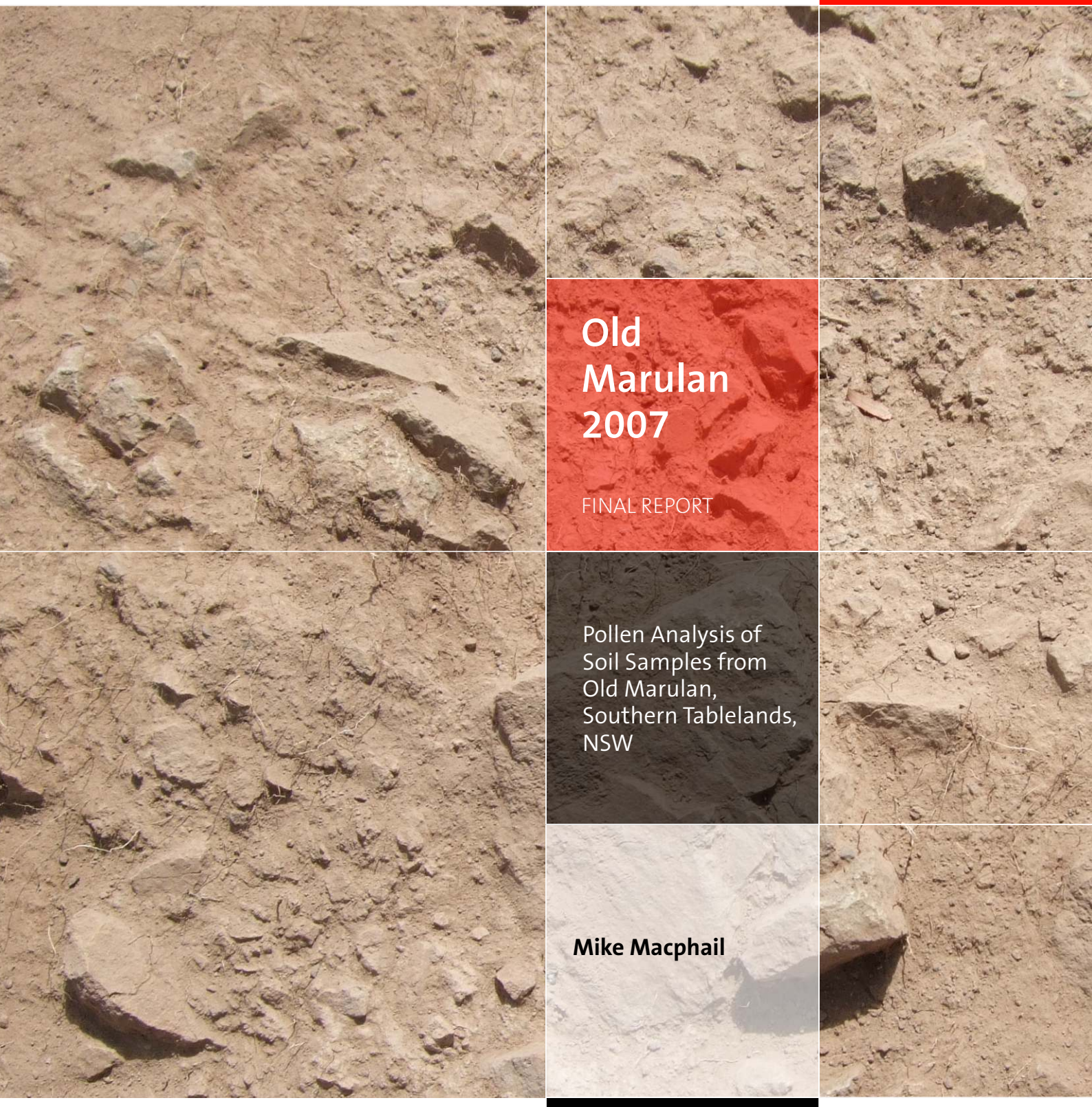
Fig. 26 Hornwort (Anthocerotae). ACN 313.

Fig. 27 Liverwort (Ricciaceae). Cesspit 32 'lower deposit'.

Fig. 28 Raspwort (*Gonocarpus*). Cesspit 32 'lower deposit'.

PLATE 2





Old Marulan 2007

FINAL REPORT

Pollen Analysis of Soil Samples from Old Marulan, Southern Tablelands, NSW

Mike Macphail

Old Marulan 2007
Archaeological Excavation

Archaeological soils

Dr Roy Lawrie

NSW Department of Primary Industries

January 2009

Introduction

Soil profiles were inspected at the site of the old town of Marulan on 11/12/07. Located on the north side of the Hume Highway, opposite the intersection with the south Marulan and Bungonia roads, the gently sloping site is 650m above sea level and covers about 1-2 ha. Three profiles were inspected and sampled, with the aim of characterising soil properties across the site and assessing the extent of disturbance to soil profile features by human activity during the mid nineteenth century.

Three backhoe pits were excavated, down to weathered rock at two sites, and to 1.6m at the third site. The pits were positioned to encompass the range of soils present across the site, and to expose the various layers or horizons that may have been disturbed.

Each horizon was described and sampled by collecting soil from a 10cm depth interval within each horizon (usually from the upper part). Soils were tested at the Department's Wollongbar laboratory for pH, salinity, extractable phosphorus and sulphur, organic carbon, total nitrogen and exchangeable cations (see attached report number WN08.0458 for full results).

Main Features of the Soil in relation to Land Use

Like many places on the Southern Tablelands, the soils vary in profile features over relatively short distances (see profile description). In general, the surface soil is loamy and there is a clay subsoil present, interspersed with pockets of strongly weathered bedrock sometimes at shallow depth. Small floaters of bedrock can occur in separate layers throughout the profile. In places where it once occurred on the surface some of this rock has been picked up and stockpiled into heaps. This may have happened in the early period of settlement to make cultivation easier. Loose surface rock does not need to be removed if paddocks are used only for grazing.

Once free of rock the surface soil is quite suitable for regular cultivation. Ploughing increases the rate of breakdown of soil organic matter, releasing nutrients for plant uptake. The level of organic matter in the topsoil at P3, the site closest to the interjection of the highway, is less than half that of P2 or P1; it also has the lowest available phosphorus and total nitrogen level (see table below). This decrease is consistent with a history of cultivation. Levels of other nutrients like potassium or sulphur are not elevated, which could have occurred if fertiliser had been applied. Finally the calcium level is also lower in the P3 topsoil (as a percentage of cation exchange capacity) than in the other topsoils. This suggests that ash from fireplaces was not dumped here even though the pH is slightly higher. Ash is alkaline and raises the pH of acid soil, and usually boosts the calcium and potassium content. No sign of charcoal or ash was observed in the three topsoils

Soil nutrient levels in animal enclosures such as stables, stockyards, piggeries or poultry sheds are often elevated. The top 3 horizons at P1 have slightly elevated potassium levels, and the phosphorus level in the subsurface layer is almost the same as in the topsoil, instead of being much lower (as in the other profiles). This may be a relic of animal or human activity many decades ago, since phosphorus applied at the surface seldom moves down the profile in most soils. Most stockfeeds are plant-based and rich in potassium. They also contain some phosphorus. Much of these nutrients end up in the manure, raising soil organic matter levels as well. The nutrient concentrations in the soils at the site however are very low overall, so differences arising from land use practices in the past can make significant changes to nutrient levels.

Table: **Soil nutrient levels most affected by land use**

Profile Depth cm	Profile Features	pH ($CaCl_2$)	Organic Carbon %	Total Nitrogen %	Colwell Phosphorus Mg/kg	Exch. Potassium Cmol(+)/kg	Sulfur (KCL40) Mg/kg	CEC Cmol(+)/ kg	Exch. Ca % of CEC
Site P1									
0-15	Brown sandy clay loam	4.5	2.0	0.28	9.2	0.60	<2.2	8.6	69
15-33	Light brown sandy light clay	4.4	-	-	9.1	0.37	2.6	4.3	74
33-70	Red brown medium clay	5.5	-	-	2.7	0.46	2.9	16	50
70-120	Mottled red and yellow brown clay	5.7	-	-	3.1	0.21	<2.2	22	47
Site P2									
0-20	Brown sandy loam	4.5	1.9	0.23	10	0.35	8.4	5.6	70
20-40	Light brown clayey sand	4.9	-	-	3.0	0.12	<2.2	2.6	73
40-80	Yellowish brown clayey sand	5.6	-	-	2.5	0.12	<2.2	2.7	75
80-120	Yellowish brown mottled sandy clay	5.9	-	-	2.0	0.08	<2.2	6.1	51
Site P3									
0-13	Greyish brown loam with fine sand	5.0	0.78	0.10	2.6	0.40	<2.2	6.2	59
13-35	Very light greyish brown loamy sand with grit	5.5	-	-	1.5	0.096	<2.2	6.7	53
35-63	Red brown medium clay	5.4	-	-	2.0	0.11	2.3	17	31

Conclusion

The soils provide some indication of previous land use at the site. Loose stones have been removed from the topsoil, presumably to make cultivation easier. Organic matter is depleted at one site (P3) possibly by cultivation in the past, reducing nutrient levels as well. Some nutrient levels are slightly raised at another site (P1), i.e. phosphorus and potassium, probably by additions of plant material for animal fodder. This may have happened many decades ago because the nutrients have penetrated below the topsoil. Nutrient levels in this layer have not been boosted at the other two sites. Current land use practices, mostly grazing by sheep or cattle, do not appear to have been accompanied by additions of fertiliser substantial enough to increase nutrient levels significantly in the topsoil (e.g. at the P3 site).

Appendix

- Profile descriptions
- Laboratory report with soil chemical properties

Profile Descriptions

Site P1: *On a gentle slope above a small flat; no surface rock*

Depth Cm	Description	Horizon	Sampling depth cm
0	Brown sandy clay loam; gradual change to	A_1	0-10
15	Light brown light clay with sand; contains small floaters of weathered rock; clear change to	A_2	20-30
33	Red brown medium clay, well-structured with plenty of roots; gradual change to	B	33-43
70	Mottled red brown and yellow brown medium clay, moderately structured with some fine roots; a few floaters below 110cm and becoming gritty with depth;	BC C?	78-88
160	Hard weathered rock	C	

Comment
The A horizons appear to have been derived by downslope movement of gravelly colluvium. The underlying clay is free of gravel until bedrock appears at depth.

Classification: red dermosol

Site 2: *On a lower slope (649m above sea level) only 10m from the creek bank marking the northern boundary of the study area; the surface is slightly hummocky, possibly due to disturbance to remove trees or surface rock.*

Depth Cm	Description	Horizon	Sampling depth cm
0	Brown sandy loam; gradual change to	A_1	0-10
20	Light brown clayey sand, porous, gradually changes to	A_2	20-30
40	Yellowish brown clayey sand, well drained and gritty; gradually changes to	A_2/B	45-55
80	Mottled light yellow brown and dark yellow brown light clay with sand, virtually no grit, with deeply weathered floaters of underlying rock; gradually changes to	B	90-100
120	Pallid clay with orange mottles; clear chance to	C	-
150	Strongly weathered rock		

Comment

The A horizons here are not gravelly, but it is very gritty between 40 and 80cm; the B horizon however below is not gritty, suggesting that the gritty material has moved downslope, probably from rocky outcrops upslope, and covered the clay B horizon, which appears to have formed in situ from the weathered rock below it.

Classification: brown kandosol

Site 3: *On the edge of a patch of rocky ground (652m above sea level) on the more elevated south western portion of the study area; gentle midslope position.*

Depth Cm	Description	Horizon	Sampling depth cm
0	Greyish brown (10YR5/3) loam with fine sand; gradual change to	A_1	0-10
13	Very light greyish brown (10YR7/3) loamy sand with grit; contains a few floaters; clear change to	A_2	20-30
35	Red brown (2.5YR3/6) medium clay, well-structured, no rocks, plenty of plant roots; gradually changes to	B	40-50
50	Red brown and yellow brown clay, with rock floaters; clear change to	BC? C?	-
65	Hard weathered rock		

Comment

The gritty A_2 horizon contains gravel, but the A_1 does not. This is consistent with other topsoils, possibly indicating that the rocks have been picked up. The clear boundary on top of the clay B horizon, and the absence of grit, suggest that the A horizons above have been deposited on top of it, probably by movement of gravelly and gritty colluvium derived from rocky outcrops upslope.

Classification: red chromosol.

Results of Archaeological Terrain Unit Testing (ATU) Near Old Marulan

Three test pit grids (R, U and X) were excavated in proximity to the area of the Old Marulan Township. All three test pit grids were located outside the area demarcated as having State Significance and outside the known allotments of the Old Marulan Township. Figure 6.1 (attached) indicates the general location of the test pit grids (please note that the size of the grids has been enlarged to make them clearly visible. Each of the testing grids consisted of 22, 50 cm test pits that were set out in two parallel rows that were 5 metres apart. The test pits were set at intervals of 5 metres along each parallel row. Thus forming a 5 metre grid pattern over an area 50 metres in length.

Following are the results of each of the test pit grids.

1.1 ATU R (7A)

ATU testing location R is within an area that will be impacted by the main access road for the quarry. **The central point of the grid was located at AMG 772739 E 6152882 N. At its closest point ATU testing location R was approximately 170 metres north of the Old Marulan Township and on the opposite (northern side) of Marulan Creek.**

1.1.1 ATU Description

ATU testing location R was on a low gradient slope within Andesite geology (7A). The area investigated had been cleared and was grassed and there was only a few mature Eucalypts remaining on the slope. The Andesite was evident as outcrop and scree across the slope. Gradient varied from 1 degree at the base of the slope to 3 degrees on the upper lower slope. There was a bench at the top of the lower slope with gradient of less than 1 degree. Aspect was to the east-south-east and across the Marulan Creek valley. Ground surface visibility averaged 30% with some relatively large patches of 70% ground surface visibility around a mature Eucalypt located near the base of the slope and along the banks of two minor drainage depressions that ran to the south-west and north-east of the testing grid. The two drainage depressions dispersed across the footslope and did not have a confluence with Marulan Creek which was located approximately 150 metres downslope (to the east-south-east). The area was being grazed by cattle at the time of the investigation.

An investigation of the surface of the testing location prior to the commencement of the test pits did not locate any surface artefacts (either Aboriginal or historic).

1.1.2 Subsurface Testing Results

ATU testing location R was excavated on 1 and 2 April 2008. The location and orientation of the grid was chosen in consultation with the Aboriginal stakeholders and it was located in a north-west/south-east (upslope) orientation.

All 22 test pits were excavated. The soil profile was similar across the grid and could generally be described as follows:

- A1 – humic, grey brown silty sand with lots of grass roots and partially decomposed cow manure (ending from 2 to 3 centimetres below the ground surface);

- A2 – bleached grey to white gravelly, silty sand with lots of fragments of decomposing bedrock (ends 8 to 20 centimetres below ground surface); and

- C – bedrock (starting from 8 to 20 centimetres below the ground surface).

The squares with the deepest soil profiles were those where rock outcrop had acted to retain soil in pockets between the rocks. The A1 soil profile is very recent in nature. The A2 appears truncated with the upper A2 missing. The soil profile indicates that the slope has suffered considerable loss of topsoil most likely initiated by tree clearance in the past and exacerbated by grazing during drought conditions.

There was one stone artefact located in Square 6 of the grid. Square 6 was in an area on the middle of the lower slope and was upslope of an area of rock outcrop that had acted to retain soil.

The artefact was a quartz broken flake. **There were no historic artefacts located.**

1.1.3 Site Cards and Requirements for Further Salvage

As there was one artefact located in ATU testing location R a site card was prepared for the location. The site was named MRN70.

A discussion was held on site on 2 April 2008 in relation to requirements for further investigation of ATU testing location R prior to impact by quarry development. The Aboriginal stakeholder representatives on site were in consensus that the site area was unlikely to have enough artefacts in a subsurface context to warrant further archaeological excavation.

The site was assessed as having low significance from an Aboriginal cultural heritage perspective due to the small number of artefacts recovered and the degree of disturbance in the area.

From an archaeological perspective it was assessed that the MRN70 site area (and the local ATU) had low archaeological significance due to its extremely low potential to contain an artefact assemblage with sufficient complexity or integrity to assist with addressing research questions and thus to warrant further subsurface salvage.

Following further consultation with the group representatives on 4 April 2008 it was agreed that:

- until the site is impacted by main access road construction it should continue to be monitored in compliance with the monitoring procedure in the Lynwood Quarry AHMP (Umwelt 2007d) and any artefacts exposed collected and stored in the facility to be provided by CEMEX within its office complex; and

- that no further subsurface salvage was required for MRN70 ahead of development impact.

1.2 ATU U (R7MG)

ATU testing location U is within an area that will be impacted by the main access road for the quarry. **The central point of the grid was located at AMG 772783 E 6152710 N. At its closest point ATU testing location R was approximately 10 metres north of the Old Marulan Township and on the same (southern side) of Marulan Creek.**

1.2.1 ATU Description

ATU testing location U was on a very gentle footslope within the riparian corridor on the south-eastern bank of Marulan Creek and within the Marulan Granite geology (R7MG). Gradient was less than 1 degree and aspect was to the north-west. The footslope was very limited in area and only from 30 to 40 metres wide at its widest point (between the lower slope and the creek banks). Whilst technically not a floodplain the area was likely to have been subject to overbank deposits prior to the deep incision of Marulan Creek. It is unlikely that it is subject to overbank flows at present as Marulan Creek has incised a channel up to 5 metres deep and 3 to 10 metres wide in this area. The area tested was directly downslope of the Old Marulan township and just outside the area of the allotments identified as belonging to the State significant Old Marulan site.

The area investigated had been partially cleared; however, there was a large amount of regrowth and numerous remnant Eucalypts. Gradient in the area was less than 1 degree and there was a thin deposit of recent colluvium over the surface derived from the slope above; most probably during the flood rains of the previous year. There were numerous unformed tracks running though the area providing ground surface visibility of 20 to 100% in some localised areas.

The area was not being grazed by cattle at the time of the investigation, however, it has been subject to a long history of grazing impact.

An investigation of the surface of the testing location prior to the commencement of the test pits did not locate any Aboriginal artefacts, though some fragmented glass and ceramics were noted in the general area (but outside the actual test pit grid).

1.2.2 Subsurface Testing Results

ATU testing location U was excavated on 2 and 3 April 2008. The location and orientation of the grid was chosen in consultation with the Aboriginal stakeholders and it was located in an east-west (across and downslope) orientation as this was the only angle that allowed the grid to fit within the ATU and between the trees.

All 22 test pits were excavated. The soil profile was similar in nature across the grid. The soil profile could generally be described as follows:

- A1 – thin veneer of cream to white silty sand over a light brown, humic silty sand with lots of roots (ending from 5 to 6 centimetres below the ground surface);

- A2 – compact, bleached grey to white clayey silt with lots of fragments of decomposing bedrock, clay increasing with depth (ends 10 to 15 centimetres below ground surface);

- B – orange and white mottled clay (starts at 10 to 15 centimetres);

OR

- C – bedrock (starts at 10 to 15 centimetres).

The A1 soil horizon contained many fragments of glass and ceramic and decomposing brick undoubtedly related to the Old Marulan township immediately adjacent (upslope). No intact heritage features were observed. The A2 soil profile appears truncated and was very shallow. There were no historic finds within the A2 soil horizon indicating that it may be at least partially intact and that it may retain some integrity. Overall the soil profile was very shallow and the underlying Marulan Granite, in its decomposed and partially decomposed state, can be seen outcropping in the creek bank from 10 to 20 centimetres below the current ground surface.

A total of 2 Aboriginal artefacts were recovered from the excavations; a silcrete flake and a quartzite broken flake. The artefacts were in Square 8 and Square 21. Both were located in the remnant A2 soil horizon. **A small piece of ceramic was located in the A1 soil profile in Square 6, 20 pieces of glass were recovered from the A1 of Square 7 (Denis some of these pieces may be diagnostic if you are interested in us trying to identify them), one piece of glass from the A1 of Square 8 and one piece of glass from the A1 of Square 19.**

1.2.3 Site Cards and Requirements for Further Salvage

As there were two stone artefacts located in ATU testing location U a site card was prepared for the location. The site was named MRN 71.

A discussion was held on site on 2 April 2008 in relation to requirements for further investigation of ATU testing location U prior to impact by quarry development. The Aboriginal stakeholder representatives on site were in consensus that the site area was not really suitable as a camp site, was highly disturbed and unlikely to have enough artefacts in a subsurface context to warrant further archaeological excavation. It was agreed that the area of the Old Marulan Township, upslope and out of the area of creek overflow would have been a better camp site.

The site was assessed as having low to moderate significance from an Aboriginal cultural heritage perspective, with its slightly higher significance attributable to its location just below the Old Marulan township were a large number of artefacts were recovered. It was agreed that the ATU U location did not warrant further investigation.

From an archaeological perspective it was assessed that the MRN71 site area (and the local ATU) had low archaeological significance due to its low potential to contain an artefact assemblage with sufficient complexity or integrity to assist with addressing research questions and thus to warrant further subsurface salvage.

Following further consultation with the group representatives on 4 April 2008 it was agreed that:

- until the site is impacted by road construction it should continue to be monitored in compliance with the monitoring procedure in the Lynwood Quarry AHMP (Umwelt 2007d) and any artefacts exposed collected and stored in the facility to be provided by CEMEX within its office complex; and

- that no further subsurface salvage was required for MRN71 ahead of development impact.

1.3 ATU X (R7BP)

ATU testing location X is within an area that will be impacted by the main access road for the quarry. **The central point of the grid was located at AMG 772865 E 6152808 N. At its closest point ATU testing location R was approximately 80 metres north of the Old Marulan Township and on the opposite (northern side) of Marulan Creek.**

1.3.1 ATU Description

ATU testing location X was on a very low gradient footslope within the riparian corridor on the north-western side of Marulan Creek and within the Bindook Porphyry (R7BP). The area investigated had been cleared and was grassed. The ground surface was very hummocky. There were regrowth and mature Eucalypts along Marulan Creek. Gradient was less than 1 degree and the aspect was to the south-east and to Marulan Creek. Ground surface visibility was patchy ranging from 5% to 50% across the footslope area. Whilst technically not a floodplain the area was likely to have been subject to overbank deposits prior to the deep incision of Marulan Creek. It is unlikely that it is subject to overbank flows at present as the creek has incised a channel up to 5 metres deep and 3 to 10 metres wide in this area.

The area was being grazed by cattle at the time of the investigation.

An investigation of the surface of the testing location prior to the commencement of the test pits did not locate any Aboriginal artefacts, **though some fragmented glass and ceramics were noted in the general area (but outside the actual test pit grid). An area of decomposing bricks was noted close to Marulan Creek so the test pits were moved slightly to the north-west to avoid this feature which appeared to be a brick dump.**

1.3.2 Subsurface Testing Results

ATU testing location X was excavated on 31 March and 1 April 2008. The location and orientation of the grid was chosen in consultation with the Aboriginal stakeholders and it was located in a north-west/south-east (cross footslope) orientation and within a meander of Marulan Creek.

All 22 test pits were excavated. The soil profile was similar in nature across the grid and could generally be described as follows:

- A1 – compact, grey brown sandy silt with lots of grass roots and curl grubs (ending between 5 and 8 centimetres below the ground surface);

- A2 – loose, bleached grey brown coarse, gravelly, sandy, silt with lots of charcoal fragments and burnt roots (ends 18 to 22 centimetres below ground surface); and

- C – orange and cream decomposing bedrock mottled clay (starts at 18 to 22 centimetres and continues beyond base of excavations).

The A1 soil horizon contained many fragments of glass and decomposing brick undoubtedly related to the Old Marulan township on the opposite side of the creek. This soil profile is probably recent and reworked. There were no historic finds within the A2 soil horizon indicating that it may be at least partially intact, though the amount

of disturbance evident in the area related to tree removal suggests that there will be little likelihood of integrity. No intact heritage features were observed within the test pit grid.

The excavations indicated that many large stumps that had been in the area had been burnt, probably as a means of removing them, however, the soil profile within the test pits did not show any indication of cultivation (though this does not negate the possibility that the area may have been cultivated).

A total of Aboriginal three artefacts were recovered from the excavations; a quartz broken flake, a silcrete broken flake and an ignimbrite broken flake. The artefacts were in Squares 11, 15 and 19. The quartz flake was located in the reworked A1 soil profile and the other two artefacts were recovered from A2 soil horizon.

As noted above all historic finds were located in the A1 soil profile. These consisted of Historic finds were: one glass fragment in each of Squares 6, 9, 13, 15and 17, five glass fragments in Square 18. Very small fragments of what appeared to be decomposed brick (<5 cm maximum dimension) where located in a number of the squares at the south-eastern end of the grid (ie. 1, 2, 4, 5, 6, 13, 14 and 15).

1.3.3 Site Cards and Requirements for Further Salvage

As there were three artefacts located in ATU testing location X a site card was prepared for the location. The site was named MRN72.

A discussion was held on site on 1 April 2008 in relation to requirements for further investigation of MRN72 (ATU testing location X) prior to impact by access road construction. The Aboriginal stakeholder representatives on site were in consensus that the site area was highly disturbed and unlikely to have enough artefacts in a subsurface context to warrant further archaeological excavation.

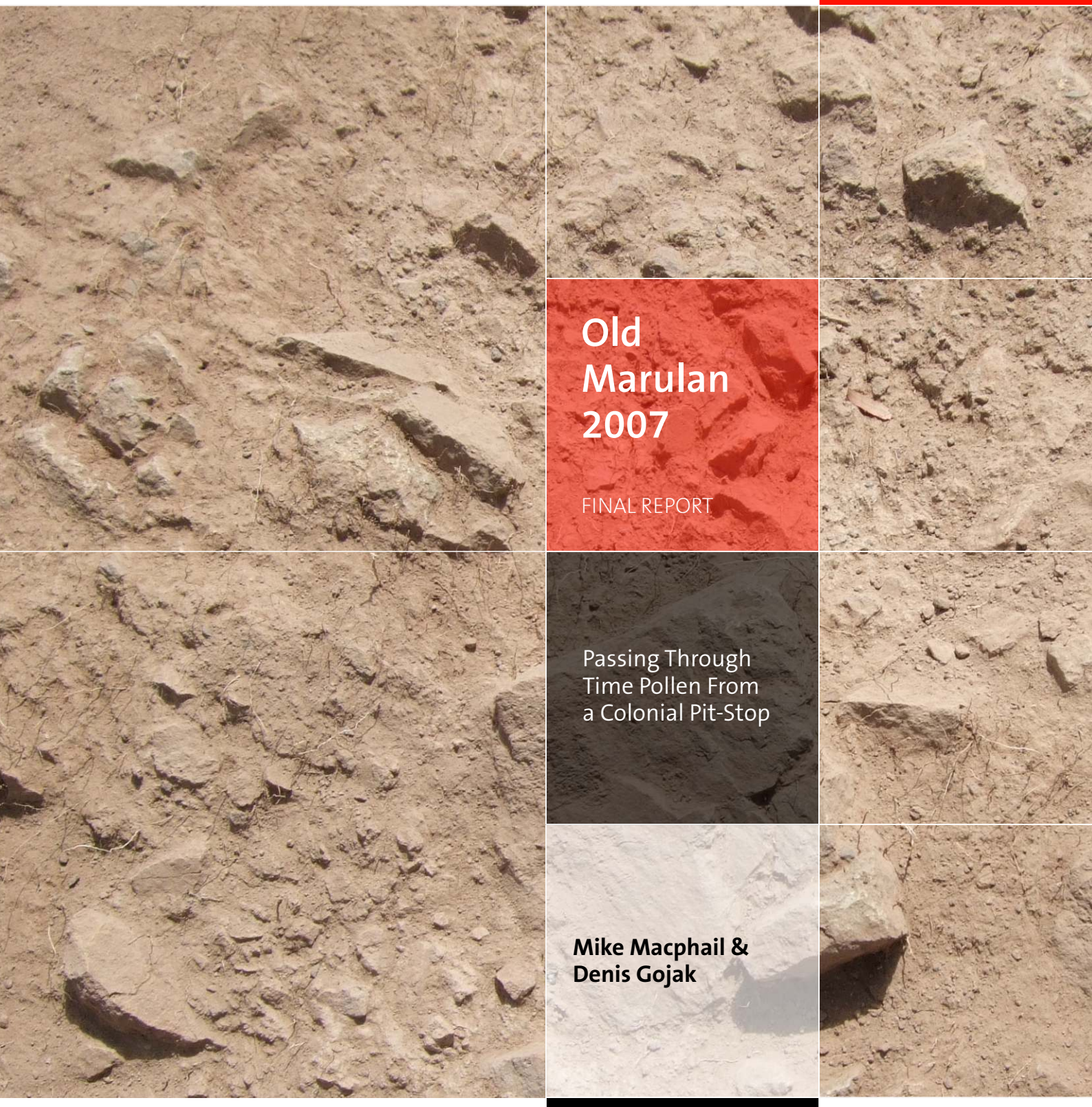
The site was assessed as having low significance from an Aboriginal cultural heritage perspective, due to its disturbed nature and the low number of artefacts recovered. It was agreed that the ATU X location did not warrant further investigation.

From an archaeological perspective it was assessed that the MRN72 site area (and the local ATU) had low archaeological significance due to its low potential to contain an artefact assemblage with sufficient complexity or integrity to assist with addressing research questions and thus to warrant further subsurface salvage.

Following further consultation with the group representatives on 4 April 2008 it was agreed that:

- until the site is impacted by road construction it should continue to be monitored in compliance with the monitoring procedure in the Lynwood Quarry AHMP (Umwelt 2007d) and any artefacts exposed collected and stored in the facility to be provided by CEMEX within its office complex; and

- that no further subsurface salvage was required for MRN72 ahead of development impact.



Old Marulan 2007

FINAL REPORT

Passing Through Time Pollen From a Colonial Pit-Stop

Mike Macphail & Denis Gojak

PASSING THROUGH…..POLLEN FROM A COLONIAL PIT-STOP

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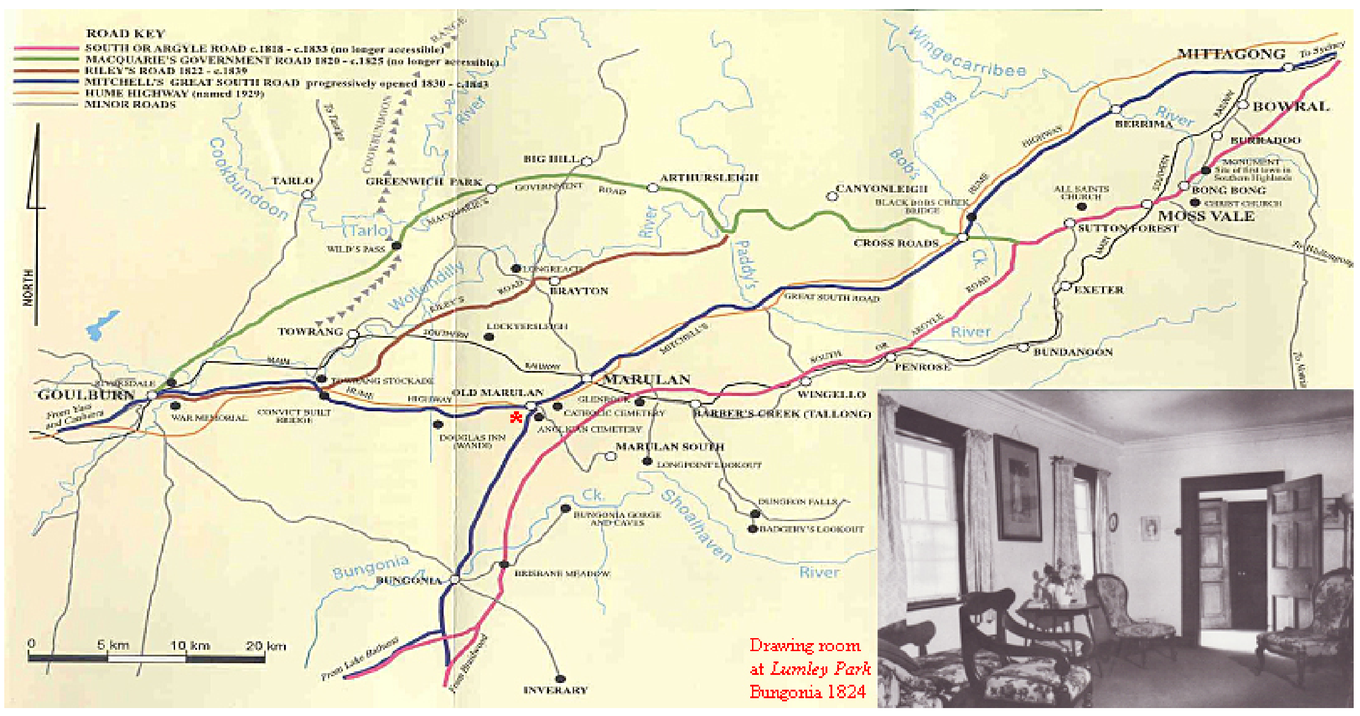
Many Canberrans travelling to and from Sydney still halt at one of the three 'pit-stops' on the Hume Highway – at Marulan, at the Exeter Road Junction or at Pheasant's Nest north of Mittagong.

170 years ago, the needs of travellers were much the same except that *their* 'pit-stops' were roadside inns, due to slow pace of travel.

The remains of one mid 19th. century 'pit-stop', the *Woolpack Inn* at Old Marulan, 1 km south of the present-day Marulan, were excavated by Denis Gojak, *Bansksia Heritage and Archaeology* P/L. in 2007

Fossil pollen preserved in soil from this site provide glimpses of the spartan diet of travellers accommodated at the *Woolpack Inn* between 1835, when earlier roads across the South Tablelands were superseded by Sir Thomas Mitchell's Great South Road (now Hume Highway), and 1868, when Old Marulan abandoned due to the extension of the railway line from Sydney to Goulburn via 'new' Marulan.



PLACE

Old Marulan was founded by Government decree in 1834 at the junction of the Great South Road and roads to Bungonia and Goulburn

In 1835, Joseph Peters, Licensee of the *Woolpack Inn* on the old Government Road, begins building a 'large brick house for the accommodation of the public …at a cost of £400' (and complains about the direction being taken by the Great South Road past the inn).

In January 1836, Peters advertises in the *Australian* that 'he had removed to his [new] licensed premises named the *Woolpack Inn* at Old Marulan. The Great South Road appears to have been completed by convict labour gangs past the Bungonia Road junction by this time.

In 1845, Old Marulan is described as a 'small village with two inns, one store and a few bark huts' Two years later, facilities included a 'commodious chapel, a post office' and 'three or four stores procuring custom nobody knows how'. This may have been the 'hey-day' for Old Marulan since, by 1851, a stone-and-brick courthouse is listed as being 'disused' and the 'other inn' is advertised for sale.

In 1867, privately owned land adjoining a railhead constructed about 1 km north of Old Marulan was subdivided for residential land. Facilities in the new township (the present-day village of Marulan) about this time included an 'accommodation house' and a 'store'.

The final death knell was the opening of a railway station at the railhead on 6 August 1868. Two years later the railway had extended as far south as Goulburn. Old Marulan is likely to have been finally abandoned by 1878 when the new township was formally named Marulan.

HIGHWAY

The Hume Highway is the latest of five 'highways' linking Sydney to Goulburn and, subsequently, Melbourne to N.S.W.

The earliest – the Argyle Road (1818-c.1833) - provided access to the very large Colonial Estates settled in the 1820s between Moss Vale and Bungonia. Examples are *Lumley Park* (1824), *Glenrock* (~1826) and *Inverary Park* (~1831).

The second road – the Government Road (1820-c.1825) – followed the line of the Wollondilly River and approached Goulburn (founded 1830) from the northwest.

Mitchell's Great South Road was progressively opened between 1830 to c. 1845. The section though Old Marulan was still under construction in 1835.

The surviving remains of Old Marulan are buried in the paddock on the left hand side of the fence line. Orange plastic in the middle distance marks the position of a stone-lined cesspit at the rear of the long-demolished *Woolpack Inn*. Bungonia Road is on the far right side of the Hume Highway (road sign near the blue truck).

PIT

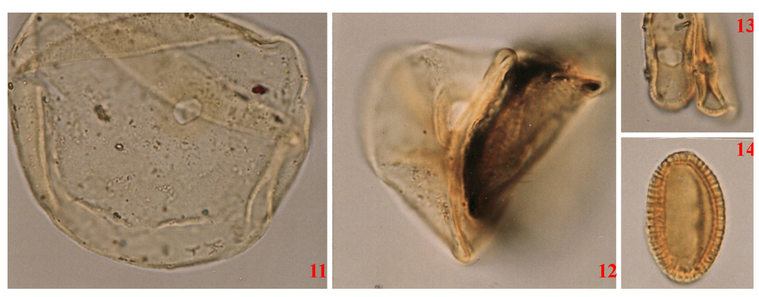
Old Marulan has largely been destroyed by the construction and duplication of the Hume Highway since World war II. Apart from the sherds of beer and port bottles, broken china and sandstock bricks, the only physical signs of Old Marulan's existence is the stone-lined cesspit, located at the back of the long vanished *Woolpack Inn*

POLLEN

Twelve soil samples were submitted for pollen analysis. Only two of these preserved fossil pollen and spores that date back to the time (1835-1860s) when the *Woolpack Inn* was a staging post (pit-stop) on the Great South Road linking Sydney to Goulburn:

One of these appears to represent clearing of the native vegetation at about the time Old Marulan was established in the early 1830s. The other, from near the base of the cesspit, preserved fossil pollen (from cereals (coarse breads or porridge), legumes and other vegetables consumed by the residents of the *Woolpack Inn* between 1835-1868.

Stone-lined cesspit at the rear of the *Woolpack Inn*. 2008



Figs. 11-12: Cereal pollen
Fig. 13: Legume pollen.
Fig. 14: Cabbage? pollen

PEOPLE

Who were these people whose 'pit-stop' at the Woolpack Inn, Old Marulan, is now marked only by fossil pollen? Some of the permanent residents may be buried in the cemetery across the Hume Highway from Old Marulan. We can be moderately certain that none were from the 'landed gentry' since this class tended to stop over on the large Colonial Estates. For example Baron Von Hugel, Governor Sir Richard Bourke and the Colonial artist Conrad Martens stayed at *Lumley Park* when they toured the Southern Tablelands in the 1830s.

Most likely the travellers staying at the *Woolpack Inn* were local farm-hands or labourers en route to Goulburn or, in the 1850s, those seeking their fortunes in the goldfields at Braidwood and in Victoria.

Circumstantial evidence for this is given by the spartan nature of plant foods eaten at the *Woolpack Inn* compared to fossil pollen evidence for the diverse diet enjoyed by early to middle 19th. century residents of Colonial Parramatta and Sydney….There is no pollen evidence that passion-fruit were on the Marulan menu! One reason may have been the difficulty of maintaining a kitchen garden given the low fertility of soils and limited water supplies at Old Marulan. Another reason may be that the residents (permanent/transient) simply preferred the typical meat-rich Colonial diet of 'mutton strew washed down with grog'.

What is certain is our pit-stops on the Hume Highway also will be recorded for posterity via the pollen in what we have eaten.