Aboriginal Glass Artefacts of the Sydney Region

Tamika Goward

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ABSTRACT

Aboriginal glass artefacts (AGAs) have become the 'type fossil' for recognising post-contact sites in countries with colonial pasts. Whether such reliance on AGAs is a valid development is contentious as the identification of these artefacts is ambiguous. This uncertainty is amplified in densely populated urban environments such as Sydney. This thesis addresses the identification of these artefacts within this region.

Technological characteristics of Sydney's AGAs and methodological issues in the recording of these artefacts have been analysed. A review of the patterns within this data has revealed how the identification issue has been managed in the past and how it may be improved. A review and evaluation of previous 'criteria for identification' has also revealed a refined approach to the identification and categorisation of AGAs within Sydney and beyond. Also, cross-cultural interactions have been characterised as affected by the unique and diverse nature of the moving frontier in this region.

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CHAPTER ONE: INTRODUCTION

Aboriginal glass artefacts (AGAs) have formed an important focus within Australian contact archaeology, as they are considered near ubiquitous in the Australian landscape (see Lawrence, 2006: 374; Veth and O' Connor, 2005:2). An example of the prominent role of AGAs is their use in Native Title claims, where they have become sought after evidence, used to prove the continuity of use of place by Aboriginal people after the arrival of Europeans (Veth and O' Connor, 2005; Harrison: 2005). Whether such reliance on AGAs is a valid development is dubious as the identification of these artefacts is particularly ambiguous. The difficulty in establishing the authenticity of an AGA has given rise to an issue of identification. Many researchers have struggled to adequately manage this issue over the last five decades. The uncertainty involved in the identification of these artefacts is amplified in densely populated urban environments such as Sydney. This thesis aims to address the identification of these artefacts within this region.

For the purpose of this thesis, an AGA is any industrial glass that has been modified by use by Indigenous people, as part of the processes that occur under the banner of cross-cultural interaction. In Australia, encounters between both Aboriginal people and the Macassans in the Northern Territory, and the British from the south east of the country, are known to have facilitated the production of these artefacts. Aboriginal people modified the glass from its original form via processes of knapping and/or use. This modification usually occurred on glass bottles but has been recorded on other materials such as ceramics. Glass was desirable as a raw material due to the

predictable way in which it fractures. The resultant sharp edges were used for cutting and scraping, or as barbs in composite tools.

In the Sydney region, there have been few studies outside of cultural heritage reports that have noted the presence of AGAs (see Rolfe, 1931; Megaw, 1968 Dickson, 1971; Harrison, 2003 and Proudfoot et al., 1991). Most data concerning AGAs is hidden in poorly indexed grey literature such as consultancy reports and site records and this has limited the potential for discussion in the published literature. For the AGAs of this region to be investigated, these archives must be systematically searched to provide data for analysis.

The only published synthesis to date on Sydney's AGAs is a brief overview in Attenbrow (2010), but this was confined to published and cited grey literature. Attenbrow has stated that 'no unambiguous glass assemblages of cores and refitting/ derived flakes have been reported' (2010: 125). It is this ambiguity that has inspired this research project. The aim of this thesis is to explore the following questions:

- *Where have AGAs been recorded in this region?*
- *How are the Sydney recorders dealing with the identification issue?*
- *How can the identification issue be better managed?*
- *What can Sydney's AGAs tell us about the broader social context of cross-cultural interaction?*

Using the greater Sydney region as the study area allows access to a broad range of resources, which have provided a both unique and

challenging data set and also allowed one of the first studies of AGAs in an urban area in Australia. This data includes published literature, cultural heritage reports and site cards, museum collections and first hand field observation. The study area is about 100km x 140km. It is bounded by the Central Coast to the north, the Illawarra to the south and extends past the Blue Mountains to the west. This area was chosen as to obtain enough sites to form a valid sample size.

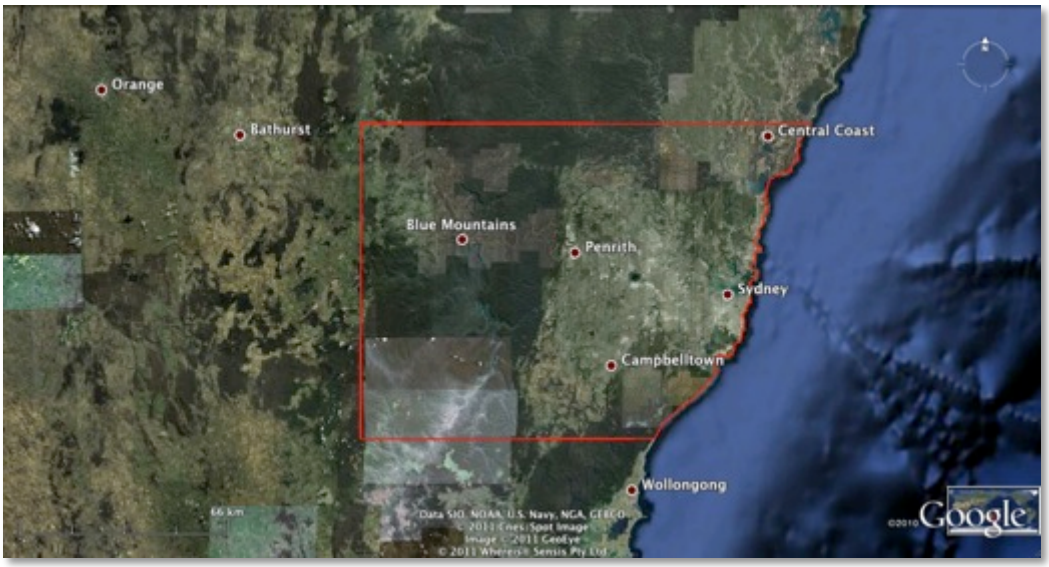


Figure 1: Study area.

The majority of research on AGAs has focused on the technological characterisation of the artefacts. This has led to the production of numerous 'criteria for identification'. The diversity of approaches to identification are difficult to navigate and not universally applicable. The existence of numerous criteria only adds to the uncertainty in identification, especially as they are based on assemblages from particular study areas that have been unsuccessfully applied to artefacts from other regions. For the purposes of this thesis the various criteria have been revised and

synthesised to produce a universally applicable and well-defined criteria to which the data will be applied. The advantage of applying such *integrated criteria* is that it will provide evaluation of methods used in identification and possibly lead to a better approach to the authentication of AGAs.

Three phases of analysis were undertaken in this thesis. The first phase was a review of previously recorded data on AGAs from Sydney with the aim of locating sites to enable a spatial analysis, retrieving previously recorded data and recognising any technological and methodological patterns. It was hypothesised that patterns in technological attributes of the AGAs may reveal characteristics of the artefacts specific to Sydney and methodological trends in the recording of these artefacts will reveal how the recorders are managing identification.

The second phase of this thesis involved the recording of two AGAs from the Stockton collection, a museum collection housed by Sydney University's Macleay Museum, which were originally categorised by Stockton as demonstrating evidence of being worked by Aboriginal people. These artefacts were assessed according to the integrated criteria. This was undertaken to evaluate the validity of the criteria as applicable to a known sample.

The third phase was the survey of four sites within the Sydney region at which potential AGAs had previously been recorded, as well as other cultural material. This phase was undertaken with the aim of assessing how identification may be better managed and also to provide a more specific classification of the AGAs within these four sites.

The results of these three phases of analysis are combined to reveal how the 'identification issue' may be better managed. Herein lies the aspiration of this thesis, to provide better understanding of and better recording methods for AGAs specific to the Sydney region.

It has been suggested that such characterisation of AGAs has dominated research to the detriment of an understanding of the meaning and social context of these artefacts (Gibbs and Harrison, 2008). This study aims to both deal with the fixation on the production and identification of AGAs but also contribute to the understanding of the social processes taking place in Sydney during the post-contact period.

CHAPTER TWO: ABORIGINAL GLASS ARTEFACTS

Aboriginal glass artefacts have played a substantial role in the study of cross-cultural interaction in countries with colonial pasts. Colonisation meant that new raw materials became accessible to Indigenous populations, one of the most common of these being glass, however Aboriginal use of these new materials is not always archaeologically obvious. Williamson (2004) has emphasized the importance of the identification of Aboriginal use of European objects in contact archaeology:

> ...at multi-ethnic contact period sites one can often not easily determine who used, modified, discarded, reused and again discarded particular items. At such sites Aboriginal people frequently become indistinguishable from poor Europeans, because unless European artefacts have been clearly modified in form in 'traditional' Aboriginal ways, any Aboriginal uses and/or movement of these items cannot be demonstrated. (Williamson, 2004: 77).

AGAs are glass pieces, predominantly from bottles, that have been modified for use by Indigenous people. Traditional methods, similar to those used in stone tool production were employed to adapt the glass to serve a function more familiar to Indigenous custom. Modification of other European materials such as glass slag, telegraph insulator and ceramic wares has also been recorded. AGAs have become the 'type fossil' for establishing contact between Europeans and Indigenous populations as they have been documented in many places around Australia and internationally, leading to an expectation that they will occur in all areas. The significance placed on these artefacts is offset by the problematic

nature of their identification. Over the last five decades there have been a number of scholarly publications and research projects relevant to questions of how to recognize these artefacts and distinguish them from broken glass commonly found in archaeological sites in Australia. An understanding of how glass has been adopted and adapted by Indigenous cultures, particularly Australian Aboriginal people, and the problematic nature of their identification is central to the aims of this thesis.

CONTACT ARCHAEOLOGY AND ABORIGINAL GLASS ARTEFACTS

The strategies used by Australian Aboriginal people to modify glass were used by Indigenous people in most countries that were affected by European colonisation. Cooper and Bowdler (1998) explored the similarities in the adaptive use of glass evident between the Andaman Islands and Western Australia. They found that while these regions have no cultural connection, the technological processes of the Andaman Islands 'describe exactly' (1998: 81) those documented from various parts of Australia. Cooper and Bowdler interpret this as a signifier of a fundamental process involved in knapping behaviour that will cause similar reaction when new materials are available. The transferral of stone working technology onto glass is a fundamental principle in the study of AGAs.

Allen's (1969) study of the cross-cultural interaction at a military garrison called Port Essington in the Northern Territory was one of the first investigations into the role of AGAs in contact archaeology in Australia. Within this study two middens were excavated in which systematically flaked AGAs were found. These AGAs, along with other evidence, demonstrated the close proximity in occupation and subsequent interaction between the Aboriginal people and European

settlers (1969: 216-243). Various studies have since utilised AGAs to identify cross-cultural interaction (e.g. Birmingham, 1992; Birmingham, 2000; Beck and Smith, 2003; Patterson, 2008). These studies have led to AGAs becoming the 'type fossil' for contact sites in Australia (Gibbs and Harrison, 2008: 61). The validity of this perception of a pan-continental signifier of contact is questionable due to the limitations in identifying these artefacts (Harrison, 2005: 16). Although AGAs are common in post-contact landscapes that have been studied in the past (e.g. Allen, 1969; Birmingham, 1992; Harrison, 2000; Patterson, 2008), whether they are ubiquitous across the Australian landscape is yet to be proven. This is particularly pertinent as the vast majority of studies have concentrated on remote nodes of frontier contact and urban areas such as Sydney have rarely been considered.

AGAs have been primarily researched to provide chronological proof of post-contact occupation and continuity of site function and tradition (see Colley, 1997: 4 2000:289). An example of this is Harrison's (2004) use of both the archaeological and oral history of glass use at the Dennawan Mission site in northwestern New South Wales. The oral history provided by Muruwari women suggested that AGAs were in use up until the 1970s. Josie Byno recounted carrying glass bottle pieces to the river during her adolescence, where the glass would be knapped to produce flakes in order to gut fish (Harrison, 2004: 177). The use of oral history in the study of AGAs has also been used by Beck and Somerville (2005: 477) at Corindi Beach, New South Wales, where the knapping of glass to carve wood was documented. Such evidence of glass use demonstrates continuity of tradition, though again this cannot be assumed to be the case in all areas.

Difference Between Glass and Stone

Aboriginal people readily adopted glass due to its similar, if not better fracture mechanics than stone. Stone is a solid aggregate of minerals that was used to produce tools due to its ease of flakability. The properties that allowed for such favourable fracture mechanics are: elasticity, brittleness and homogeneity (Holdaway and Stern, 2004:25). Glass is an amorphous solid that has similar properties to stone. Natural forms of glass, such as obsidian, were used throughout prehistory due to the predictable way in which it fractures and the resultant sharp edges. In Australia, glass tektites, formed during meteor impacts were used to produce tools (Cotterell and Kamminga, 1987: 677). Both glass and stone have mid range *modulus of elasticity*, low fracture toughness and are relatively homogenous in most forms. Such properties made these raw materials useful for knapping. In the colonial period, industrial glass, imported from Europe, was used to make AGAs.

Glass Bottle Reduction Strategies

There are also differences between the physical morphologies of glass and stone. 18th and 19th century glass bottles were the chief raw material for AGA manufacture in Australia. The fundamental constituent of this glass was silica. Metallic Oxides were combined with silica to provide better chemical durability and to add colour. Their frequency of use was probably the result of the relative abundance and ease of access to this material, as European settlers readily discarded it. Bottles were also highly desired due to their thick bases that were used for knapping. A guide to identifying such bottles is provided in Appendix C. Harrison (1996; 2000) has used the morphological form of bottles to examine the difference between stone and glass as raw materials. He argues that there needs to be

more awareness of the difference between these raw material as bottles have both curved and flat pieces that can be used for a variety of tasks. Harrison explains:

> Unlike stone, which allows the artisan a large amount of flexibility in shaping the material into an artefact, glass bottles have a distinctive shape and only small sections of thickened glass which may be flaked to produce artefacts that are shaped like conventional stone flakes and cores (Harrison, 2000: 44).

He investigated this by analysing 15 sites containing AGAs, made from similar bottle types over two general areas of Western Australia: Shark Bay and the mid-west area, and Swan River and Perth metropolitan region. The results of this study showed that in the Perth metropolitan area, the selection of fragments of the sides of bottles to be used in scraping tasks were preferred. Conversely, in the mid-west, knapping of the thickened bases of bottles dominated. One of Harrison's conclusions is that this regional variation may relate to the different ways people approached the manufacture of AGAs. Harrison (2000: 35-36) has illustrated two reduction strategies for glass bottles that relate to AGA production based on his research. These are *base core reduction* and *worked fragment reduction* (Figure 2). *The base core reduction* strategy is closely related to stone tool manufacture. This strategy results in the production of cores and flakes from the base of a bottle that generate characteristics associated with conchoidal fracture. The *worked fragment reduction* strategy involves a smashing action to the side of the bottle producing fragments with mostly plunging and axial terminations (Harrison, 1996: 36). All parts of the bottle (base, neck and wall) may be used as implements in this reduction strategy.

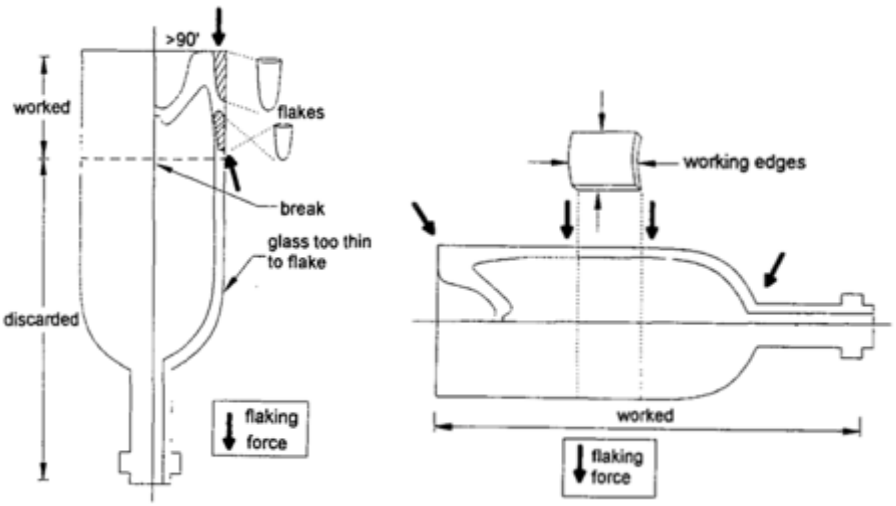


Figure 2: The two strategies for glass bottle reduction (Harrison, 2000: 42; 43).

FLAKES, FORMALISED TOOLS AND EXPEDIENTLY USED FRAGMENTS

The aforementioned reduction strategies were used to produce three general types of AGAs. These were systematically flaked implements (*base core reduction*), formalised tools that mirror pre-contact tool types (either *base core* or *worked fragment reduction*) and expediently used fragments (*worked fragment reduction*).

Knapping the thick base of a glass bottle as part of the *base core reduction strategy* to produce flakes through conchoidal fracture is a direct translation of pre-contact stone tool manufacture. The majority of research on AGAs has focused on characterising the artefacts created through this type of reduction strategy (Allen, 1969; Allen and Jones, 1980; Cooper and Bowdler, 1998 etc.).

Formalised stone tool types used in the pre-contact era were transferred onto imported glass after European contact. Most well known of the formalised tool types translated onto glass is the Kimberley Point. The production of these tools was exclusive to the

Kimberley region of Western Australia. Pre-contact, Kimberley points were invasively pressure flaked, bifacial points made from a variety of fine-grained stone. It was in their glass form that Kimberley Points were most widely manufactured and traded in the late 19th and early 20th century. This occurred as these tools captured the attention of European collectors, becoming an 'artefact of colonial desire' (Harrison, 2006). They were produced on the wall of a bottle and rarely on glass flakes (Harrison, 2000: 36). Evidence of formalised tool types on glass in New South Wales was reported from a site near Singleton consisting of a large amount of glass found on the surface of a deposit containing stone artefacts (McCarthy and Davidson 1943). Within this assemblage, glass concave and nosed tools, glass side and end scarpers as well as 'piercers' were recorded, suggesting that the same toolkit used in the pre-contact era on stone were being knapped on glass after European contact in this particular area. However doubt has been cast on this assemblage as: the field from which the glass was collected had been cleared and heavily ploughed, the site was near to the remains of European homes and the most convincing of the AGAs was the flaked base of a brown glass beer bottle with a molded date underneath of 1938 (Allen and Jones, 1980: 231).

AGAs do not always morphologically reflect the previously mentioned knapped flakes and formalised tools. The *worked fragment reduction strategy* produces fragments that either undergo retouch or lack any modification, the already sharp edges being used expediently. Wilkie (1996) has investigated the retouch and expedient use of glass bottle fragments. Although Wilkie's study used African American slave assemblages from Oakley Plantation, Louisiana, the artefacts are directly comparable to Australian AGAs. Wilkie analysed glass

fragments recovered from undisturbed assemblages dated from 1840-1930s. He used macroscopic observation to determine various technological attributes in order to assess typological differences between implements. As a result, Wilkie was able to divide the glass implements from the three assemblages into two categories based on functionality. The first identified group were retouched fragments that served as scrapers. The second category was unmodified expediently used fragments, which were determined by Wilkie to have served as knives.

Regional Variation in Aboriginal Glass Artefacts

The existence of regional variation in the shape, form and process of manufacture of AGAs has been recognised by archaeologists. As noted above in Harrison (2000), regional variation was found at contact sites in Western Australia. He suggests that this deviation may relate to the long-term continuity in regional variation of pre-contact stone artefact manufacture being reflected in the production of post-contact AGAs (2000: 45).

Neimoller and Guse (1999) found similar inter-regional variation in glass bottle reduction between contact sites at Union Reef on the Coburg Peninsula and Bradshaw Station in the Victoria River region of the Northern Territory. Within the Union Reef assemblage artefacts were predominantly produced through the *base core reduction strategy* by the extraction of flakes from the base of bottles, whereas at Bradshaw Station the *worked fragment reduction strategy* was used to obtain wall fragments that were used to produce formalised points.

Microscopic Analysis of Aboriginal Glass Artefacts

Microscopic analysis is the only indisputable way of confirming the artefactual nature of an AGA. Martindale and Jurakic (2006) have demonstrated the validity of AGA identification by microscopic analysis, even on expediently used AGAs, with no macroscopic evidence of use. They examined a glass assemblage from Northern Tsimshian, British Columbia Canada to test the possibility that microscopic usewear-like patterns were the product of post-depositional effects. Martindale and Jurakic found that an array of usewear traits only correlate with use activity, thus proving the validity of microscopic assessment of identification.

Microscopic analysis can also provide evidence for the function of AGAs. Tindale's (1941) description of an artefact from Kempton, Tasmania, was one of the first microscopic analyses of an AGA that determined function. Tindale detailed a systematically flaked bottle base with microscopic evidence of use, which he described as an, 'irregularly shaped notched scraper' (1941:1). He interpreted the abrasion on the edge of this artefact as the result of friction against wood. He observed three notches on the artefact, which he suggests were used to construct a spear or a thin club-like object. The abrasions occurred on the inner surface of the artefact and their direction indicates that the AGA was drawn towards the worker. Other microscopic functional analyses of use-wear and residue on glass artefacts have since been undertaken. These include Bolton's (1999) study of Illamurta Springs Police Camp in the Northern Territory and Ulm et al's (1999) study of the Ironbark site complex in Central Queensland. Both of these studies also concluded that woodworking was the primary function of the AGAs at these respective sites.

Microscopic analysis of AGAs has revealed the 'invisibility' of the archaeology of the post-contact Aboriginal landscape. Wolski and Loy (1999) conducted a microscopic residue analysis of AGAs from three contact sites within western Victoria. The residue analysis revealed that glass fragments that displayed even the most subtle edge damage, sometimes with no macroscopic edge damage at all, may nevertheless be AGAs. Therefore fragments that seemingly have no visible artefactual attributes may have been used. This reveals that all identification methods borrowed from lithic analysis e.g. bulb of percussion, platforms, and flake scars, are inappropriate for understanding the expedient use of glass. Due to their lack of visible attributes, expediently used AGAs are hard to recognise without the aid of microscopic analysis. Archaeologists in the field must therefore be aware of the 'invisibility' of AGAs and of the entire Aboriginal post-contact landscape. This is particularly relevant in urban areas where glass is routinely encountered in European historical archaeological contexts. The glass may be assumed to be 'European' and is rarely analysed in this manner unless suspected to be modified on the basis of clear macroscopic traits or contextual historical information about the presence of Aboriginal people at the time of European use of the site.

Microscopic analysis of usewear and residue may also reveal that fragments that appear to have macroscopic evidence of use, may not have been used at all, but are the product of incidental damage. Glass pieces that demonstrate 'attributes that resemble conchoidal fracture, flake scars or macroscopic edge damage, but on closer microscopic inspection these may be revealed as pseudo-artefactual. This was demonstrated by the usewear analysis of supposedly retouched glass flakes at Fortlet Miñana, Argentina, by Clemente

Conte and Romero (2008). The microscopic analysis demonstrated that the previously identified AGAs recovered were not used as tools at all. This was established by comparison with the usewear produced on an ethnographically based experimental glass assemblage. This result was based on the fact that none of the fragments displayed traces of usewear and that the negative scars on the edges, initially interpreted as retouch, were probably not of conscious human origin but the result of incidental damage. Clemente Conte and Romero's study did not account for AGAs that conform to a very specific formalised type but were not 'used' in a functional sense e.g. Kimberly Point manufactured for trade.

Glass fragments can be confirmed as intentionally modified only when their morphology closely replicates that of a known tool type or when the usewear and/or residue traces unmistakably indicate that they were used as tools. The microscopic analyses mentioned above have demonstrated that if these methods cannot be used to identify an artefact, an issue of identification arises. This is particularly acute in cultural heritage management field contexts where use must be distinguished from incidental fracture without the ability to remove artefacts for microscopic analysis and where the consequences for identification are acute (i.e. whether a place is treated as a heritage 'site' and legally protected or not).

THE IDENTIFICATION ISSUE

Incidental fracture that resembles systematic knapping and/or retouch occurs on both stone (see Boot, 1967) and glass. Glass, which is more brittle in nature, will fracture in this way more easily. Beaumont (1961) discusses this problem of identification at length

whilst considering three post 17th century AGAs from South Africa. Beaumont explains that

> If a fragment of glass lies on a hard surface so that it's entire, or part of it's edge, is in contact with that surface, then any pressure applied onto that glass fragment will result in the removal of small flakes of the glass from that edge (1961:161).

Such damage to glass produces physical attributes that are identical to those that would be produced by deliberate knapping. Beaumont goes on to explain that curved glass from a bottle is even more easily fractured in this way as the curve causes all pressure to be applied to the edges of the fragment. Allen and Jones (1980:230) have also noted that curved pieces of glass placed on a hard surface and having pressure applied will produce objects that superficially look like scrapers.

Incidental damage generating pseudo-artefactual characteristics is particularly prevalent when glass is introduced into a context where taphomonic processes such as vehicular traffic, agricultural activities and foot trampling can cause further damage. Beaumont also explains that 'trimming (retouch) cannot be regarded as a criterion for human workmanship' (1961: 162) unless circumstantial evidence of incidental damage is nil, such as would occur in a remote or isolated area.

This issue has led to much hesitation in the identification of AGAs. Some researchers have even doubted the ability of archaeologists to accurately identify AGAs, which lack formalised type, outside of a laboratory (Wolski and Loy, 1999). This has led to much effort aimed at overcoming this dilemma by construction of criteria for identification.

CRITERIA FOR IDENTIFICATION

Various criteria have been developed to aid the identification of AGAs. Similar approaches have been taken to guide the identification of other cultural material where objective confirmation or measurement is not possible. For Example, Attenbrow (1992) developed criteria for identifying middens while investigating two shell deposits from Sydney. Her criteria for differentiating between Aboriginal midden and natural shell deposit was formulated by a revision of previously identified criteria, with special consideration of how post-depositional European activities have affected the landscape.

Numerous attempts at developing successful criteria for identifying AGAs have been proposed in an attempt to solve the identification issue. Despite this, there is still no definitive methodology for identifying AGAs. This is the result of the complexity in determining the significance and reliability of the diverse criteria. The following is an overview of the various criteria presented over the last 50 years.

Runnels (1976) developed one of the first criteria after finding 'modern' glass pieces in surface scatters in Southern Argolid, Greece. This glass displayed macroscopic evidence that resembled artefactual characteristics. He formulated three hypotheses and corresponding criteria, to explain these characteristics. As well as the morphological and technological features of the glass, Runnels relied heavily on ethnographic evidence from living Greeks to develop an answer. His three hypotheses and criteria are summarised in Table 1.

Author	Criteria
Runnels (1976: 29)	*Hypothesis one: living people deliberately retouched the glass fragments.*
	1. A 'native tradition' of knapping, or of using retouched tools will be known to the living inhabitants of the area.
	2. The flake scars will not be irregular but will form 'clusters' along the edge of the artefact.
	3. The scars will have modified the shape of the glass.
	4. There will be uniform direction of force of flake scars.
	Hypothesis two: Flake scars are the result of expedient use, probably by use in woodcarving.
	1. If the glass fragments were modified by expedient use, a tradition of using glass fragments as implements should be known to the living inhabitants.
	2. The flake scars will form clusters.
	3. The scars will not have modified the shape of the glass, but may have modified the working edge.
	4. The scars will show a uniform direction of force.
	Hypothesis three: Scars are a result of accidental force, probably from trampling.
	1. No knowledge of their use or nature will be known to the living inhabitants of the area.
	2. The flake scars will be randomly distributed on all edges.
	3. The scars will not modify the shape of the glass.
	4. The scars will not show a uniform direction of force.

Table 1: Runnels criteria for identification.

Runnels conducted two experiments to test these hypotheses by determining the affects of certain activities on the formation of macroscopic damage. The aim of the first experiment was to determine patterns of deliberate use, and the second was to determine patterns related to damage caused by trampling. The results of Runnels analysis indicated that the criteria associated with hypothesis two *Flake scars are the result of utilisation, probably by use in woodcarving,* best described the artefacts. It was found that artefacts closely resembled the glass experimentally used to carve olive wood by scraping.

The major weakness in Runnels criteria is that it is assumed that the AGAs are of the same tradition and time period as that of the living culture. He does not adequately provide a definition of 'modern' glass and does not deliver a hypothesis that accounts for a forgotten tradition of glass use. Although many of Runnels assumptions are dubious, his criteria are particularly useful as they account for artefacts manufactured by both the *base core reduction* strategy and the *worked fragment reduction* strategy. Runnels also stipulates three sets of criteria, allowing for a well-rounded understanding of the processes that produce AGAs and also pseudo-artefacts.

In Australia, criteria for identification of AGAs were formulated by Allen and Jones (1980). They based their criteria on the findings of Allen's (1969) study of glass assemblages at Port Essington, Northern territory. The Port Essington site complex consisted of a military establishment and two contemporaneous Aboriginal middens containing over 15 000 pieces of bottle glass, 20% of which were considered possible artefacts. The criteria derived from this study are summarized in Table 2.

Author	Criteria
Allen and Jones (1980: 231)	1. Amount of wall attached to the bottle base.
	2. Thicker parts of the bottles are more likely to be used.
	3. The presence of struck flakes with a bulb of percussion.
	4. Bifacial and unifacial flaking on both sides of the lower parts of the bottle wall, where this was attached to a base or part of a base.
	5. Location and context of an artefact.

Table 2: Allen and Jones' criteria for identification.

Allen and Jones applied these criteria to an assemblage of 20 glass bottles pieces from Oyster Cove, Tasmania, a 19th century Aboriginal reserve. The glass was collected near roadways and the assemblage was found to contain no struck flakes but did carry flake scars along one or more margins. During their investigation Allen and Jones also considered historic documentation of glass use in the area and determined the age of the glass as pre-1850 based on attributes related to manufacture (Allen and Jones, 1980:228). The application of the criteria resulted in conflicting opinions and the validation of the glass at Oyster Cove remained inconclusive. The conclusion of this study was that the construction of criteria for identification of AGAs in general is impossible and that 'the location of the objects (AGAs) coupled with commonsense still provide the best guide to validity' (Allen and Jones, 1980: 231).

Allen and Jones' criteria are exclusively applicable to AGAs derived from glass bottles. Herein lies the primary fault in the criteria as it only accounts for AGAs that comply to the bottle base/core paradigm borrowed from lithic analysis. This makes the criteria redundant in the identification of glass bottle AGAs produced by the

worked fragment reduction strategy. Also, two of the criteria (*amount of wall attached to the bottle base* and *bifacial and unifacial flaking on both sides of the lower parts of the bottle wall, where this was attached to a base or part of a base*) are open to interpretation as they do not specify whether the presence or absence of these criteria signify an artefact. Overall, the criteria are restrictive and as Allen and Jones recognise, are not universally applicable.

Paterson (1999: 81) identified AGAs during his PhD research in the South Australia. The focus of this project was the cross-cultural interaction at the historical period pastoral station, Strangeway Springs. During his fieldwork, many AGAs produced on bottle glass were found. He used the following criteria (Table 3) to identify AGAs:

Author	Criteria
Patterson (1999: 18)	1. Being located on a knapping floor: characterised by cores, flakes or debitage.
	2. Qualitative differences between tools and other unmodified glass pieces.
	3. Presence of bulb of percussion on modified flakes.
	4. Presence of sequential flaking, edge modification and striations on used flakes.
	5. The absence of other agencies that may produce flakes such as roadwork.

Table 3: Paterson's criteria for identifying AGAs.

Although Paterson's criteria have progressed from Allen and Jones' (1980) suggestion, it still follows the bottle base/ core model and does not account for artefacts produced by the *worked fragment reduction strategy.*

Harrison (1996) proposed a revision of Allen and Jones' criteria in an honours thesis in which he compared the previously discussed

contact period Aboriginal assemblages of Shark Bay and Swan River, Western Australia. The aim of this study was to investigate the variability between the two regions and also how bottle morphology influences artefact manufacture. In a later study using the same data, Harrison (2000) again advocated that differences between stone and glass as raw materials need to form the basis of criteria for identification and analysis of AGAs. Within this later study he provides a guide for recording AGAs (2000: 45). He encouraged a universal stardardisation of AGA recording. These recommendations are useful in the process of identification (see Table 4).

Author	Recommendations for standardisation of recording glass implements
Harrison (2000: 45)	1. Bottle type, glass colour and the presence of other diagnostic attributes to determine the earliest date for which the glass may have been used as an Aboriginal artefact.
	2. For flaked glass, orientation of flaking on the bottle, location on the bottle of any platform preparation, orientation of flakes and flake scar size.
	3. Presence/absence of usewear and residues on broken bottle edges, which may identify expedient use of glass fragments as tools.
	4. The use of particular parts of the bottle for particular artefact types.
	5. Whether the pieces can be shown to be from the same vessel, or whether they appear to be from several different vessels. This will show whether the whole bottle has been reduced in situ at the source of the raw material or whether the pieces have been transported from the site of primary reduction.
	6. Potential sources of the glass bottles. By locating the source of the glass, it is possible to begin to build a picture of post-contact land and resource use strategies.

Table 4: Harrison's proposal for standardised recording of glass artefacts.

Harrison's recording standard is comprehensive and is used as a guide in the general recording of AGAs throughout this thesis. Within the same study, Harrison also formulated criteria for identifying expediently used AGAs that are devoid of attributes related to knapping (2000: 38). He does this by examining usewear and residues with a stereoscopic dissecting microscope under 10-100x magnification.

Author	Criteria
Harrison (2000: 38)	1. Presence of residue (potential residue deposits were viewed under higher magnification).
	2. Presence of small conchoidal use scars.
	3. Consistent orientation of striations.
	4. Macro and micro scars that appeared 'fresher' than the aged surface of the glass were discounted as post-depositional damage.

Table 5: Harrison's criteria for identifying casually used glass.

An issue that is emphasised by Harrison's criteria for identifying expedient use of bottle glass is the difficulty of identifying these AGAs in the field, without microscopic equipment. If one were to assess potential expedient use, could they adequately do so macroscopically, as Runnels (1975) has suggested? This issue will be investigated within this thesis.

Williamson (2004) proposed a set of criteria during her study of a site at Burghley, Tasmania. This assemblage was found in association with the remains of a 19th century hut that was part of the Van Diemens Land Company establishment. Within an assemblage scattered over the remains of this hut were 63 AGAs identified as having been retouched to form scrapers. Williamson chose a different approach to identifying these artefacts shifting the

emphasis from artefactual characteristics of AGAs, and instead suggests that unintentionally fractured bottle glass can be characterized more effectively (Table 6).

Author	Criteria
Williamson (2004: 86)	1. Flaking on an edge of a tool that is irregular.
	2. Flaking present on more than one margin.
	3. Intermittent flakes across the edge of the piece.
	4. Initiation/ platform either from the inside or outside of the bottle.
	5. Steep flaking (forming edges close to 90 degrees).
	6. Flakes that are often in the form of large, isolated flake scars on the margin of the glass piece.

Table 6: Williamson's criteria for identifying unintentional damage on glass.

Although Williamson does not outline the basis of these assumptions, her criteria forms a particularly interesting approach and may be universally applicable in the identification of AGAs. She pairs these criteria with guidelines for identifying intentional modification (see Table 7).

Author	Criteria
Williamson (2004: 86)	1. Semi-circular flake scars.
	2. Regular and continuous flake scars.
	3. Flaking is perpendicular to the working edge.
	4. High level of scar overlap.
	5. The flaking is generally on one surface only.

Table 7: Williamson's criteria for identifying intentional modification.

How Williamson decided on this set of criteria is also not specified. Never the less it follows convention previously proposed by Runnels (1975), Allen and Jones (1980) and Patterson (1999).

Veth and O'Connor (2005: 8) generated criteria for the purposes of their field inspection for the *Martu* native title claim of the Western Desert lands in 1992. They based these criteria on recent critical reviews of physical attributes of AGAs. The presence of the following attributes (Table 8) was considered to contribute to a positive identification of AGAs.

Author	Criteria
Veth and O'Connor (2005:8)	1. Point of applied force.
	2. Ventral surface and margins on flakes.
	3. Negative flake scars.
	4. Retouch flakes.
	5. Undercutting.
	6. Step fractures.
	7. Crushing.
	8. Polishing (under 10x hand lens).

Table 8: Veth and O'Connor's criteria for identification.

Again this approach is based on attributes related to lithic analysis and does not account for expedient use of AGAs. Veth and O'Connor do not detail the scheme behind their criteria.

The diversity of approaches, and also the overlapping of certain criteria are difficult to navigate even in this condensed form. The existence of numerous criteria only adds to the ambiguity of

identification. It may also be said that criteria have focused too heavily on conventions of lithic analysis and need to account for the unique morphology of glass bottles, as they are the dominant raw material for AGA manufacture. For the purposes of the analysis conducted in this thesis, the various criteria have been reviewed to produce a more widely applicable and well-defined criteria. This will enable an evaluation of each individual criterion and also a standard against which the data can be assessed. These *integrated criteria* are outlined in chapter four.

SUMMARY

This chapter has outlined how AGAs have become the 'type fossil' for identifying cross-cultural interaction in countries with colonial pasts. The reduction strategies and subsequent artefact forms particular to AGAs have also been investigated. An overview of the different approaches to the study of these artefacts has demonstrated their ambiguity and emphasised the need for a better understanding of the methods involved in their identification.

CHAPTER THREE: BACKGROUND

This chapter provides a background to the study of AGAs in the Sydney region, outlining the research from which this thesis builds. The chapter includes a brief overview of Sydney's post-contact history, the historical evidence of Aboriginal use of glass in Sydney, the late Holocene and post-contact archaeological context of the study area and finally an outline of the previous research on AGAs within this region.

SYDNEY'S CONTACT HISTORY

Most contact histories of Sydney are preoccupied with the two major events of 'first contact'. These are Captain James Cook's eight-day visit to Botany Bay in 1770 and the voyage of the First Fleet to the same site 18 years later in 1788 followed by the settlement of Port Jackson. These two events have become the staple narratives for cross-cultural interaction Australia wide, due to their popularity in historical, educational and memorial culture. As a result, references to Aboriginal agency beyond first contact are often overlooked when investigating cross-cultural encounters in Sydney. Looking past the colonial meta-narrative of first contact reveals the vast network of cross-cultural interactions between Aboriginal people and Europeans that took place over the next century.

Reconstruction of contact period languages suggest that several languages and dialects were spoken in the Sydney region, including Dharawal in the south, Darug to the west, Gungungurra in the southern Blue Mountains and Darkinung to the north (Attenbrow, 2010: 158). In the time after British colonisation these groups were impacted by introduced disease, conflict and dispossession of land.

The Aboriginal population dropped dramatically and social organisation was disrupted, thus the traditional way of life that had been adhered to for millennia was rendered almost impossible within the next half century (Attenbrow, 2010: 158). The affect of British settlement was felt first by communities living around Botany Bay and Port Jackson then spread throughout the Sydney Region with a rapidly moving frontier. Christian missions were set up and abandoned in the early to mid-19th century, followed by a system of mission and Aboriginal reserves set up with government oversight from the 1880s. However before and even after this time Aboriginal people lived in a range of semi-independent settlements across Sydney, following an adapted traditional lifestyle and working on farms and in other capacities for survival. In some cases Aboriginal people continued to live in this way into the 20th century, such as at Salt Pan Creek in southern Sydney which was documented to have been in use up until the 1940s (Australian Institute of Aboriginal Studies, 1988; Ardler, 1991; Goodall&Cadzow, 2009 in Irish, 2011: 32). The following (Table 9) is a brief timeline of significant events in the post-contact Aboriginal history of Sydney. This thesis focuses on the first century of European settlement, as this is the timeframe in which AGAs are likely to have been in use. The timeline is similarly focused.

Year	Event
1770	Landing of the Endeavour in Botany Bay. Conflict between Aboriginals and visitors. Cook and his crew take 40-50 spears and attempt to amend any malice by tossing trinkets among the local people.
1788	English First Fleet reaches Botany Bay. The interactions of the first six months were dominated by violence. 17 Europeans killed or wounded during this time, fatalities to Indigenous population not recorded.
1789	A smallpox epidemic is thought to have halved the Aboriginal coastal population. So many people die around Port Jackson that traditional burial practices are discontinued.
1790s	Pemulwuy, an Aboriginal warrior, leads a resistance by attacking farms on the George' s River, Prospect, Seven Hills, Toongabbie and

	Parramatta until he is killed in 1802.
1791	Europeans explore Sydney basin to the base of the Blue Mountains, the Hawkesbury River and the Georges River. Many Aboriginal people are encountered; several are kidnapped in an attempt to learn more about them. Another smallpox epidemic causes deaths and major social re-organisation.
1792	Emancipated convict John Wilson lives with the Gundungurra people after his release. Similar interaction by escaped convicts was likely to have been the first contact for many Aboriginal people, beyond the realm of official records.
1794	70 European farms on the Hawkesbury already established by this time. A frontier war ensues involving settlers and English troops that lead to the deaths of an unknown number of Aboriginal people and at least 26 Europeans.
1797	Wreck of the *Sydney Cove* near the Furneaux Islands in Bass Strait. 17 survivors forced to walk northward to Sydney. Aboriginal people aided them during various parts of their journey.
1800s	Spread of Europeans over the Cumberland Plain.
1814	Governor Macquarie establishes the 'Black Native Institution of New South Wales' at Parramatta. The annual Parramatta feasts begin.
1815	Governor Macquarie allots land for Aboriginal fishing and agricultural settlement at George's Head on Sydney Harbour but Aboriginal people are not interested in this imposed form of permanent settlement.
1819	Governor Macquarie grants land at Blacktown to Aboriginal tribesmen.
1820s	Some of the remaining Aboriginal people of the Sydney clans unite at certain places e.g. the 'Mulgoa tribe' on William Cox's estate, the 'South Creek tribe' on Charles Marsden's property near the junction of South Creek and Eastern Creek.
1820	Governor Macquarie tries to settle people at Elizabeth Bay in a village of bark huts supplied with fishing gear and gardens. Again, Aboriginal people abandoned this settlement as it did not meet their needs.
1830s & 1840s	Charles Darwin and others (e.g. Backhouse) encounter Aboriginal people in Sydney living semi-traditionally. A number of Aboriginal settlements present across Sydney from rural areas to the towns of Sydney and Parramatta. Still large populations of Gundungurra and Dharawal people living in the mountains and to the south of Sydney. Gundungurra initiation ceremonies and Dharawal corroborees continue into the 1840s.
1850s - 1870s	A range of Aboriginal settlements throughout Sydney. Some groups recorded as living semi-traditionally in the Blue Mountains. People from outside Sydney increasingly moving into Sydney.
1880s & 1890s	Aboriginal Protection Board established by New South Wales Government. Aboriginal reserves established e.g. at La Perouse and Sackville on the Hawkesbury River. Aboriginal people continue farming, fishing and living in huts on these reserves. Some Aboriginal people continue living in 'fringe' camps though settlements becoming more permanent.

Table 9: A brief timeline of Sydney's Aboriginal post-contact history adapted from Meredith (1989), McDonald (2008) and Karskens (2009).

HISTORICAL EVIDENCE OF GLASS USE IN SYDNEY

Historical evidence of indigenous glass use in Sydney is rare but does exist. For example, Governor Phillip details the use of glass in barbed spears in his account of the spearing of his games-keeper, eleven miles from Sydney:

> They generally are armed for seven or eight inches from the point, with small bits of sharp stone, bone, or shells; and, since our settling amongst them, bits of glass bottle: these are fixed on with the yellow gum, which is softened by fire, and afterwards grows hard and firm, making a very good cement (Governor Phillip in Hunter, 1973 (1968): 467& 496).

Benjamin Bowen Carter, in his interaction with Aboriginal elder, Maroot, in 1798, provides another account of glass used in spears at La Perouse:

> Their spears... were stuck full of broken glass which closely adhered to the Iron wood by means of Gum (Carter, 1798: 81).

In 1820, Russian astronomer, Ivan Mikhailovich Simonov recorded the use of glass in Sydney by Aboriginal people:

> Some of these had in their hands small iron axes with which they fashioned various fishing implements, smoothing them down with glass (Simonov 1820 in Barratt 1981:48).

Figure 3: Backhouse, 1843: 433 '…a death spear, barbed with a row of pieces of glass'.

Ethnographic evidence for the use of glass is also recorded on the outskirts of Sydney. In his description of the Goulburn area in 1836, Surveyor W.R. Govett mentioned the use of glass in barbed spears (Govett in Attenbrow, 2010: 124). Later, near the foot of the Cambewarra Mountains, James Backhouse (1843: 433) witnessed a

native carrying a death-spear armed with a single row of glass chips. In 1843 he illustrated this death-spear in his publication *A Narrative of a Visit to the Australian Colonies* (Figure 3).

ARCHAEOLOGICAL CONTEXT

The archaeological context of Sydney shows both continuity and innovation. Observation of these themes in the prehistoric late Holocene and the post-contact era of Sydney is an important foundation for the study of the AGAs of this region.

Late Holocene Archaeology of Sydney

Intra-regional variation occurs in the archaeological record of Sydney in the last part of the late Holocene (Attenbrow, 2010: 156). From 1500 years ago and up until 1788AD the stone tool tradition in Sydney can be divided into two geographic contexts: the coastal/ sandstone country and the Cumberland Plain. The stone tool tradition of this period is called the 'late Bondaian phase'. The dichotomy between the sandstone/ coastal region and the Cumberland Plain during the Bondaian phase was possibly caused by a change in access to raw materials due to variation in social conditions. This may have been the result of; variation in clan or language group boundaries, trading networks, change in arrangements of direct access or the restriction of land use (Attenbrow, 2010: 156).

These changes meant that the archaeology of the Cumberland Plains generally continued as before but the lithic tradition of the sandstone/ coastal regions diverged. This was due to a reduction in access to silcrete, tuff and chert and so the bipolar method of stone knapping was adopted to a greater extent to make more efficient

use of these non-local materials and also to exploit the locally available quartz. This technique saw the increase in the production and use of unmodified flakes as opposed to formalized tools. Another manifestation of social change was the dramatic reduction of Bondi Points and Geometric Microliths in the coastal/ sandstone country approximately 1 500- 1 400 years ago (Attenbrow, 2010: 102). On the Cumberland Plain the use of these implements continued until at least 340 years ago (JMcDCHM, 2005: 152). In the coastal zone, use of bone and shell as implements, as well as the use of fishhooks and associated stone files developed around 900-1000AD.

Changes that apply to both geographic areas during the late Bondaian phase included; an increase in the use of the Elouera tool, ground-edge hatchets and the first evidence of plant processing (about 1 000 years ago). The technology of the pre-contact stone toolkit may be expected to have continued into the post-contact period, and have been transferred onto glass, as was done elsewhere in post-contact sites within Australia.

Post-contact Archaeology of Sydney

From 1788 the social framework and raw materials behind this traditional toolkit were affected by a shift in access to existing sources and also introduction of new materials such as glass, ceramic and metal. Traditional technologies persisted and innovated with these new materials, illustrating the remarkable ability of Aboriginal people to adopt and adapt to change. Trade developed between the Aboriginal people and the settlers and European material was exchanged for local implements and weapons, manual labour, fish and wood. The use of glass and ceramic for cutting and

piercing activities and for use as barbed spear blanks emerged. Metal became highly desired and spades, pickaxes, knives and shovels are recorded as being stolen to use in barbed spears also (Attenbrow, 2010: 124). Contact period rock art also became discernable in Sydney's landscape as European figures and objects were used as subject matter. Rock-art depicting ships, figures in European dress and historic events have been found in the Sydney region (McDonald, 2008).

Looking at the continuity between the late Holocene and post-contact periods, assists in overcoming issues that have hindered post-contact archaeology in the past: the need to develop long-term trajectories (Lightfoot, 1995) and the need to avoid colonialist binaries of Aboriginality (Byrne, 1996). Lightfoot (1995: 200) argued that the prehistoric/ historic divide, inherent in most archaeological research, hinders the investigation of long-term culture change as relevant to the wider view of cross-cultural interaction. Byrne (1996) has revealed how the authenticity of Aboriginal culture is measured by its relationship to the prehistoric and how this has rendered the perception of post-contact and living Aboriginal culture as diluted or even invisible. Many researchers have begun to address these issues within contact studies (e.g. Patterson, 2008). By looking at both the prehistoric and historical contexts for the archaeology of Aboriginal Sydney these issues are avoided and a better understanding of AGAs is ascertained.

Aboriginal Glass Artefacts in the Sydney Region

The amount of published research on the use of glass in Sydney is minimal. As a result, access to information on AGAs of the region is lacking. The primary reason for this is that information is hidden in

cultural heritage management reports and site recordings. This thesis aims to overcome the divide between the published work and grey literature to enable a comprehensive investigation. The following is a summary of the published research on AGAs found in Sydney.

Most references to AGAs are concerned with the archaeology of Kurnell, Botany Bay, the site of both Captain Cook's landing and the arrival of the First Fleet. One of the first recordings of AGAs from this region was by Rolfe (1931) whilst investigating the isolated middens of Quibray Bay, Kurnell. Rolfe identified seven pieces of flaked bottle glass, all of the 'scraper type' on a small midden. Also found in this midden were two Regimental buttons; one of Macquarie's 73rd regiment and the other of the 19th Highlanders, and a Half Crown of George IV dated to 1820. He identifies one of the worked bottle pieces as a 'Tasmanian groover type' (1931: 62). He explained that the glass was dulled by the passage of sand (sand-blasting) and covered in deep scratches, which Rolfe interpreted as a result of wedging the glass between two stones to provide rigidity during retouch.

Decades later, Dickson (1971) identified AGAs from an extensive midden in the same area as Rolfe, and possibly from the same site. Two varieties of glass were present within this assemblage. The first variety was of French origin dated to the late 18th century. These pieces were found while collecting clay pipe fragments within the midden. It is not specified whether this glass was worked but Dickson speculated on the possible deposition of the bottle by the 'La Perouse to Botany Bay Expedition'. The second variety of glass was of British manufacture and dated to 1810-20. Dickson notes that, of the British glass, there were several flaked pieces as well as one 'crude point which has been worked upon the back after the

fashion of a Bondi' (1971:60) (Figure 4). The point measured 26mm in length and is described as 'showing the facets produced by transverse flaking' (Dickson, 1971: Plate IV caption). Dickson argues that the AGAs were protected from sand-blasting by the midden but the artefact in Figure 4 appears to be heavily abraded. This grainy image is the only evidence of this artefact available as it cannot be located within the museum collection and so its authenticity remains ambiguous.

Figure 4: The glass 'Bondi Point' from Kurnell identified by Dickson (1971: Plate IV).

Dickson suggests that the glass Bondi Point is evidence that backed artefact technology, which is now known to have dissipated from the archaeological record of coastal Sydney 1 500- 1 400 years prior (Attenbrow, 2010: 102), was still known to Sydney's Aboriginal people in 1820. Val Attenbrow (2010) explains that:

> ... glass Bondi Points found at Kurnell suggest that their use continued infrequently along the coast or perhaps that they were re-introduced from the Hinterland after British colonisation (Attenbrow, 2010: 102).

Harrison (2003: 318) investigated this idea further, suggesting that an Aboriginal person knapping such a tool in the 19th century would have deliberately copied the 'archaic' technology apparent to them from the surface scatters of continuously occupied open campsites. Harrison goes on to speculate that the glass Bondi Point represents:

> ...the purposeful creation of an object associated closely with Aboriginal identity and 'the past' in the materials of the colonial 'West', deposited at the landing place of western colonialism's most well known figurehead (Harrison, 2003: 328).

Glass fragments have been found at Captain Cook's Landing Place, Botany Bay. Megaw (1968: 18; 1969: 215) included a glass amongst the artefacts found during the trial excavations at the 'Watering Place'. He found, one fragment of weathered bottle glass dated to the late 18th / early 19th century and derived from a cylindrical wine or rum bottle. The glass was not described as being flaked in any way but was well stratified within a midden, along with a square-section iron nail and a bone button.

Another site containing an AGA that has been detailed in published research is the First Government House site on Bridge Street in the Sydney CBD. Proudfoot et al (1991: 47) describe a flaked AGA made from the centre of a black bottle base (Figure 5). Ronald Lampert, previous curator of Anthropology at the Australian Museum, identified the 'irregular flakes' on this bottle base as consistent with Aboriginal flaking techniques (Proudfoot et al, 1991: 47). A possible flaked piece of yellow-brown gunflint was also found at this site.

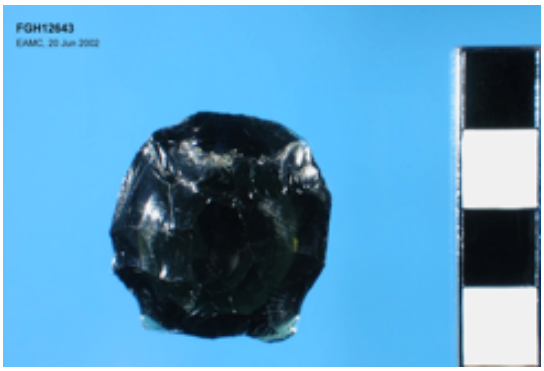


Figure 5: Piece of flaked bottle base from the First Government House site (Crook, P., Ellmoos, L. & Murray, T. 2003: Photo archive).

In Attenbrow' s (2010:125) publication *Sydney' s Aboriginal Past: Investigating the Archaeological and Historical Records,* an overview of AGAs from the region that the author was aware of was compiled. Attenbrow lists Aboriginal sites that have been recognized as containing 'pieces of broken glass, ceramic and other European materials dating to the 18th and 19th centuries' . These sites include; Manly, Palm Beach sand barrier, Mulgoa Valley, Yarra Point near La Perouse, Kurnell Pennisula and Prospect Reservoir (2010: 125). The majority of the information on these sites exists in cultural heritage reports though the listing does not indicate a systematic review but those sites known to Attenbrow. Attenbrow notes that despite the recognition of many sites containing AGAs 'no unambiguous glass assemblages of cores and refitting/ derived flakes have been reported' (2010: 125). She notes the complexity of determining whether these artefacts were actually used by Aboriginal people, or by British colonists in the 18th and 19th centuries or by later European settlers. Attenbrow also addresses 'the identification issue' by discussing the difficulty in determining the authenticity of AGAs, because incidentally broken pieces can resemble properties of humanly modified artefacts.

Descriptions of the systematic authentication of AGAs from Sydney are scarce. Besides basic description in the field, few detailed technological studies have been undertaken, which are all detailed within cultural heritage reports. These reports provide insight into the methods of identification that have been used in practical assessments of AGAs. The following tables (Table 10-12) are summaries of the criteria used by four known assessments, which demonstrate the identification process.

Reference	Criteria used for identification of Aboriginal glass artefact
Ngara Consulting Pty Ltd, 2003a & Ngara Consulting Pty Ltd, 2003b	1. Presence of flaking patterns that are similar to known artefact types or edge shapes.
	2. Presence of distinctive use-wear and residues.
	3. Contextual information that may support Aboriginal use or other non-Aboriginal damage.

Table 10: Criteria used by Ngara Consulting Pty.

Ngara Consulting Pty Ltd identified 'potential' AGAs at REL3, Prospect (AHIMS # 45-5-2893) and Northern Boiler Paddock One, Blacktown (AHIMS #45-5-3309). These artefacts were assessed macroscopically, in the field, under the guidance of Richard Fullagar (dating of the glass was undertaken by Martin Carney). The method of identification is demonstrated in Table 10. Evidence both for and against were listed and post-depositional damage was identified in conjunction with characteristics of Aboriginal knapping on some artefacts. The evidence supported classification of post-contact AGAs.

Reference	Criteria used for identification of Aboriginal glass artefact
Richardson, 2005	1. Positive or negative flakes.
	2. Scar termination type, it is not specified how this criterion contributes to identification.
	3. Initiation/ platform type.
	4. The number of scars that measure >5mm.
	5. Scar regularity.
	6. Number of scarred edges (most stone tools only have one or two working edges).
	7. Crushing of high points related to simultaneous application of pressure to multiple points.
	8. 'Scar position' or platform angles over 80 degrees.
	9. Edge damage
	10. Context in terms of date and associated aboriginal artefacts.

Table 11: Criteria used by Richardson.

This was an assessment of a glass assemblage at the historical site on the Corner of Charles and George St, Parramatta. The criteria used are demonstrated in Table 11. There is a very technological approach taken to the identification of these artefacts. Richardson used a combination of physical attributes to analyse the glass. A probability measure is used to assess whether glass is intentionally flaked or not. The measure is expressed as 'low', 'medium' or 'high'. Almost all the glass produced a low probability of being artefactual.

Reference	Criteria used for identification of Aboriginal glass artefact
Mary Dallas Consulting Archaeologists, 2010	1. Conchoidal scars across all surfaces, which are not consistent with the process of knapping glass, but from repeated strikes in a random fashion.
	2. The heavy abrasion on much of the surface of the fragments indicates that it had been moved around.
	3. The glass is not likely to have been the result of deliberate placement, as large amounts of ceramics and more recent rubbish were identified.

Table 12: Criteria used by Mary Dallas Consulting Archaeologists.

This was an assessment of Cobham OC1, Werrington (AHIMS # 45-5-3953). This assessment resulted in a negative identification on the listed grounds (Table 12). It was concluded that the negative flake scars and damage on this fragment were caused by a lawnmower, repeatedly striking the glass and moving it across the ground.

These examples demonstrate the diversity of approaches to identifying AGAs that are being used within the sphere of cultural heritage management in Sydney. The criteria chosen for assessment within these studies range from simplistic guidelines to in-depth technological characteristics. It is also worth noting that the criteria chosen are not consistent with those outlined in chapter two. This demonstrates a need for the better management of the identification.

SUMMARY

This chapter has outlined Sydney's post-contact history, historical evidence, archaeological context and previous studies of AGAs. This outline has provided an insight into the study area and the foundations on which this thesis is built. This chapter has emphasised the need to better understand the AGAs of this region. This is evident in the neglect of Indigenous agency in the post-contact histories and archaeological record, the scarcity of research done on AGAs in Sydney and the inconsistency in the criteria used for identification within cultural heritage assessments.

CHAPTER FOUR: METHODOLOGY

The initial step in the methodology was the construction of *integrated criteria* that would provide the foundation for the study. This was followed by data collection and analysis, which consisted of three phases. These phases were undertaken separately as each process provided distinctly different data types that would be used in three separate analyses. The first phase was the collection and analysis of previously recorded data, the second was the assessment of artefacts from a museum collection, and the third was the field survey of four previously registered sites within Sydney.

INTEGRATED CRITERIA

Previously formulated criteria for identifying AGAs have been integrated for the purposes of this study (see discussion in chapter two). The criteria included in this synthesis were limited to those that can be used without the aid of microscopic analysis, thus constructing clear guidelines for identification that can be used 'in the field'. Although international glass assemblages have been recognised as having similarities (Bowdler and Cooper, 1998) the criteria that have been integrated are primarily based on studies of Australian post-contact sites. The aim of collating this information is to evaluate past criteria by applying them to pre-recorded data, and new data collected during the assessment of artefacts within a museum collection and field survey. This schema was used throughout this study to interrogate the pre-recorded data, construct a recording sheet (see Appendix B) for use during phases two and three of the data collection and also to formulate a spreadsheet for the analysis of subsequent data.

Fulfilment of Criteria

Recognition of positive or negative identification of an AGA is built on the presence or absence of certain attributes. These attributes are derived from previous research that has assessed them as being either characteristic or uncharacteristic of an AGA. The attributes have been sorted into individual criterion that cumulatively create a *integrated criteria* that will aid in: establishing categories for recognising patterns in the data, measuring the degree of efficiency with which AGAs are being recorded and evaluating the validity of individual criterion in the identification of various AGA 'types'.

These criteria were broken down into two groups, 'primary' and 'secondary'. For the purposes of this study, the fulfilment of all primary criteria is a definitive indication of whether the glass has been utilized by Aboriginal people. Therefore the presence of primary criteria alone will confirm the artefactual nature of the glass. The primary criteria may be applicable to most assemblages of glass, as they relate to the morphological and technological attributes of the artefact alone. These criteria are the primary checkpoints for identification. If the primary criteria are not fulfilled the secondary criteria will provide supplementary validation. The secondary criteria neither confirm nor deny the validity of the artefact but contribute to the general probability of the artefact being of Aboriginal manufacture. They are chiefly concerned with contextual indicators but also include morphological attributes that have been previously identified by several researchers as commonly occurring e.g. the use of thick portions of the bottle for knapping (Tindale, 1941:1; Dickson, 1971:61; Allen and Jones, 1980; Freeman, 1993). Even though these criteria are not conclusive, they are important overall aspects of context of all sites and should be considered and detailed even

where a positive identification has been made using the primary criteria.

A measure of the reliability of an assessment derived from criteria for identification, created for archaeological materials, needs to be implemented (Clarkson and Hiscock, 2000: 99). For the purposes of this study, a measure has been used to ascertain the positive or negative identification of an artefact. Any artefact that meets either 100% of the primary criteria or both groupings of the criteria at 50% correlation will fulfil positive identification for the purposes of an analysis. It should be specified which of the ten individual criteria the artefact meet and which they do not, as to provide an articulation of the probability of authenticity. A similar approach is used to measure the validity of individual criteria in the identification of the various artefacts within this study (see Tables 16 and 17 for an example). The following is a comprehensive revision of previously formulated criteria for identifying AGAs used in this study.

Glass datable to the late 18th - mid 19th century	-Manufacture -Makers mark -Colour
Presence of macroscopic usewear and/or residue	-Located to one or two working edges
Presence of 'convincing' retouch	-Continuous retouch -Scar size regularity -Scar location predominantly on edges -Regularity of orientation/initiation of negative flake scars -Relative age of scars -Backing
Presence of stone artefact attributes	-Bulb of percussion -Erailure scar -Acute external platform angles -Stress fractures and ripple marks -Reflection of stone tool type
Absence of attributes related to unintentional damage	-Intermittent retouch -Irregular sized flake scars -Flaking on more than one or two margins -Steep flaking (forming edges close to 90 degrees) -Large isolated flake scars --High point crushing
Absence of taphonomic processes related to incidental flaking	-Animal trampling -Vehicular traffic -Agricultural activity -Construction work -19th century European rubbish dumping
Evidence of reduction sequence	-Cores and flakes -Worked and unworked fragments from the same bottle -Refitting
Presence of associated contemporary material culture	-Stone tools -Fish hook technology -Other modified European material -Scarred tree/s -18th-19th century datable Aboriginal burial/s -18th-19th century datable midden -Contact period rock art
Availability of associated historical evidence	-Specifically documents or oral histories documenting cross-cultural interaction or occupation in the immediate area -Information on possible sources/ quarries
Presence of thick glass	-Thicker parts of the glass are more likely to be used e.g. Bottle bases, shoulder -Lack of wall/ body attached to a base -Curved parts of a bottle

Table 13: Summary of the integrated criteria.

1. PRIMARY CRITERIA

1. 1 Glass datable to the late 18th - late 19th century

This criterion allows one to develop the earliest time for which the AGA could have been in use. The period in which Aboriginal people were using AGAs in Sydney is likely to have occurred between the late 18th century and the later 19th century. Before this time it would have been highly unlikely that glass was available and afterwards, it would have been unlikely that such traditional technologies would have persisted. As bottles are the predominant source for AGA manufacture much of this criterion is concerned with the identification of such materials. It is hoped that if glass was not derived from a bottle then this criterion is still applicable. A guide for determining glass bottle age is provided in Appendix C of this thesis. This guide details how attributes related to manufacture, colour and makers marks can aid in determining the age of glass.

1.1.1 Manufacture

Techniques of manufacture can provide an age for glass bottles and other glass objects. These are physical evidence on glass of techniques of manufacture used during the 18th and 19th century on different types of European glass objects. Specific to glass bottles, mould seams, pontil scars, turning marks and shape etc. can be used to date the glass to a certain time period (Burke and Smith, 2004: Appendix 3: 359). This is a good indicator of age but rarely occurs on AGAs, as this portion of the bottle is usually fragmentary.

1.1.2 Maker’s mark

A maker’s mark can be present on many glass objects but on bottles it usually occurs on the base, which is the most accurate way to date the glass. Trademarks can be dated according to their changing motif e.g. The Australian Glass Manufacturing Company (Burke and Smith, 2004: Appendix 3: 359). As above, this attribute is a good indicator of age but rarely occurs on AGAs.

1.1.3 Colour

Most colours of glass are not a precise indication of the age but can be used to support a relative date. The relationship between glass colour and technology of manufacture is debatable (see Jones and Sullivan, 1989:31). There are some colours of glass that can provide a more defined date such as: solarised glass with a purple tinge can be dated from c1890-1916, solarised glass with a brown tinge can be dated to post 1916 and black glass can be dated from 1830-1870 (Burke and Smith, 2004: Appendix 3: 359). Glass colour can be used to date any AGA, as it is the only attribute related to age that is consistently present.

1.2 Presence of macroscopic edge damage and/or residue

Macroscopic edge damage, as well as microscopic usewear and residue can be expected to occur on glass as it would on stone or naturally occurring glass artefacts e.g. obsidian. This attribute is significant in identification, as the most reliable indicator of use is edge damage and/ or residue deposits. The

ability to macroscopically identify edge damage and usewear on glass was used by Tindale (1941) and Runnels (1976). The ability to identify these attributes without microscopic equipment has been doubted (Wolski and Loy, 1999). It may be difficult to distinguish usewear from damage caused by post-depositional affects (Fullagar, 2006: 226). A macroscopic appraisal of potential edge damage may provide sufficient resolution but this attribute may not be able to be detected unless microscopic analysis is implemented. The validity of this criterion will be evaluated within this thesis.

1.2.1 Located on one or two working edges

Damage will occur on the working edge of the artefact as it can be expected to have sustained damage during use. Usewear will be restricted to one or two edges (Richardson, 2005). Expertise on edge damage is needed to recognise this attribute. Characteristics such as edge rounding, scarring, polishing, edge fracturing, bevelling, striations and residue deposits may indicate use (Fullagar, 2006). Residue can be expected to occur on the surface near the working edge, or on the surface opposite the working edge underneath the 'grip' of the artefact.

1.3 Presence of 'convincing' retouch

'Convincing' retouch requires that the flake scaring resembles patterns of intentional retouch and not random, irregular damage (Patterson, 1999; Harrison, 2000; Williamson, 2004). This criterion will not apply to all AGAs, as both flakes and fragments were used expediently, without secondary

modification. Therefor this criterion will only be applicable if the AGA has retouched edges.

1.3.1 Continuous retouch

Studies indicate that humans detach successive flakes during intentional flaking (Holdaway and Stern, 2004: 32). Flake scars are most commonly continuous or even overlapping when deliberate modification has occurred.

1.3.2 Scar size regularity

During a flaking event it can be expected that regular sized flakes will be detached (Holdaway and Stern, 2004:32). If retouch occurs, negative scars should be of a relatively consistent size.

1.3.3 Scar location predominantly on edges

Retouch will chiefly occur on the edge of an artefact, as this is where resharpening or edge modification is required. If backing occurs, flaking may be located predominantly away from the working edge.

1.3.4 Regularity of orientation/direction of force

Humans are expected to remove flakes in a regular direction when re-sharpening an edge. This criterion has been recognised by Runnels (1976), Paterson (1999), Harrison (2000) and Veth and O'Connor (2005).

1.3.5 Relative age of scars

A knapping event is expected to occur over a short time span. Flakes are most commonly detached during one knapping

event. If the surfaces of negative scars appear to have diverse patina, this decreases the probability of deliberate modification as it indicates numerous events in which damage occurred (Holdaway and Stern, 2004: 30). This is particularly relevant, as we know glass was probably used in Sydney only for a relatively short time.

1.4 Presence of technological attributes related to stone artefact manufacture.

This criterion may be used to determine whether a piece of glass has undergone knapping. Even though many of the attributes associated with this criterion can be created through post-depositional damage, their presence increases the likelihood of human agency. If the glass has been knapped, producing a flake, the following technological attributes related to knapped stone will occur on the glass. This will not apply if the glass has been created through the *worked fragment reduction strategy*. Therefore this criterion is redundant if the AGA has not been produced by the *base core reduction strategy.*

1.4.1 Bulb of percussion

The force applied during conchoidal fracture causes a bulge to appear on the ventral surface of a flake. Allen and Jones (1980) place emphasis on the presence of a bulb of percussion as an indicator of Aboriginal modification.

1.4.2 Erailure scar

An erailure scar or bulbar scar is associated with conchoidal fracture. This is a small scar that can be found on the bulb of percussion.

1.4.3 Acute exterior platform angles

This attribute is highly reliable as flakes that are produced by natural processes rarely have well-developed platforms (Holdaway and Stern, 2004: 30). An exterior platform angle of less than 90 degrees is more likely to have been produced by intentional knapping.

1.4.4.Stress fractures and ripple marks

Stress fractures and ripple marks are also associated with conchoidal fracture. Stress fractures (also called hachure marks and fissures) are small cracks that branch out from the point of impact. Ripple marks are undulations that radiate from the bulb of percussion in progressively larger arcs. These attributes should be observable macroscopically but microscopic analysis may be needed.

1.4.5 Reflection of stone tool type

AGAs may resemble formalised stone tool types. This may apply to AGAs produced by both the *base core reduction* and *worked fragment reduction* strategies. Examples of this are the Sydney Bondi points at Kurnell (Dickson, 1971) and scrapers from Singleton (McCarthy and Davidson, 1943). Creation of such tool types on glass is a fairly reliable indication of authenticity.

2. SECONDARY CRITERIA

2.1 Absence of attributes related to unintentional damage

Post-depositional damage can also be characterised. Williamson (2004) chose to shift the emphasis from technological characteristics of AGAs and instead suggests that unintentionally fractured glass can be characterized effectively. Obviously there is the potential for some of these features to also be present on intentionally retouched pieces, producing a gradation from clearly unintentional damage to unmistakable intentional modification.

2.1.1 Damage of high points on artefact

This is damage located on prominent points of an artefact created by simultaneous application of force to multiple points caused by trampling, vehicular damage etc. This damage may be present as crushing or fracturing (Richardson, 2005).

2.1.2 Intermittent retouch

Intentional retouch is expected to produce continuous flakes that overlap to produce a sharp edge. If scarring is intermittent this affect will not be achieved. If gaps occur between scars it is less likely that the fracturing was intentional.

2.1.3 Irregular sized flake scars

If flake scars are of distinctly irregular size it is less likely that they were caused by intentional modification.

2.1.4 Flaking on more than one or two margins

Flaked artefacts usually have retouch restricted to one or two margins that create working edges (Richardson, 2005). If the flaking occurs on more than two margins it is less likely that the glass is a product of intentional flaking.

2.1.5 Steep flaking

Glass that has scarring along the edge that form edges close to 90 degrees are not likely to be of Aboriginal manufacture (Williamson, 2004). Such an edge angle would blunt the glass, which is not consistent with the aim of resharpening.

2.1.6 Large isolated flake scars

Large isolated flake scars are likely to be caused by natural processes. Such scars demonstrate no human forethought to the modification of the blank glass piece.

2.2 Absence of taphonomic processes related to incidental flaking

Taphonomic processes, related to incidental damage, produce attributes on glass that simulates artefactual characteristics. If these processes are part of the context of a site containing AGAs the probability of authenticity is lowered. This criterion has been considered by Allen and Jones (1980) as some of the artefacts in their study were found in a context associated with vehicular traffic. Taphonomic processes are likely to be important in Sydney given intensity of urban development.

2.2.1 Post-depositional context

Taphonomic processes that cause unintentional damage may include: animal trampling, vehicular traffic, agricultural activity, construction work and rubbish dumping.

2. 3 Presence of evidence of reduction sequence

This criterion may aid in identification of an AGA, if it occurs as part of a knapping floor. If a reduction sequence can be identified the probability of the artefacts authenticity is increased. This criterion will not be applicable for individual finds. As Attenbrow (2010) has noted, an assemblage containing a convincing reduction sequence has yet to be bought to light in Sydney, thus this criterion may be of limited use.

2.3.1 Cores and flakes

If a knapping event has occurred, which has resulted in a knapping floor, it can be expected that flakes and the cores from which they have been struck will occur within an assemblage. This criterion is dependant on the post-depositional taphonomy of the artefacts. It is not applicable for many AGA assemblages as they may not occur in a knapping floor but were carried away or produced by the *worked fragment reduction strategy,* which does not produce cores or flakes.

2.3.2 Worked and un-worked fragments from the same bottle

If AGAs are produced via the *worked fragment reduction strategy*, it can be expected that both worked and un-worked

pieces of glass will be contained within an assemblage (Harrison, 2000).

2.3.4 Refitting

Refitting is a good indication of whether a reduction sequence has occurred. If glass pieces can be refitted to establish a reduction sequence this may indicate a knapping event.

2. 4 Presence of associated contemporary material culture

The presence of archaeological evidence from the same time period, that is in direct association with AGAs provides contextual substantiation for its identification.

2.4.1 Stone technology

Stone technology that belongs to the late Bondaian tradition (c1600- 1788AD) will support the date for the glass assemblage. An issue that arises when assessing this feature has been recognised by Bolton (1999:18). She reveals that if AGAs and stone tools do not occur in stratigraphical deposit but in a surface scatter, the stone tools may be completely non-contemporaneous with the AGAs. The stone tools may be thousands of years old even though they are of the same toolkit used during the contact period. Therefore, the time difference between deposition of the stone and glass assemblages can be anywhere between a few minutes and a few thousand years.

2.4.2 Other Aboriginal material culture

Contemporaneous Aboriginal material culture may support the positive identification of AGAs. Such evidence may include: scarred trees, fishhook and stone file technology (developed in

coastal New South Wales 1000-900 years ago), datable Aboriginal burial/s, contact period rock art or a datable midden.

2.4.3 Other modified European material

The presence of other modified European material within the same assemblage will also support positive identification. This may include worked ceramic or metal modified from its original function etc. It must be noted here that if European materials are present as rubbish it will not support identification. Bolton (1999: 18) discusses another deficiency in using this feature as evidence for contextual substantiation. She explains that contact period sites are rife with temporal and functional issues that make it difficult to determine whether Aboriginal people exclusively used a site. It is possible that European objects, modified or not, made their way into the assemblage by European agency.

2.4 Availability of associated historical or ethnographic evidence

This criterion may provide substantiation for the identification of AGAs. Records of the post-contact occupation of the site, the interaction of Aboriginal people with Europeans in the vicinity of the site, possible sources of glass and even the first hand observation or remembrance of the use of glass will contribute contextual support for the identification of AGAs. This criterion is often overlooked in the identification process yet can provide valuable insight on the Aboriginal use of the area in the post-contact period. There is a gap that exists between the disciplines of history and archaeology that needs to be closed in order to develop a full understanding of the context in which these

artefacts were produced. In Sydney, the historical evidence of post-contact Aboriginal occupancy is rife in comparison to some more remote regions; hence this criterion is particularly pertinent to this study.

2.4.1 Documents and oral histories

Documentation of cross-cultural interaction and oral history associated with a site provides substantiation for the presence of AGAs. Information on how the glass was used and under what circumstances may also be ascertained.

2.4.2 Information on possible glass sources/ quarries

This may provide evidence on how glass was procured. If a glass source is documented it may provide substantiation for a glass knapping site. Glass sources may include settlements, stations, missions, bottle and rubbish dumps etc. This may not be very useful in the identification of AGAs from Sydney as sources were numerous.

2.5 Presence of thick glass

There is a general trend in the literature that indicates a preference for thicker parts of glass bottles for knapping.

2.5.1 Thicker parts of the glass are more likely to be used

A preference for 'thick' glass has been noted by numerous studies e.g. Bottle bases or shoulder (Tindale, 1941:1; Dickson, 1971:61; Allen and Jones, 1980; Bradshaw, 1991:38; Freeman, 1993). This is assessed by standard width dimension.

2.5.2 Lack of wall/ body attached to base

Allen and Jones' (1980) criterion has been interpreted to indicated that if less wall is attached to the base of the bottle this increases the probability of deliberate modification. This is assumed as the wall of the bottle would have been removed in the process of knapping the base.

2.5.3 Curved parts of the bottle

Various studies have also found that there is a preference for the curved portions of the bottle e.g. base and shoulder (Freeman, 1995; Cooper and Bowdler, 1998).

PHASE ONE: PRE-RECORDED DATA

Most of the information on AGAs is within archived cultural heritage assessment reports. To obtain this information a search was conducted to ascertain the location of sites containing AGAs in Sydney by using the NSW Office of Environment & Heritage[1] (OEH) Aboriginal Heritage Information Management System (AHIMS) and other sources. This information was compiled and analysed in a spreadsheet. This data was also used to map all sites containing AGAs.

AHIMS Search

The AHIMS database was searched for information on sites containing AGAs. This stage of the data collection and analysis was undertaken with the aim of: locating the sites in which AGAs have been found in Sydney and retrieve information on these sites and the AGAs within them. Information retrieved from this process was

[1] Formerly National Parks & Wildlife Service

used to determine general patterns in the Sydney data and also to assess how the identification issue has been approach.

As there is no way to keyword search for post-contact sites within AHIMS, records of all 3 871 "open campsites" within the study area were systematically reviewed in order to identify the sites which contained AGAs. The detail within these site cards varied considerably, resulting in a high degree of variation in the quality and quantity of the data derived from them. During this search, sites that contained unmodified glass associated with Aboriginal material culture were also noted (see table 15). Associated reports were also reviewed from within AHIMS and the State Library of NSW.

A query was also posted on the Ozarch forum (21/01/2011) seeking information from archaeologists on sites within Sydney that contain AGAs and this resulted in data that would not otherwise have been accessible. A number of sites were also located within a database of historical Aboriginal places compiled by Paul Irish for his current doctoral research (see Irish, 2011).

Mapping

The co-ordinates of each site were retrieved in order to use this data for a spatial analysis of the distribution of AGAs in Sydney. After the conversion of all geographic information, EarthPoint™ was used to construct a map using Google Earth™ free software.

Analysis

Information on sites containing AGAs found during the previous process was entered into a spreadsheet. The objectives of the analysis were: to deduce general trends in the characteristics of the

artefacts and to observe and assess methodological trends in the recording of AGAs.

The categories of data included in this analysis (when specified by the original recorder) included: site location, site type, glass type, portion of glass (bottle), glass colour, age of glass, dimensions of AGAs, minimum number of flakes/ fragments (MNF), presence of AGA morphology including retouch and edge damage, associated assemblage contents, environmental and historical context, level of disturbance, when recorded and by whom and any associated photographic material (see Appendix A).

This phase of the analysis was limited by various irregularities in the data, due to reliance on the expertise of others, who may not possess a developed knowledge of AGAs. An example of this is that the majority of archaeologists recording these sites have some expertise in pre-historic archaeology but little knowledge of historic artefacts such as glass bottles. This becomes particularly problematic when archaeologists attempt to date AGAs. A common way around this issue is the classification of these artefacts as 'possible' AGAs, instead of articulating the probability of the artefacts authenticity.

Another issue that arises when using information derived from cultural heritage assessments is that there is no standardised method of recording. The data retrieved from this process is extremely irregular from site to site. The result of such miscellaneous recording is a patchwork of information that says more about the inadequacy of information presented in reports and site cards than about the AGAs themselves. Many assessments only provide general information on the site, and artefacts are merely confirmed as being

present in an assemblage and are not detailed further. Due to such imprecise recording, many sites containing AGAs will provide little information in this analysis. Such variability in the description of AGAs has reinforced the need for a recording standard.

PHASE TWO: MUSEUM COLLECTION

The next phase in the analysis was to apply the aforementioned *integrated criteria* to the AGAs within the museum collection of Father Eugene Stockton. Stockton was a catholic priest that also undertook archaeological work in Sydney. His collection of ethnographic and archaeological specimens is maintained by the Macleay Museum and is held within Fisher Library Ethnographic storage. This collection is made up of various Aboriginal artefacts from around Australia. These are stored in draws that indicate the general location from which the artefacts were collected, two draws of which contain AGAs exclusively. These are named 'No.63 WA, NT Glass Implements' and 'No. 64 NSW Glass Implements' [2]. Within draw No. 64, there are four fragments of glass that are identified as being from the Sydney region. Both the context and date of this glass is unknown beyond that they were collected from Manly sometime in the last 50 years. Only one of these four glass fragments is identified as artefactual, labelled 'S.P.C. Manly'. The other three are labelled 'Manly FB' and were identified by Stockton as non-artefactual. All four of the glass fragments were recorded but only two were chosen for a detailed analysis. These included the piece of glass identified by Stockton as intentionally

[2] All artefacts from draw no. 64 were photographed (33 artefacts). Draw no. 63 was noted as containing a greater number of artefacts with substantially more retouch, a greater variety of glass colour and also bifacially flaked Kimberley Points were present.

retouched, which is transparent green in colour and has macroscopic edge damage and residue. The other piece of glass chosen for detailed assessment was one of the darker green pieces that were identified by Stockton as a product of trampling of 'modern glass'. These artefacts were chosen to test the validity of each criterion due to their accessibility.

PHASE THREE: FIELD SURVEY

The final phase of the data collection involved relocating and surveying four registered sites selected during the collection of the pre-recorded data. These were all open artefact scatters situated in the centre of my study area (see Figure 6). These are Cobham OC1 (AHIMS#45-5-3953), REL3 Prospect (AHIMS# 45-5-2893), Prospect Reservoir 3/ PR3 (AHIMS# 45-5-0767) and Prospect Reservoir TTP1 (AHIMS# 45-5-0866). The aim of the field survey was to evaluate the initial recordings of AGAs at each site by applying the criteria. This phase was also used to assess the validity of each criterion in a field setting.

Figure 6: Location of sites visited during field survey.

During a third inspection of the sites in August 2011, four assemblages of glass were located and recorded. Sites were located using information within site cards and reports and the use of GPS. A buffer of 50m was searched in the process of locating the sites. Assistance in relocation was provided by Paul Irish. Prior to the third inspection a recording form (see Appendix B) was constructed to ensure all attributes related to identification of AGAs were considered.

SUMMARY

In this chapter the *integrated criteria* for identification was discussed as a basis for analysis. The aims and limitations of the methodology have been outlined and the processes by which the methodology was undertaken were detailed. The methodology involved three phases of data collection. These were:

Phase One: Collection of pre-recorded data on AGAs that was entered into a spreadsheet and also mapped against the geographic landscape of Sydney.

Phase Two: The assessment of the *integrated criteria* by application to the AGAs from Manly within the Stockton Collection.

Phase Three: The field survey of Cobham OC1, Prospect REL3, Prospect Reservoir 3/ PR3 and Prospect Reservoir TTP1.

As detailed in this chapter, the data collected during these phases will be used to evaluate the validity of the *integrated criteria* to produce answers to the research questions outlined in chapter one.

CHAPTER FIVE: RESULTS

An analysis of the three data sets described in the previous chapter has informed the following results. Firstly, patterns in the spatial distribution of sites containing AGAs are presented. Secondly, patterns observed in the pre-recorded data, both technological and methodological, will also be outlined. Thirdly, an assessment of the validity of the *integrated criteria* when applied to the AGAs from the Stockton Collection will be provided and finally, the results of the field survey, according to the *integrated criteria*, will also be detailed. This chapter aims to present the results of the analysis of this thesis in preparation for a discussion of what these patterns might indicate.

PHASE ONE: PRE-RECORDED DATA

Mapping

During the collection of the pre-recorded data, records of 68 sites containing glass significant to the study of AGAs were located. All 68 sites are detailed in Appendix A and are mapped in Figure 7. AGAs make up 58 of these sites (signified by red points), while seven sites contain glass that was not recorded as being humanly modified but has been interpreted as directly associated with an Aboriginal assemblage. These have been included, as they could have been used in some way by Aboriginal people despite having no macroscopic evidence of use. Another three sites contain AGAs that failed to stand up to a technological assessment and were thus classified as pseudo-artefactual (signified by purple points) were also included.

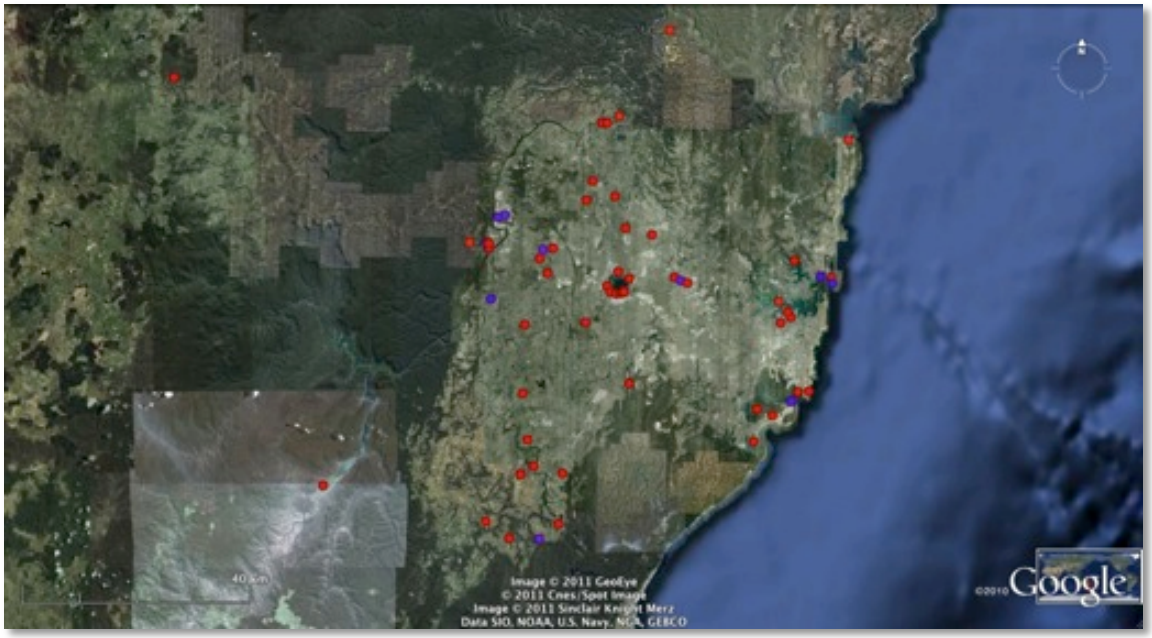


Figure 7: The location of all known sites containing AGAs in Sydney.

Spatial patterning can be discerned from the clustering of sites plotted in Figure 7. One pattern that is quite clear is that sites seem to follow waterways, which may be a reflection of general occupation habits or may just reflect the patterning of archaeological assessment within cultural heritage management. This will be discussed further in chapter seven.

A pattern that is quite significant is that the majority of sites occur on the Cumberland Plain as illustrated in Figure 8. 75% of sites found during this study were located in this area. Within this area there is a large clustering of sites around Prospect Reservoir (9 sites) and Emu

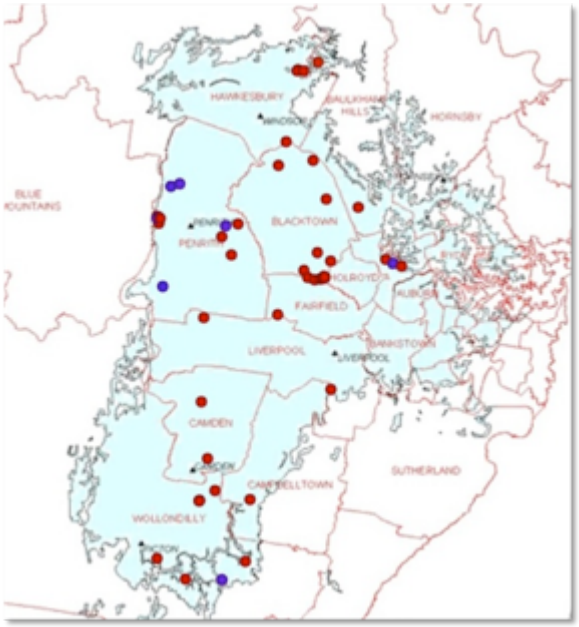


Figure 8: Majority of sites located on the Cumberland Plain.

Plains (6 sites) (Figure 9). This clustering may be related to methodological processes that will be discussed in chapter six.

Clustering of sites occurs outside of the Cumberland Plain also. In the coastal zone two areas of site concentration occur. These are Botany Bay (6 sites) and Port Jackson (8 sites), the two areas considered to be of key historical significance for culture contact in Sydney (Figure 10). This may be a meaningful pattern that demonstrates either settlement history or methodological concentration on these areas.

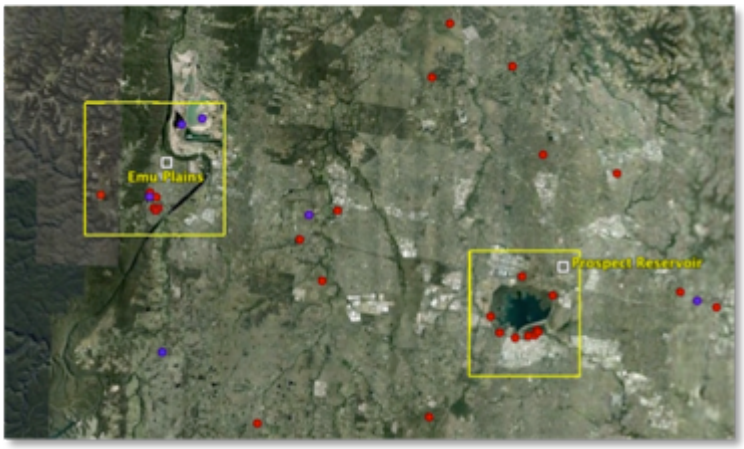


Figure 9: Clustering of sites around Emu Plains and Prospect Reservoir.

Figure 10: Clustering of sites around Port Jackson and Botany Bay.

Patterns in the Data

A general pattern in raw material preference emerged from the analysis of the pre-recorded data. Although over a third (38%: n=22 sites) of recordings did not specify the original form of the glass, when detailed (44%: n=26 sites), all raw materials were identified as 19th century bottle glass. When more specific information was

recorded the following bottle types were specified: champagne bottle, demi-john bottle, rum/wine bottle, perfume bottle and glass slag (a product of bottle manufacture). Only 10% of recordings specified technological features related to glass bottle manufacture. These included; mould seams, baffle plate seams, hand blown bottles and sand moulded bottles.

Patterning in the portion of the bottle from which the artefact was produced was also noted. Figure 11 demonstrates the patterns in bottle portion used per site. The base accounted for 30% (n=58) of sites. The body of the bottle accounted for 12% (n=58) of sites. Again a substantial number of site recordings did not specify this information.

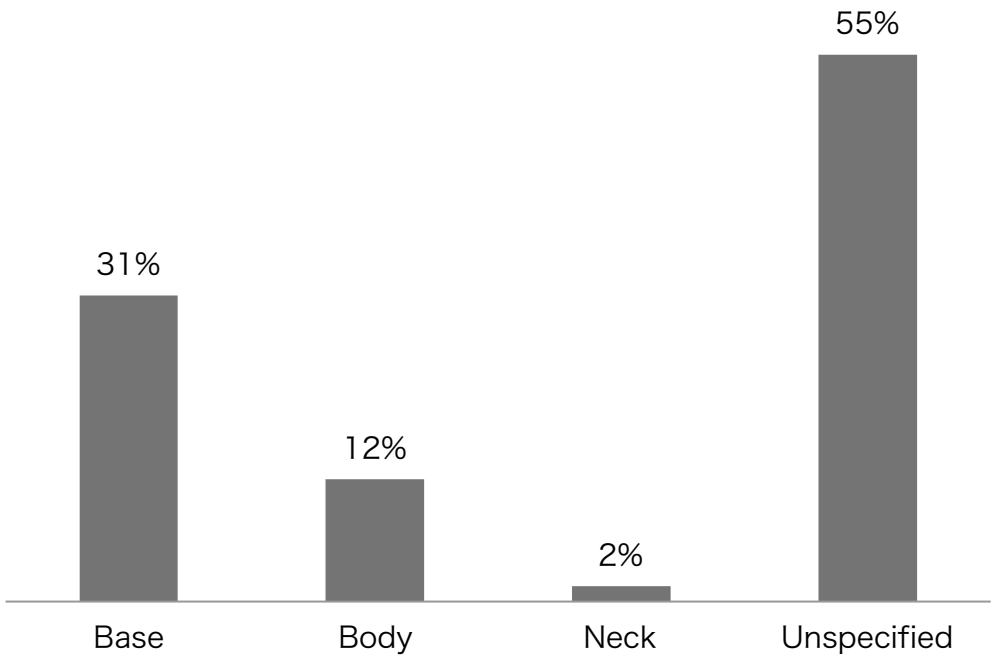


Figure 11: Portion of the bottle used for artefacts (n= 58 sites).

Patterns in glass colour were also noted. Glass colour within the pre-recorded data included: black, solarised[3] purple, green, colourless, olive, blue, brown, solarised bronze and light green. Black glass was by far the most common colour used in the production of AGAs in this analysis, per site (40% sites, see Figure 12) and per artefact (96%: n= 1 445 artefacts). Whether this pattern represents raw material preference, availability of 19th century black glass or a methodological trend will be discussed in the next chapter.

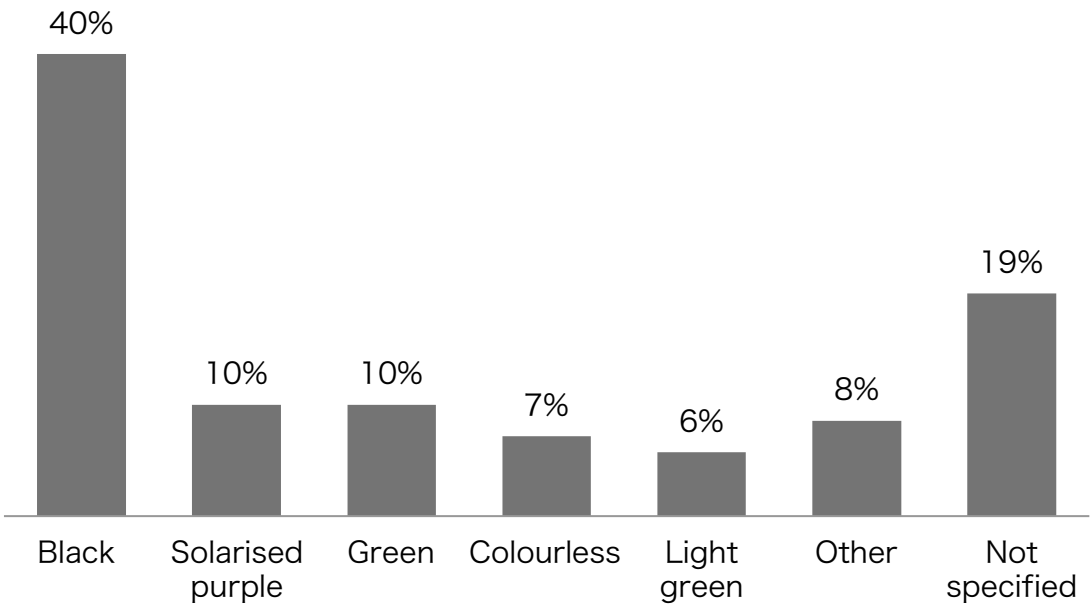


Figure 12: Percentage of sites containing AGAs made on each glass colour (n= 58 sites).

The minimum number of fakes/fragments (MNF) was recorded. Most sites contained individual finds (47% n=27 sites). 21% (n= 12) of sites contained 5-20 AGAs and 10% (n=6) of sites contained over 50 AGAs. Whether these large assemblages represented a knapping floor was not specified. For 5% (n=3) of sites, it is not specified how

[3] Solarised is used to describe glass that develops a colour tint due to prolonged exposure to the sun.

many AGAs were within the assemblage. Further breakdown of MNF per site is illustrated in Figure 13.

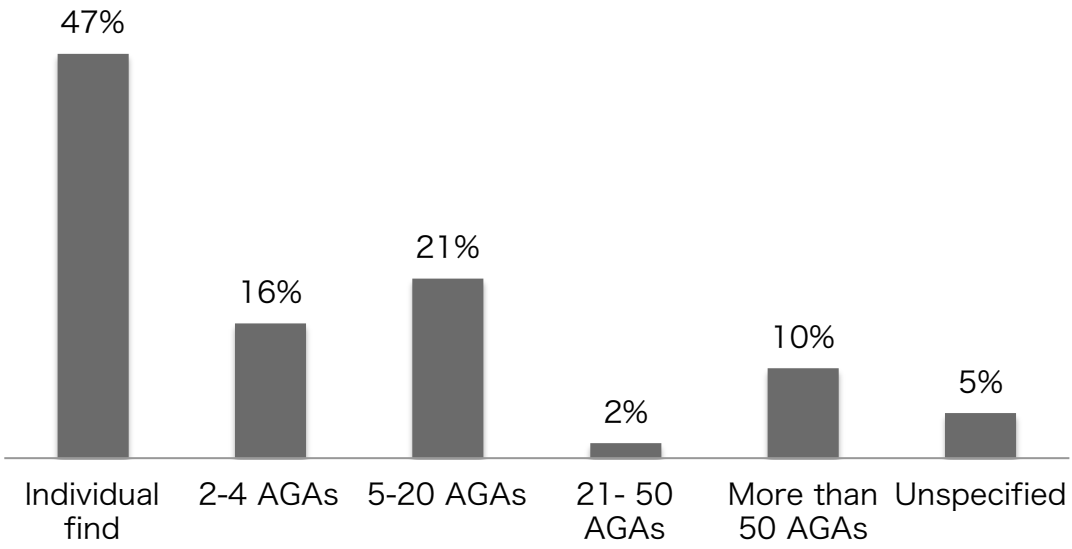


Figure 13: MNF of AGAs per site (n=58).

Artefact morphology	Number of artefacts
Flake	558
Core	31
Fragment	27
Unspecified	889

Table 14: Artefact morphologies (total n= 1 505).

Artefact morphology was also analysed. Whether the artefacts were described as flakes, cores or fragments was used to determine morphology. Table 14 is a breakdown of how many AGAs adhered to these artefact morphologies. 95% (n=616 artefacts) of artefacts that specified morphological forms were identified as either a core or flake indicating that the technology most recorded is the *base core reduction strategy*. Fragments accounted for only

4% (n= 27 artefacts) of AGAs that had a specified form in the pre-recorded data. Of the majority of the total artefacts recorded, the morphology was unspecified.

Only 18 AGAs or 1% of the artefacts within the pre-recorded data were recorded as formalised tool types. These tool types included 12 scrapers, three backed artefacts and two blades.

Patterns were also noted in the types of modification recorded (Figure 14). 80% (n=46 sites) of artefacts were recorded as having evidence of retouch and usewear and 13% (n=8 sites) of artefacts were recorded as having evidence of retouch only and usewear is not noted. It is presumed that identification of these attributes was achieved by macroscopic observation. No expediently used artefacts were recorded, as no site descriptions specified only usewear and no other attributes related to modification.

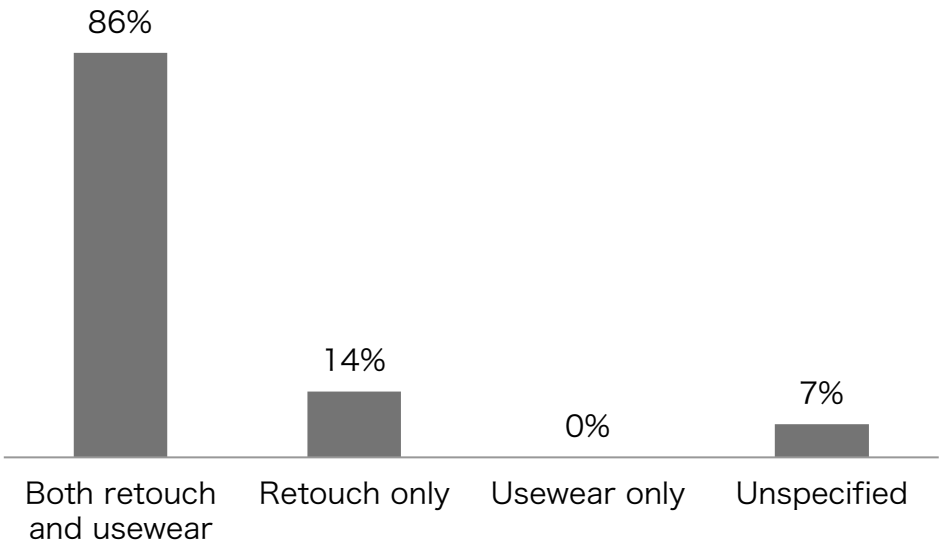


Figure 14: Type of modification recorded (n= 58 sites).

Contextual patterns were also observed. Most artefacts were recorded as part of an open surface scatter (97% n=52 sites), while 9% (n=5 sites) of AGAs were well stratified, usually within a midden. Types of associated material culture included; stone tools, midden material, burials, European materials and other modified European artefacts (Figure 15). Stone tools were the most recorded associated material culture with 61% (n= 35 sites) of sites containing these artefacts. The majority of these stone tools are associated with the late Holocene tool kit. Stone tools were followed by unmodified European materials that comprised 14% (n=8 sites) of associated material within sites.

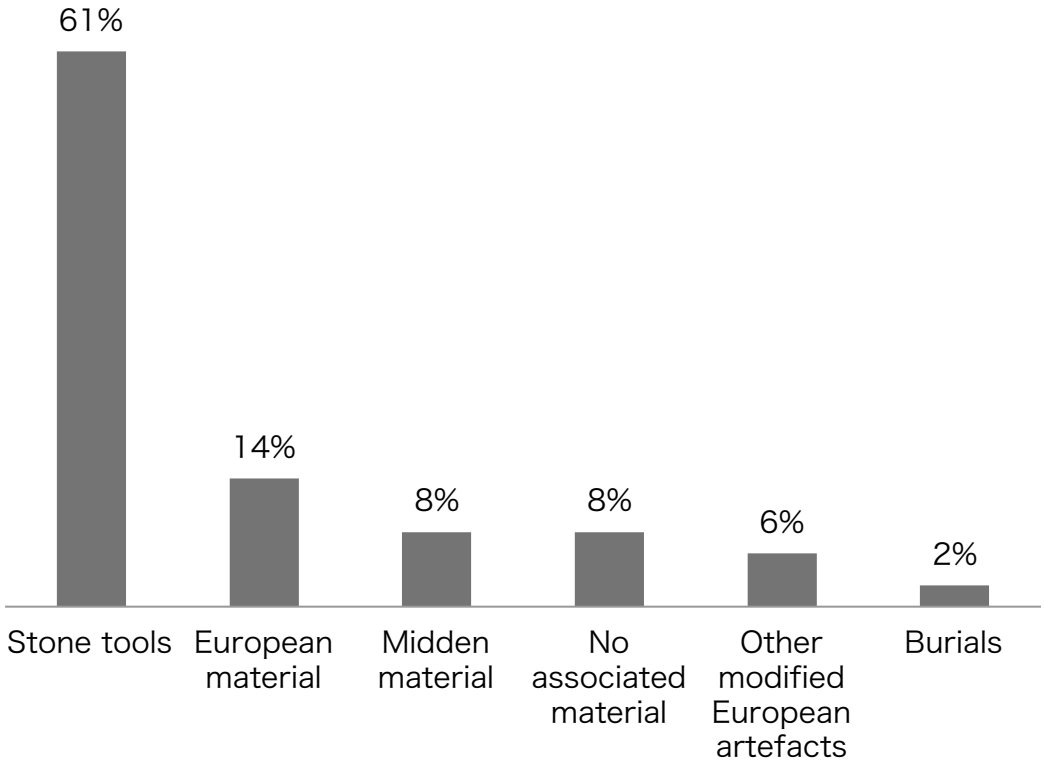


Figure 15: Associated material culture (n= 58 sites).

The analysis found that exactly half of the sites were recorded as being disturbed. Types of disturbance recorded included; machine clearance, agricultural grazing and ploughing, construction, vehicular traffic and quarrying.

Many methodological issues arise in the pre-recorded data. One such issue was the use of the word 'possible' when describing AGAs. The ambiguity of these artefacts is echoed in the rate to which this descriptor is used. 35% (n= 20) of AGAs were described in this way.

During this study sites that contained glass that was not described as modified but was interpreted as directly associated with other Aboriginal material culture were also investigated. Also, sites in which AGAs were initially suspected but have been since reassessed as pseudo-artefactual were also documented. Ten such sites of the 68 sites were found during the data collection. These AGAs were not included in this stage of the analysis. Descriptions of these sites and the artefacts within them are summarised in Table 15.

Site Name	Description
Cobham OC1	Two black glass fragments initially assessed as possible artefacts but re-assessed as non-artefactual (MDCA, 2010).
Captain Cook's Landing Place/ Skeleton Cave	Unspecified amount of 18-19th century glass fragments within a midden along with a burial (Megaw, 1968).
Captain Cook's Landing Place/ Watering Place	Unspecified amount of 18-19th century glass fragments within a midden that also contained a burial (Megaw, 1968).
Corner of Charles and George St	34 glass fragments found during the excavation of a substantial prehistoric assemblage (JMcDCHM, 2005). Submitted for evaluation, resulting in low probability of being artefactual.

Cranebrook Creek CC1	A few 19th century glass fragments amongst a surface scatter of stone tools (Kohen, 1981).
Emu Plains F4-1	Open scatter of various European 19th century objects including glass, ceramic brick and iron sickle blade amongst stone tools (Dallas, 1984). An assessment of these materials was undertaken to determine whether this was a contact site. It was assessed as a historic period domestic assemblage.
Manly, Spring Cove Shelter/ North Head	Unspecified amount of glass deposited within a midden containing four burials (Stockton: site card 45-6-0728/ 45-6-0726/ 45-6-2039/ 45-6-2495).
Mulgoa 2	Unmodified glass fragments in an open scatter of stone tools and ceramic (Dallas, 1981). Assemblage assessed as a contact site.
Penrith Lakes 39	Excavation found six glass fragments amongst an extensive stone assemblage (Kohen, 1992).
Reef Beach 1- Manly	One glass fragment associated with an infant burial within a midden. Midden dated to 800AD. Metal military button and coin bearing impression of woven cloth also found (Attenbrow, 1990).

Table 15: Ten sites containing unmodified glass considered significant to the study.

PHASE TWO: MUSEUM COLLECTION

The examination of the two glass pieces from the Stockton Collection according to the *integrated criteria* supported Stockton's original identification. The light green glass was deemed an AGA, specifically a worked fragment (Figures 16 and 17) and the second piece of darker green glass was assessed as being a product of unintentional damage (Figures 18 and 19). This was ascertained as the light green artefact strongly adhered to two of the primary criteria (*Presence of macroscopic edge damage and/or residue, presence of 'convincing' retouch*) and supported by one of the secondary criteria (*Availability of associated historical evidence).* The second darker green glass did not meet any of the primary criteria

and so was immediately classified as pseudo-artefactual (see Table 16). The secondary criteria were mostly ignored in this evaluation, as the contextual information was not known. A comparison of the two glass pieces from the Stockton Collection and an evaluation of the relevance of each criterion when applied to these objects follow.

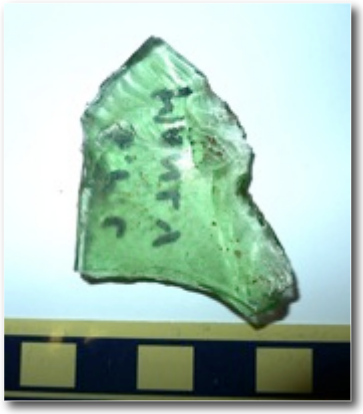


Figure 16: Ventral surface of an AGA within the Stockton Collection.

Figure 17: Working edge of an AGA within the Stockton Collection.

Figure 18: Dorsal surface of pseudo-artefactual glass within the Stockton Collection.

Figure 19: Damaged edge of pseudo-artefactual glass within the Stockton Collection.

		AGA	Pseudo-artefactual Glass Fragment
Description		Light green bottle glass. The fragment is part of the wall of a bottle. The fragments dimensions are 50x 5x 35mm.	Black bottle glass. This fragment also appears to be part of the bottle wall. The fragment measures 35x 5x 19mm.
Primary Criteria	**Glass datable to late 18th-late 19th century**	This criterion is applicable to this artefact as it is derived from bottle glass but whether glass can be dated to the necessary date range is indeterminate. This is because the colour of the fragment is not diagnostic and the glass did not have attributes related to manufacture.	This criterion tells us little about this glass. The fragment is derived from a dark olive/ black bottle that may suggest an age of 1830-1870. This determination id cancelled out as Stockton describes this artefact as 'modern trampled glass'. How Stockton came to this conclusion is unknown. No attributes associated with manufacture that indicate age can be ascertained.
	Presence of macroscopic use-wear and /or residue	This criterion is valuable in the positive identification of this artefact as it has use-wear and plant residue. Use-wear is located on the working edge and the residue is located on both the working edge and the opposite edge (see Figure 15).	This criterion is valuable in the negative identification of this glass as the fragment shows signs of crushing on all edges of the glass but do convincing edge damage is present (Figure 17).
	Presence of convincing retouch	This criterion is valuable in the assessment of this artefact. Positive identification is supported as the fragment has 3 continuous scars of a regular size (+/- 8mm) located on the working edge. The retouch is bifacial but is initiated dominantly from the ventral surface (see Figure 15).	This criterion aids negative identification of this glass, as retouch is unconvincing as it occurs as steep retouch with irregular initiation and size of flake scars. (See Figure 17)
	Presence of technological attributes related to stone artefact manufacture.	This criterion is somewhat redundant when applied to this artefact as it is not the product of a knapping event but produced through the *worked fragment reduction strategy*. Despite this, the negative scars of the retouched edge display striations and ripples, which are related to the percussion technique.	This criterion is applicable to this artefact as attribute related to stone artefact manufacture are completely absent.

Table 16: Application of the primary criteria to the glass from the Stockton Collection

		AGA	Pseudo-artefactual Glass Fragment
Secondary Criteria	**Absence of attributes related to incidental damage**	This criterion was valid in the positive identification of this artefact as no attributes related to incidental fracture were present.	This criterion is most significant glass has much damage to all edges that is irregular in size, orientation and does not seem to have any purpose in the sharpening of the edge but forms extremely steep edge angles.
	Absence of taphonomic processes related to incidental flaking	This criterion is not applicable to this particular artefact as contextual information is unknown.	This criterion is not applicable to this particular glass as contextual information is unknown.
	Presence of evidence of reduction sequence	This criterion is not applicable to this particular artefact as contextual information is unknown.	This criterion is not applicable to this particular glass as contextual information is unknown.
	Presence of associated contemporary material culture	This criterion is not applicable to this particular artefact as contextual information is unknown.	This criterion is not applicable to this particular glass as contextual information is unknown.
	Availability of associated historic evidence	Post-contact occupation of Manly is documented (Folley, 2001: 188). An opportunistic Aboriginal camp is recorded as in use at Spring Cove, Manly. This criterion would have been much more useful if more detailed information was known about the context of the site from which this glass was derived.	Post-contact occupation of Manly is documented (Folley, 2001:188). An opportunistic Aboriginal camp is recorded as in use at Spring Cove, Manly.
	Presence of thicker glass	The fragment is part of the wall of a bottle. Its' dimensions are 50x 5x 35. Therefore is not part of the thicker parts of the bottle. Based on the application of previous criteria within this set, it is highly likely that this fragment is an AGA. Whether the application of this criterion is valid in an all-encompassing list is dubious as it unfairly lowers the probability of the positive identification.	This fragment also appears to be part of the bottle wall. It measures 35x 5x 19mm.Therefor this glass does not comply with this criterion.

Table 17: Application of the secondary criteria to the glass from the Stockton Collection.

This process was most helpful in the evaluation of individual criteria. The criterion that proved most helpful in proving the artefactual nature of the light green glass was *the presence of macroscopic edge damage and/or residue* and *the presence of convincing retouch* and the criterion most valid in the identification of the non-artefactual black glass was the *presence of attributes related to incidental damage*. Despite resulting with identification, the application of the *integrated criteria* to these artefacts has revealed the inadequacy of many of the criterion when assessing the authenticity of an AGA. The major issue revealed is, again, that many individual criteria related to the base/core paradigm are inapplicable to these artefacts as they have been produced through the *worked fragment reduction strategy*. The solution to this may be to divide the *integrated criteria* according to reduction strategy.

PHASE THREE: FIELD SURVEY

The field survey involved the recording of 22 artefacts. The *integrated criteria* were applied to the survey data, evaluating the original identification of the recorded material and also assessing the validity of the criteria.

Cobham OC1

Cobham OC1 (AHIMS# 45-5-3953) is an open artefact scatter over an area of 480m^2 in an area of regrowth eucalypt woodland. The site was originally recorded as consisting of '> 50 stone artefacts' (silcrete, chert, quartz and IMTC) and several pieces of 'old black glass', two of which were identified as potential AGAs. These AGAs were re-evaluated by the same team of recorders as the product of incidental damage within the same assessment (MDCA, 2010:21).

During the site survey for this thesis, five glass fragments were recorded within Cobham OC1. The artefacts lay on an exposed clay flat in cleared woodland in an area were taphonomic processes such as foot trampling, vehicular traffic and landscaping are likely to have affected the artefacts. No historic evidence of cross-cultural contact was currently available for this site (Irish pers. comm. 2/8/11).

Three of the fragments produced a negative identification and two a positive identification (see Table 18 for demonstration of identification). The artefacts that produced a positive identification were classified as a worked flake and a multiplatformed core. They were both made from the base of a 19th century black glass bottle, demonstrated attributes associated with stone tool manufacture and had no attributes related to incidental damage. The worked flake had regular retouch along one edge of the ventral surface (Figure 20). No macroscopically discernable edge damage occurred on this artefact so microscopic analysis would be a valuable next step in the identification this particular AGA. The multiplatformed core had four large negative scars (Figure 21).

The previous assessment of these artefacts as non-artefactual was based on conchoidal scars on all surfaces, heavy abrasion and the presence of European rubbish in the vicinity of the site, (MDCA, 2010: 21). Conchoidal fracture and some abrasion was recognised during the field survey but not on all surfaces. The presence of European rubbish was accounted for in the application of the *integrated criteria* but the resultant identification agreed with the initial classification of the artefacts. Unmodified glass fragments derived from the same bottle were not considered to be part of a reduction sequence due to the level of disturbance at this site.

Based on this data Cobham OC1 does contain AGAs but that they were not deposited here by Aboriginal agency but by post-depositional factors. Therefore it is concluded that Cobham OC1 does not represent a contact site.

Artefact No.	Primary criteria met	Secondary criteria met	Identification
1	-Glass datable to the late 18th to the mid 19th century - Presence of convincing retouch. - Presence of attributes related to stone artefact manufacture.	-Lack of attributes related to unintentional damage. - Presence of associated material culture. -Presence of thick glass.	Criteria indicate that this artefact represents a worked flake (Figure 20).
2	-Glass datable to the late 18th to the mid 19th century. - Presence of attributes related to stone artefact manufacture.	-Lack of attributes Related to unintentional damage. - Presence of associated material culture. -Presence of thick glass.	Criteria indicates that this artefact is a core (Figure 21).
3	-Glass datable to the late 18th to the mid 19th century.	-Lack of attributes related to unintentional damage. -Presence of associated material culture.	Negative
4	-Glass datable to the late 18th to the mid 19th century.	-Lack of attributes Related to unintentional damage. -Presence of associated material culture.	Negative
5	-Glass datable to the Late 18th to the mid 19th century.	-Lack of attributes Related to unintentional damage. -Presence of associated material culture.	Negative

Table 18: Assessment of artefacts from Cobham OC1.

Figure 20: Artefact 1 from Cobham OC1.

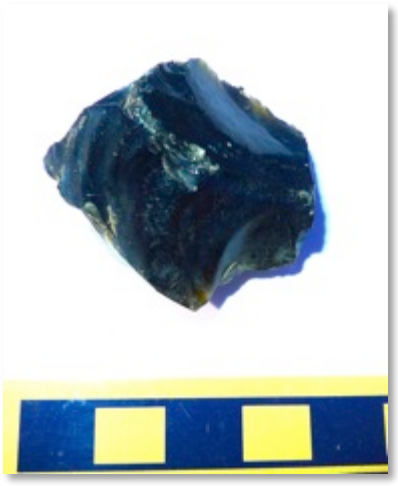


Figure 21: Artefact 2 from Cobham OC1.

Prospect REL 3

REL3 Prospect (AHIMS# 45-5-2893) was originally recorded as an artefact scatter extending over an area of 10 000m^2 of open woodland containing an unspecified number of stone tools (silcrete, chert, basalt, quartz and quartzite) and various fragments of 19th century European material including ceramic, brick, clay pipe fragments, coin, badge and several glass bottle fragments (Ngara Consulting, 2003). A technological study of REL 3 had been previously undertaken, which established a high probability of five AGAs having undergone a knapping event. These were evaluated by Carney and Fullagar (in Ngara Consulting, 2003: 24) as having 'convincing' evidence of Aboriginal manufacture, which included: flake removals, retouch, and possible usewear.

Whether REL 3 Prospect was relocated during the field survey is dubious as the artefacts described in the report could not be located. The area assessed was atop a cleared slope on which artefacts would have been subject to taphonomic processes that could produce pseudo-artefactual characteristic. This area is just

north of Prospect Hill, an area associated with an Aboriginal resistance, which was the result of the death of Pemulwuy, a renowned Aboriginal resistance leader in 1802 (Flynn, 1997). The one artefact that was found during the survey produced a negative identification when applied to the *integrated criteria* (see Table 19 for demonstration of identification). It appeared to be of modern manufacture, but this could not be validated as no attributes related to manufacture were present on the glass. The edges of the glass did appear to have edge damage, but it is more likely that this was the product of incidental damage considering the context of the site.

Artefact No.	Primary criteria met	Secondary criteria met	Identification
1	-Presence of edge damage and /or residue.	-Absence of attributes related to unintentional damage. -Presence of associated material culture. -Available associated historical evidence.	Negative

Table 19: Assessment of artefacts from REL 3.

Prospect Reservoir/ PR 3

Prospect Reservoir 3/ PR 3 (AHIMS# 45-5-0767) is an open artefact scatter over an area of 200m^2 amongst partially cleared woodland. It was originally recorded as containing '< 2 000 fragments of glass' in four mounds over an area of 16m^2 with no associated Aboriginal material culture (Smith, 1989: 19). The original site recording described the artefacts as 'possible' glass flakes, cores and scrapers. Reassessment was recommended but this did not occur. This is significant as subsequent recordings of glass in the area appear to have assumed these items had been shown to be AGAs (Irish 2011: 39).

This site is located southwest of Prospect Hill, were the aforementioned Aboriginal resistance took place. The immediate area of this site is also associated with the residence of William Lawson, who acquired a land grant in 1808 (Flynn, 1997).

The only associated cultural material were small fragments of 19th century ceramic. As the glass scatter at PR3 was so extensive only a sample of nine artefacts were recorded in detail. These were selected from four specific areas within the general survey area. Only one of the artefacts assessed during the field survey produced a positive identification (see Table 20 for demonstration of identification). The criteria deemed this artefact an expediently used fragment (Figure 22). This artefact is on the curved base of a 19th century black bottle with mould seems and displays evidence of usewear on one edge of the dorsal margin. As this was the only glass to even come close to producing a positive identification, the authenticity of this classification is questionable. Based on the proximity of the glass assemblage to a historic period home, it has been interpreted as a bottle dump that may have been sourced for raw materials in the production of AGAs. This classification is strengthened by the positive identification of an AGA in site TPP1 Prospect, which is located 15m north of PR3.

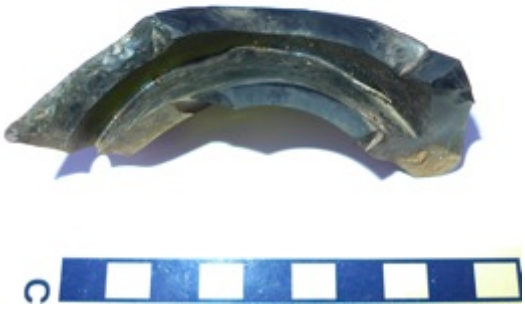


Figure 22: Prospect PR3 artefact 9.

Artefact No.	Primary criteria met	Secondary criteria met	Identification
1	-Glass datable to the late 18th to the mid 19th century.	-Absence of attributes Related to unintentional damage. -Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
2	-Glass datable to the late 18th to the mid 19th century.	-Absence of attributes Related to unintentional damage. -Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
3	-Glass datable to the late 18th to the mid 19th century.	-Absence of attributes Related to unintentional damage. -Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
4	-Glass datable to the late 18th to the mid 19th century.	-Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
5	-Glass datable to the late 18th to the mid 19th century.	-Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
6	-Glass datable to the late 18th to the mid 19th century.	-Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
7	-Glass datable to the late 18th to the mid 19th century.	-Absence of attributes Related to unintentional damage. -Absence of taphonomic	Negative

		processes related to incidental damage. -Availability of associated historical evidence.	
8	-Glass datable to the late 18th to the mid 19th century. -Presence of macroscopic edge damage and or residue.	-Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence.	Negative
9	-Glass datable to the late 18th to the mid 19th century. -Presence of macroscopic edge damage and or residue.	-Absence of attributes Related to unintentional damage. -Absence of taphonomic processes related to incidental damage. -Availability of associated historical evidence. -Presence of thick glass.	Criteria indicate expedient use (Figure 22).

Table 20: Assessment of artefacts from Prospect Reservoir 3/ PR 3.

Prospect TPP1

Prospect Reservoir TPP1 (AHIMS# 45-5-0866) may have been a part of the PR 3 scatter, as a clearway for a powerline easement has been constructed between them. TPP1 is an open artefact scatter over an area of 32m^2 amongst partially cleared woodland. This site was originally recorded as containing an unspecified amount of both glass fragments and AGAs (Donlon and Comber, 1991: 14).

During the field survey a total of seven artefacts were recorded at TTP1. One artefact achieved a positive identification and the remaining six artefacts produced a negative identification (see Table 21 for demonstration of identification). The positively identified artefact is a worked fragment of the base of a black glass bottle (Figure 23). Edge damage and retouch occurs on the dorsal surface of one edge (Figure 24). This working edge is on the wall of the bottle that is attached to the curved base that may have been used as a 'grip'. The glass within this site can be refitted to have come from one 19th century black glass bottle.

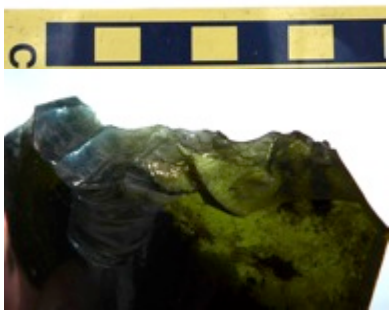


Figure 23: Ventral surface of artefact 1 from TTP1.

Figure 24: Dorsal margin of artifact 1 showing retouch.

When paired with the information derived from TPP1, this site may represent a post-contact period impromptu Aboriginal camp close to a bottle dump from which raw material for AGAs were sourced. It is suggested that microscopic analysis be used to adjudicate this conclusion.

Artefact No.	Primary criteria met	Secondary criteria met	Identification
1	-Glass datable to the Late 18th to the mid 19th century. -Presence of Edge damage and /or Residue. - Presence of Convincing Retouch.	-Absence of taphonomic processes related to incidental damage. -Evidence of a reduction sequence. -Available associated historical evidence.	Criteria indicates worked fragment (Figures 23 and 24).

2	-Glass datable to the late 18th to the Mid 19th century.	-Absence of attribute related to unintentional damage. -Evidence of a reduction sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence.	Negative
3	-Glass datable to the late 18th to the mid 19th century.	-Absence of attribute related to unintentional damage. -Evidence of a reduction sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence.	Negative
4	-Glass datable to the late 18th to the mid 19th century.	-Absence of attribute related to unintentional damage. -Evidence of a reduction sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence.	Negative
5	-Glass datable to the late 18th to the mid 19th century.	-Absence of attribute related to unintentional damage. -Evidence of a reduction sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence.	Negative
6	-Glass datable to the late 18th to the mid 19th century.	-Absence of attribute related to unintentional damage. -Evidence of a reduction	Negative

		sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence.	
7	-Glass datable to the late 18th to the mid 19th century.	-Evidence of a reduction sequence. -Absence of taphonomic processes related to incidental damage. -Available associated historical evidence. - Presence of thick glass.	 Negative

Table 21: Assessment of artefacts from TPP 1 Prospect.

The application of the integrated criteria to the field data has revealed discrepancies in the application of an all-encompassing set of criteria. As mentioned previously, the criterion that are built on the bottle base/ core model (*presence of attribute related to stone tool manufacture* and *presence of thick glass)* were redundant when applied to most artefacts. The only site that contained artefacts to which the bottle base/ core model was applicable was Cobham OC1. Therefore the *integrated criteria*, when used in the current all-encompassing form, served to weaken the assessment of artefact produced via the *worked fragments reduction strategy.*

Another discrepancy in the criteria presented by this stage of the analysis is that many of the criteria do not facilitate the identification of expediently used fragments. These include: *The presence of convincing retouch and the presence of attributes related to stone tool manufacture*. Despite this, expediently used AGAs produced by *worked fragment reduction,* may be recognized by the following primary criteria: *presence of 18-19th century glass* and *presence of*

macroscopic edge damage. It must be noted that the expediently used AGAs are less likely to achieve definitive identification without further microscopic analysis. The incompatibility of many of the artefacts with each individual criterion within the *integrated criteria* emphasises the need for a division according to reduction sequence and also according to individual AGA 'types'. Glass flakes, worked flakes, worked fragments and expediently used fragments need to be differentiated in the identification process.

SUMMARY

This chapter has outlined the results obtained from the three phases of analysis within this thesis. Spatial analysis of the sites containing AGAs produced distinct patterning. Most sites occurred on the Cumberland Plain and areas of sites clustering occurred around four general zones: Emu Plains, Prospect, Port Jackson and Botany Bay. Patterns in the pre-recorded data indicated that black glass, the use of bottle bases, artefacts with retouch and usewear and associated material culture of stone tools were the most commonly recorded characteristics of AGAs. Application of the *integrated criteria* to the glass from the Stockton Collection strongly supported Stockton's original identification and revealed the inadequacy of many of the criterion when assessing the authenticity of an AGA produced by the *worked fragment reduction strategy*. The field survey resulted in the recording of 22 artefacts. When these artefacts were assessed according to the *integrated criteria*, only four produced a positive identification. The field survey also indicated discrepancies in the application of criteria to expediently used AGAs. Suggested solution to the issues emphasised by the application of the *integrated criteria* is the deviation of the criterion according to reduction strategy and AGA 'type'. These results will be discussed in the next chapter.

CHAPTER SIX: DISCUSSION

MANAGING IDENTIFICATION

Patterns in the pre-recorded data suggest that when glass raw material form is specified, AGAs were primary manufacture from 19th century bottles. Therefore Harrison's (2000) avocation for criteria that considers the unique morphological form of glass bottles is extremely relevant.

This is also supported by patterns in the pre-recorded data that indicate a reliance on the conventions of lithic analysis. The proportionately higher frequency to which AGAs are recorded as being produced by the bottle base/ core model indicate that only one of the two reduction strategies relevant to AGA manufacture are being accounted for. Almost all (95%) of the recordings, which specified form, described the artefacts as either base cores or flakes. Only 4% of artefacts, which specified morphology, were described as fragments.

This pattern is most probably the result of a concentration on this model within previously formulated criteria for identification. The application of the *integrated criteria* to the two glass fragments from the Stockton collection and the field data revealed that the focus on the *base core reduction strategy* evident within the criteria is unhelpful in the identification of AGAs produced by the *worked fragment reduction strategy*. Criteria that relate directly to knapping of thick bottle bases in the *base core reduction strategy* such as *presence of attribute related to stone tool manufacture* are completely inapplicable to artefacts manufactured through the *worked fragment reduction strategy*. Also the field data revealed that

criteria are not compatible between artefact 'types'. Worked flakes, expediently used flakes, worked fragments and expediently used fragments need to be considered separately in the identification process.

An awareness of glass bottle reduction and the different types of AGAs that may be produced by these, achieved within this thesis, has emphasised the need for re-evaluation of approaches to identification. A suggestion for a new model that caters for such division is illustrated in Table 22.

Base core reduction		***Worked fragment reduction***	
Worked flake	**Expediently used flake**	**Worked fragment**	**Expediently used fragment**
18th- 19th century glass. Attributes related to stone tool manufacture. Edge damage and/or residue. Convincing retouch. Made from thicker portion of glass. Absence of attributes related to incidental damage. Contextual associations (other material culture, historical evidence, lack of taphonomic processes associated with incidental damage).	18th- 19th century glass. Attributes related to stone tool manufacture. Edge damage and/or residue. Made from thicker portion of glass. Absence of attributes related to incidental damage. Contextual associations (other material culture, historical evidence, lack of taphonomic processes associated with incidental damage).	18th- 19th century glass. Edge damage and/or residue. Convincing retouch. Absence of attributes related to incidental damage. Contextual associations (other material culture, historical evidence, lack of taphonomic processes associated with incidental damage).	18th- 19th century glass. Edge damage and/or residue. Contextual associations (other material culture, historical evidence, lack of taphonomic processes associated with incidental damage).

Table 22: Revised model for identification of AGAs. Refer to chapter four for an outline of each criterion.

General Patterns in the Sydney Data

Whether the general patterns observable in the pre-recorded data indicate technological or methodological processes is uncertain. This is due to the equifinality in the interpretation of these patterns. Both possible explanations have been attempted to be addressed but it is suggested that methodological issues have greater influence over the findings presented by this particular dataset.

One major pattern in the data was the dominance of black glass as a raw material. Whether the abundance of this colour reflects raw material preference or methodological habits adopted by archaeologists during recording is questionable. Black bottles (also dark green or dark olive) generally date from 1830-1870 and were the most common bottle type during the 19th century. The reason for the prevalence of this bottle colour is that before local manufacture of bottles commenced, they were imported from Britain. In the importation process clear flint, coloured and green glass was taxed heavily, causing a greater incidence of the use of cheaper black glass (Burke and Smith, 2004: 191). This is reflected in the results of this analysis. The frequent reporting of black glass may indicate raw material preference due to ease of availability. Many other studies have identified black glass as the most commonly chosen for artefact manufacture (Allen, 1969; Wolski and Loy, 1999; Birmingham, 2000; Carver, 2005 etc.). It must also be considered that as black glass is such a well-known 19th century type, it may be more readily identified thus. Recorders, in the field, that need to recognise 'old' glass may be more confident in the artefacts authenticity when it occurs in this colour.

Patterns in artefact technology may be analysed in this way also. The data indicates that a preference for the *base core reduction strategy* exists. This is based on the majority specification of cores and/or flakes (95%) and also the prevalence of bases as the specified portion (31%) from which artefacts are produced. Whether this trend is caused by actual patterns in the archaeological record is questionable. It is more likely that issues in the methodological practice of identifying artefacts have triggered these trends. Archaeologists may be more likely to record artefacts that display attributes related to the *base core reduction strategy,* as these are the technological characteristics that one would be accustomed to look for on stone. These technological characteristics have also been focused on in the majority of studies of AGAs that have adhered to or presented criteria for identification (Allen and Jones, 1980; Williamson, 2004; Carver, 2005; Veth and O' Connor, 2005; Freeman, 1993; Wickman, 1993 etc.).

Although expedient use of AGAs has been investigated within recent research (Wilkie and Loy, 1999; Harrison, 2000), the Sydney data indicates that such artefacts are not being accounted for. The pre-recorded data from Sydney indicated that 93% of artefacts had evidence of secondary modification and the technological characteristics of the other 7% were not specified. Therefore no expediently used AGAs were present in the pre-recorded data. However, it is unlikely that expediently used AGAs did not occur in Sydney. It is suggested that previously mentioned adherence to conventions of lithic analysis and the bottle base/flake paradigm caused this pattern. This trend is more likely to represent the familiarity of archaeologists with stone knapping techniques and that expedient use of glass has been over looked in Sydney.

Another general pattern that may be explained by methodological issues is the frequency of which sites occur on the Cumberland Plain. It is suggested that this pattern does not reflect any significant behaviours of post-contact Aboriginal people, but the nature of archaeological work done in Sydney. This area has been investigated thoroughly within cultural heritage management since the 1970s. The Cumberland Plain has been subject to more archaeological survey than the highly populated urban areas of Sydney. More sites have been recorded in this area as surface scatters (accounting for 97% of AGAs) are more likely to be undisturbed. The same methodological trends have caused higher frequency of prehistoric (see Figure 25) and post-contact (see Figure 26) camps and stone scatters to be recorded in this area also.

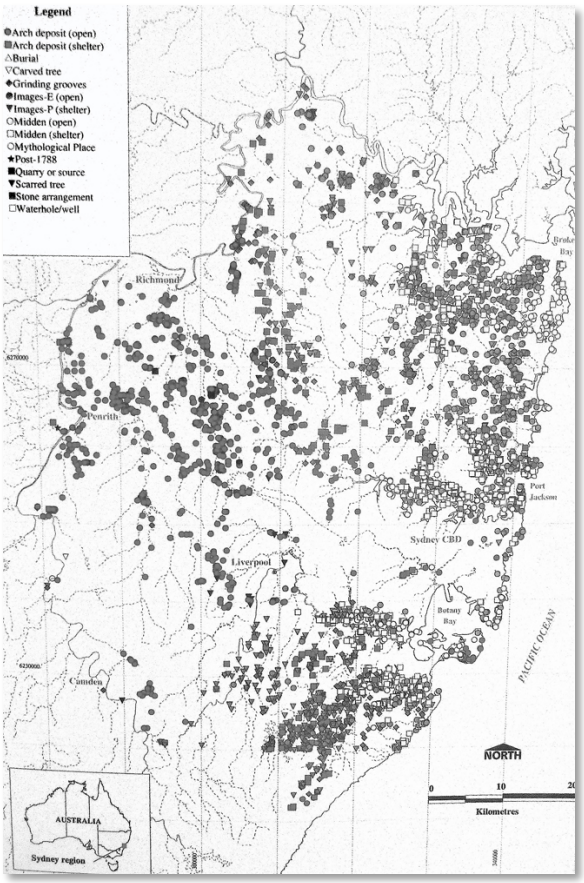


Figure 25: Distribution of prehistoric sites in Sydney (Attenbrow, 2010).

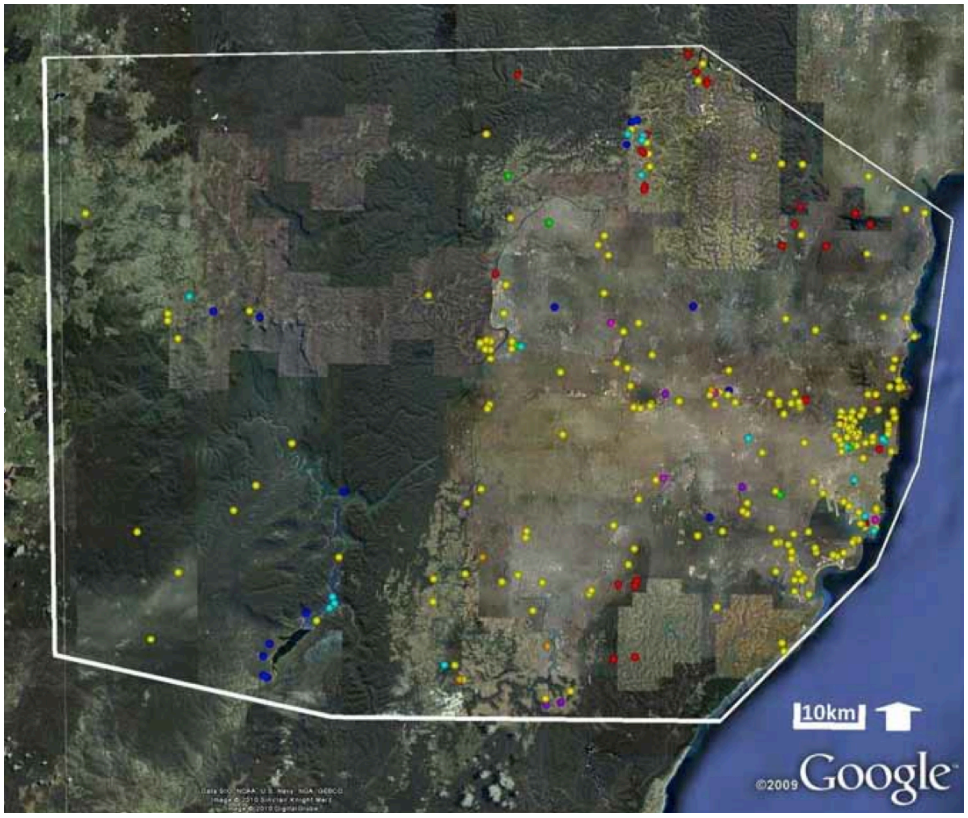


Figure 26: Distribution of post-contact camps indicated by yellow points (Irish, 2011).

REQUIRING FURTHER INVESTIGATION

The results of the survey data suggest that further investigation of AGA sites is needed in Sydney. This is evident in the hesitance in classification or over-recording to compensate for uncertainty in the identification of AGAs. This uncertainty is observable in the common use of 'possible' as a descriptor in the pre-recorded data.

Two of the sites assessed during the field survey produced an identification that diverged from the original assessment. The original investigation of Cobham OC1 evaluated the artefacts as being the product of post depositional damage caused by taphonomic processes acting on the glass (MDCA, 2010). The analysis of these

artefacts according to the *integrated criteria* outlined in this study, contrasted this identification. Application of the *integrated criteria* supports the classification of this artefact as a worked flake, having undergone a knapping event and secondary modification. The second site to produce a divergent identification was Prospect PR3. This site was originally recorded as an extensive scatter of > 2 000 AGAs, made up of cores, scrapers and flakes (Smith, 1989), yet the assessment conducted during this study only identified one 'possible' expediently used fragment of the sample recorded. Two historic period homes are known to have existed near the site, which may have produced the assemblage (Flynn, 1997; pers. comm. S. Smith). The results of this study indicate that this site represents a European bottle dump. The use of this bottle dump as a source of raw materials for artefact production is possible due to the positive identification of AGAs at Prospect TPP1 and Prospect Reservoir/ PR 3, just 15m apart. Due to these deviations in identification it is suggested that further study, in the form of microscopic analysis, would be beneficial.

Further investigation is needed to determine an explanation for some of the spatial patterning of sites across Sydney. It is suspected that the clustering of sites around Emu Plains and Prospect Reservoir are a reflection of methodological processes rather than anomalous evidence of high-density site distribution in these particular landscapes.

The abundance of recordings at Prospect Reservoir may be explained by a 'domino effect'. It appears that the initial identification of AGAs in these areas may have influenced subsequent recordings. The nine sites recorded around Prospect Reservoir over a period of 20 years by six sets of recorders,

suggests on first observation, that a tradition of glass use in the area may have occurred. Paul Irish (2011: 39) provides an alternate explanation for this phenomenon at Prospect. He suggests that glass scatters have been recorded without expert knowledge and that the initial identification of AGAs ignited heightened tendency to record fractured glass in this vicinity. Irish goes on to explain that even the initial recording at PR 3 only describes the glass as 'possibly flaked' and 'requiring further examination' (Smith, 1989 in Irish, 2011: 39). As mentioned above, Prospect PR 3, has undergone reassessment during this study, which casts doubt on the initial identification of a scatter > 2 000 glass flakes, cores and scrapers and has reappraised the site as containing hundreds of pieces of broken glass and some potential for expedient use of fragments.

Emu Plains could be the result of similar circumstance. Here the six sites identified as containing AGAs within the Emu Plains district were recorded within five years by one recorder. An explanation for this clustering may be the intensive investigation of this area for AGAs by a lone archaeologist aware of these artefacts as signifiers of contact sites.

Focus on First Contact

Spatial clustering also occurs at Botany Bay and Port Jackson. Rather than reflecting a high frequency of AGA manufacture in these areas, this patterning is likely the result of intensive research in these regions due to the extreme significance placed on these areas as places of cross-cultural interaction. Botany Bay was the landing place of the Endeavour and the First Fleet, and Port Jackson was the site of the first British penal colony in Sydney. Cross-cultural encounters at these historic landmarks were recorded in various ethnographic

sources (Tench, 1789; Phillip, 1789; Collins, 1798 etc.). Much of Australia's post-contact history has focused on the meta-narrative established within these areas. The focus within both the academic and public domain on these sites has infiltrated archaeological research and subsequent academic publication. The comparatively large amount of research conducted in these areas has caused the clustering of sites. This interpretation indicates that the high frequency of AGAs identified in these areas may be the result of close attention to the history and archaeology of the area. If such research focus was taken on other areas in Sydney that have similar significant post-contact histories, such as missions and reserves, a similar pattern may emerge. If more attention is given to the post-contact historical evidence of Sydney during archaeological investigation in the future, it may shed light on AGAs and other post-contact artefacts within such significant Aboriginal historical places.

CROSS-CULTURAL INTERACTION

The data set for this study pertains to a substantially broader study area and the recording or AGAs is of less standardised form than that used by most post-contact studies. This means that it is difficult to apply the results derived from the analysis to many of the frameworks for studying culture contact. Despite this, the following is an attempt at interpreting the patterns in the context of cross-cultural interaction. This will be achieved by an exploration of the different approaches to post-contact archaeology of the Sydney region and beyond and how they apply to AGAs.

Moving Frontier

The nature of the moving frontier in Australia meant that Indigenous people of the southeast suffered the direct impact of invasion and

colonialism most severely. This was a consequence of the early concentration of British settlement in this area, while elsewhere the colonial frontier expanded more slowly. The moving frontier can be tracked in the archaeological record of Sydney. The sparse distribution of sites containing AGAs located during this study does form general spatial pattering that can be used to infer the Indigenous response to the moving frontier. This could be another explanation for the majority of sites being located on the Cumberland Plain (75%), and other sites located far away from areas of initial and most intensive contact. The contact period rock art of the region as investigated by McDonald (2008) shows a similar pattern. The spatial patterning of this evidence is also scarce and restricted in distribution across Sydney' s landscape. The contact art sites do not similarly occur on the Cumberland Plain but do predominantly occur to the north around the Hawkesbury region, and no contact art occurs at the initial points of contact around Botany Bay or Port Jackson (Figure 27). McDonald suggests this spatial patterning represents a truncation of Indigenous social organisation nearer to European settlements, caused by the more rapid and intensive cross-cultural interaction at these sites. Devastating events such as the spread of disease during the smallpox epidemic of 1789 may have contributed to the disparity in contact sites between these two areas. The rock art production stopped being a socially enacted process soon after contact. The continued function of rock-art and other cultural material in more remote locations of Australia contrast this termination of the symbolic and artistic culture. This indicates that social dislocation was rapid and devastating in the areas of Sydney that were heavily occupied by the British. The sparse distribution of both the AGAs

and rock art in these areas suggests that response was short-lived and stifled.

As the majority of sites are located on the Cumberland Plain, away from areas of most intensive contact, a higher frequency of AGAs may have been used within the context of 'contact-from-a-distance'. This type of cross-cultural interaction occurs in more remote locations and thus the influence of invasive progression of European settlement is lessened. European material may have made its way into Aboriginal hands before face-to-face contact ever occurred. McDonald (2008) has characterised this particular type of cross-cultural interaction operating in Sydney by contrasting the contact rock art of the region with that of the Northern Territory in which Macassan ships are represented. The ship motifs of the Northern Territory art have consistent technological features and are depicted with numerous passengers. McDonald argues that this is a portrayal of familiarity, which is not present in the contact art of Sydney. She explains that in Sydney European boats are the most commonly portrayed contact motifs but occur in locations far removed from the points of first contact. They lack detail, stylistic conventions and never depict passengers (Figure 28). This evokes a sense of the unknown in the Sydney rock art, the depictions are spontaneous and 'from a distance'. There is also no evidence in other forms of Sydney's contact art that any shared connection was felt between the Aboriginal people and the British. This may have also been the case with AGAs. Contact- from-a-distance on the Cumberland Plain meant that there was knowledge of Europeans and access to their materials but traditional practice continued more frequently and for a longer period of time. Glass was more readily modified from its

original use as part of a continuity of traditional practice in the more 'remote' areas of Sydney.

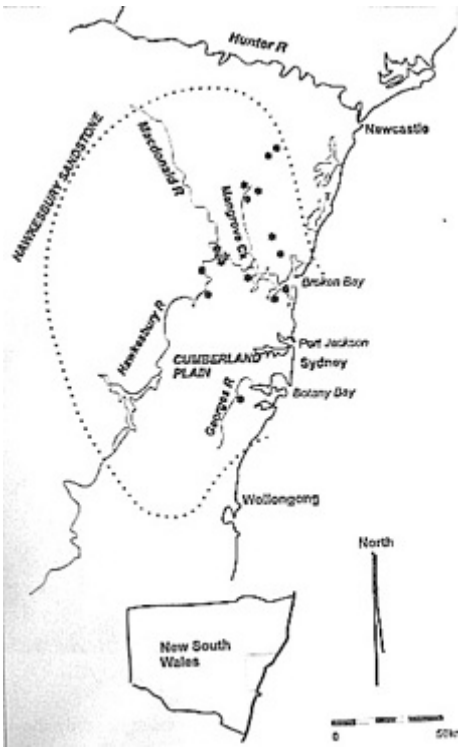


Figure 27: Distribution of contact rock art in Sydney (McDonald, 2008).

Figure 28: Tracing of two engraved ships from around the Hawkesbury River (McDonald, 2008).

Exchange and Sources

McBryde (2000) has presented evidence for continuing economic cross-cultural exchange between Europeans and Aboriginal people in Sydney. McBryde uses evidence of the exchange at Port Jackson in the first 40 years of settlement to explain how exchange continued even after the devastation of changing social context and conflict. The exchanges at Port Jackson and beyond demonstrate the dynamic utilitarian and symbolic context behind transactions and the deliberate social and political choices made by Indigenous people during this period. Similar veins of cross-cultural negotiation through trade and exchange occurred throughout Australia (e.g. Mitchell, 2000). Evidence of exchange is difficult to determine using AGAs in

Sydney, as there is no evidence that glass bottles acted as an exchange item within this region. The nature of British settlement meant that it was probably easy to obtain glass, especially in the more heavily settled areas, as there were numerous sources. Glass may have been readily accessible through sources such as European bottle dumps. Other European material were also fairly accessible, such as metal, thus the desirability of glass may have also differed from more remote areas. In this respect, Sydney is quite different to other studied post-contact landscapes.

Most studies of AGAs have been undertaken in remote areas with less complexity in spatial patterning (Birmingham, 2000; Patterson, 2008; Harrison, 2000). Most of these studies have been undertaken in areas where cross-cultural interaction revolves around a place that acts as a source of European materials and facilitates encounter such as a mission or cattle station. In Sydney these places were scattered through the landscape and encounters overlapped between these places, forming a complex pattern of sources and relationships that facilitated exchange. In more remote regions it is possible to measure the contribution of glass sources in cross-cultural interaction, as there is most often only one point from which to obtain the raw material. Birmingham (2000: 385-396) employed a distance-decay model to observe the frequency of glass within Aboriginal camps distributed across the landscape at Killalpaninna Mission in Central Australia. She found that the presence of glass decreased with distance, and that a steep drop off occurred at 1km from the mission. Birmingham argues that this is evidence for optimal foraging (selective resource exploitation) and the option of limited engagement. This patterning cannot be ascertained in Sydney due to high source density. Also, it is possible that the 'option' of

limited engagement was not as available in many areas of Sydney due to the intensity of European incursion. If anything, spatial distribution and artefact frequency per site is opposite in Sydney as sites and the AGAs within them increase in frequency further away from areas with more potential sources. This pattern has also been in other studies of post-contact sites (e.g. Colley, 2000 and Head and Fullagar, 1997).

Function

The few historical references suggest glass was used primarily for barbed spear blanks in Sydney (Phillip in Hunter, 1973 (1968); Govett, 1836 and Backhouse, 1843). Three backed artefacts were specified within the Sydney data that could have functioned as spear blanks. This is based on the fact that backing of stone implements was used to facilitate hafting, to create composite tools such as barbed spears.

The most common tool type specified within the pre-recorded data was the scraper, which is the most common tool type within Australian assemblages. Scrapers are flakes with one or more margins with continuous retouch that are most commonly used for woodworking (Holdaway and Stern, 2004: 230). Blades are also specified within the pre-recorded data. All morphological forms designated in the pre-recorded data are consistent with late Holocene technologies. In terms of long-term trajectories, the stone and glass components of the post-contact assemblages examined within this thesis broadly reflect the pre-contact toolkit of the area. This suggests traditional tool types were transferred onto glass into the post-contact period.

Within the results a curiosity emerges that may be related to function. Several sites contain glass associated with Aboriginal burials. Three sites containing AGAs and four sites containing unmodified glass fragments were recorded as associated with burials. The intentional shattering of bottle glass to decorate graves is known to have occurred in Western NSW (Byrne, 1998; Goodall, 2002; Harrison, 2004: 178). At Collarenebri, Aboriginal people continue to add glass to graves today. A similar tradition may have been operating in Sydney. Although Collarenebri and Sydney are regionally diverse, parallels may be drawn between them to explain the phenomenon.

Post-contact Aboriginality

Archaeological approaches to the post-contact Aboriginal landscape have been inhibited in the past by the assumption that urban sprawl in highly populated areas causes amplified post-depositional impact on the archaeological record. Much of the study area of this thesis is made up of such densely occupied areas. Archaeological approaches to Sydney as a post-contact landscape have been influenced to a significant extent by the concept of 'disturbance'. This study has found that exactly half of the sites were recorded as being disturbed in some way. Types of disturbance recorded included; machine clearance, agricultural grazing and ploughing, construction, vehicular traffic and quarrying. Such 'disturbance' has affected how archaeologists have perceived the urban post-contact scatters in Sydney, and to a greater degree, the identification of AGAs in the region. It is thought that post-contact archaeology is diluted and churned up due to the massive 'disturbance' of the urban footprint. This is particularly significant for post-contact archaeology of Sydney's urban environments as they lay on the 'vulnerable'

surface. Prehistory lay 'preserved' and safe insitu in underground deposits but the surface scatters are seen as 'weakened' (see Tainter, 1998: 170) by the powerful, superior western wrecking-ball. This colonialist perception sees white settlement as the pinnacle disturbance of Aboriginal history and culture, from which Aboriginal culture will never recover or innovate.

The colonialist persuasion of weakening post-contact aboriginality, which was once intrinsic in the archaeological discipline, has been examined by Byrne (1996). Byrne exposed how authentic Aboriginality is perceived as prior or distant and locked away in the past or on the frontier. He explains how we may overcome such colonialist thinking:

> ...by bridging the gap between that pre-contact and the present, to counter the view that a changed and therefore no longer authentic- contemporary Aboriginality is radically discontinuous with the timeless/authentic Aboriginality of the pre-contact past. (Byrne, 2002: 145).

As a consequence of such out-dated perceptions, archaeological evidence of the post-contact period in Sydney has been treated dismissively in the past along with the potential for Sydney to contribute to discourses concerning post-contact archaeology. Even so, the presumed high impact of European settlement on Sydney's post-contact Aboriginal archaeology has repressed the production of research from the region (Irish, 2011). It is true that the urban development within Sydney has affected the archaeology of some areas but despite this the post-contact archaeology can still inform much about the cross-cultural processes operating in Sydney.

A broader temporal framework has been implemented by recent studies to evaluate the long-term consequence of European presence and reveal the continuity of Aboriginal agency and tradition in the post-contact archaeological record (e.g. Torrence and Clark, 2000). This study and others (e.g. Irish, 2011) have shown that Sydney's post-contact urban environment should not incite such deterrence of archaeological research. In this light, Sydney's AGAs must be seen as a fluid stepping-stone to contemporary Aboriginality rather than an ethnographically recorded step in the demise of a culture.

CHAPTER SEVEN: CONCLUSION

Where have AGAs been recorded in this region?

The location and information on 58 sites containing AGAs were analysed during this study (see Appendix A). It was found that the majority of these sites occur on the Cumberland Plain. Clustering of sites was also noted at Botany Bay and Port Jackson, as well as Prospect Reservoir and Emu Plains. It has been concluded that such spatial patterning is likely to reflect the nature of archaeological work in Sydney, rather than any significant cultural behavior.

How are the recorders dealing with the identification issue?

An assessment of the past proposals for identification of AGAs and how these have permeated through to the recording of Sydney's archaeological sites has revealed that the identification of these artefacts follows a dependence on the bottle base/flake model or *base core reduction strategy*. This paradigm of AGA production is directly appropriated from the conventions of lithic analysis and does not account for AGAs manufactured by different reduction strategies. Little recognition of the different characteristics of artefacts produced by the *worked fragment reduction strategy,* which is unique to glass bottle reduction has led to the neglect of many AGAs. The distinction between these two reduction technologies needs to be acknowledged as they produce different AGA 'types'.

How can the identification issue be better managed?

A review of past criteria for identification has been achieved through the application of *integrated criteria*, which has exposed how

classification of AGAs may be better managed. A new approach to identification has been presented within this thesis (Table 22). This model for identification is based on Harrison's (2000) call for identification to consider bottle morphology. It provides a better understanding of the unique reduction strategies associated with bottle morphology and the artefacts produced by them.

What can Sydney's AGAs tell us about the broader social context of cross-cultural interaction?

The processes of interaction derived from the Sydney data are relatively unique to the region. Urban development has had a major impact on the post-contact archaeological record in some areas but regardless, it can tell us much about Aboriginal response to European settlement. It is tentatively suggested that the spatial patterning of sites containing AGA indicates that the nature of the 'moving frontier' meant that most AGAs were being used under the context of contact-at-a-distance. The radical affect of colonisation possibly meant that the Aboriginal people occupying the sites of initial settlement adopted European materials faster due to increase interaction and trade relations. People living further away from these areas were able to utilise European materials in a fashion more familiar to them for a longer period of time. In light of this AGAs must be seen as a fluid stepping-stone to contemporary Aboriginality rather than an ethnographically recorded step in the demise of a culture.

Future Directions

Microscopic Analysis

Microscopic analysis might be conducted to confirm some of the controversial identifications of AGAs from Sydney. The glass Bondi

Point from Kurnell and the invasively flaked AGA from the First Government House site would be interesting specimens for such as study. Microscopic analysis of potential expediently used AGAs would also be advantageous to the study of Sydney's AGAs as the occurrence of these artifacts is yet to be proven for this region.

Regional variation

Studies of regional variation have provided informative explanation of Aboriginal peoples approaches to AGAs. As the Sydney data stands, such disparity cannot be exposed within this region. This is due to the fact that most of the artefacts have been found incidentally during field surveys and excavation. Further studies that systematically investigate the regions AGAs offer great potential for drawing conclusions concerning inter-regional variation.

REFERENCES

ALLEN, J. (1969) 2008. *Port Essington: The Historical Archaeology of a North Australian Nineteenth Century Military Outpost.* Sydney. Sydney University Press in association with the Australasian Society for Historical Archaeology.

ALLEN, J. AND JONES, R. 1980. Oyster Cove: Archaeological traces of the last Tasmanians and notes on the criteria for the authentication of flaked glass artefacts. *Papers and Proceedings of the Royal Society of Tasmania*. 114: 225-233.

ARDLER, G. 1991. *The Wander of It All*. Darlinghurst (NSW); Burraga Aboriginal History and Writing Group Inc.

ATTENBROW, V. 1992. Shell Bed or Shell Midden. *Australian Archaeology* 34: 3- 21.

ATTENBROW, V. 2010. *Sydney's Aboriginal Past: Investigating the Archaeological and Historical Record.* Sydney. UNSW Press.

AUSTRALIAN INSTITUTE OF ABORIGINAL STUDIES. 1988. *La Perouse. The Place, the People and the Sea.* Matraville, NSW. Individual Heritage Group.

BACKHOUSE, J. 1843. *A Narrative of a Visit to the Australian Colonies.* London. Hamilton and Adams.

BARRATT, G. 1981. *The Russians at Port Jackson 1814-1822.* Canberra. Australian Institute of Aboriginal Studies.

BEAUMONT, P. 1961. The problem of glass implements. *Bulletin of the South African Museums Associations* 7(8): 161-163.

BECK, W. AND M. SMITH. 2003. The archaeology of No man’s land: Indigenous camps at Corindi Beach, mid-north coast New South Wales. *Archaeology in Oceania* 38 (2): 66 - 77.

BECK, W. AND M. SOMMERVILLE. 2005. Conversations between disciplines: Historical archaeology and oral history at Yarrawarra. *World Archaeology 37 (3): 468-483.*

BIRMINGHAM, J. 1992. Wybalenna: the archaeology of cultural accommodation in nineteenth century Tasmania. Sydney. Australian Society for Historical Archaeology.

BIRMINGHAM, J. 2000. Resistance, creolization or optimal foraging at Killalpaninna Mission, South Australia. In R. Torrence and A. Clarke (eds.) *The Archaeology of Difference: Negotiating Cross-cultural Engagements in Oceania.* London. Routledge.

BIRMINGHAM, J. AND A. WILSON. 2010. Archaeologies of cultural interaction: Wybalenna settlement and Killalpaninna Mission. *International Journal of Historical Archaeology,* 14: 15-38.

BOLTON, S. 1999. *Towards a Functional Analysis of Flaked Glass from Central Australia*. Honours Thesis. Department of Archaeology. University of Sydney.

BOOT, P. 1987. Trampling damage on stone artefacts: some experimental results. *Australian Archaeology* 24: 10-15.

BOOW, J. 1991. *Early Australian Commercial Glass*. Department of Planning and Heritage Council New South Wales.

BURKE, H. AND C. SMITH. 2004. *The Archaeologists Field Handbook.* Crows Nest (NSW). Allen and Unwin.

BYRNE, D. 1996. Deep Nation: Australia's Acquisition of an Indigenous Past. *Aboriginal History*: 82-107.

BYRNE, D. 1998. *In Sad but Loving Memory: Aboriginal Burials and Cemeteries in the Last 200 Years in NSW.* Sydney. New South Wales National Parks And Wildlife Service.

BYRNE, D. 2002. An archaeology of attachment: Cultural heritage and the post-contact. Harrison, R. And C. Williamson (eds.). *After Captain Cook*: *The Archaeology of the Recent Indigenous Past in Australia*. Sydney. Archaeological Computing Laboratory: 75-99.

CARVER, G. 2005. *Post-Contact Archaeology at Nuccaleena, South Australia: An Investigation of Glass Tool Use by Indigenous Australians*. Masters Thesis. Flinders University Archaeology Department.

CARTER, B. 1798. *Journal on Ann and Hope 1798 - 1799.* Rhode Island Historical Society. (SLNSW Microfilm 769, Pages 80 - 82).

CLARKSON, C. AND P. HISCOCK. 2000. Analysing Australian Stone Artefacts: An Agenda for the 21st Century. *Australian Archaeology 50:* 98- 108.

COLLEY, S. 1997. A pre- and post-contact Aboriginal shell midden at Disaster Bay, New South Wales south coast. *Australian Archaeology* 45: 1-19.

COLLEY, S. 2000. The colonial impact? Contact archaeology and indigenous sites in southern New South Wales. R. Torrence & A. Clark (eds.). *The Archaeology of Difference: Negotiating Cross-cultural Engagements in Oceania*. London. Routledge.

COLLINS, D. 1789. *An account of the British Colony in New South Wales Vol 1*. Cadell and Davies. London. Republished 1975 by B. Fletcher (ed.). Sydney. AH and AW reed.

COOPER, Z. AND BOWDLER, S. 1998. Flaked glass tools from the Andaman Islands and Australia. *Asian Perspectives* 37(1): 74-83.

COTTERELL AND KAMMINGA, J. 1987. The formation of flakes. *American Antiquity* 52 (4): 675- 708.

CROOK, P., L. ELLMOOS AND T. MURRAY. 2003. *Assessment of Historical and Archaeological Resources of the First Government House Site, Sydney. Volume 5 of the Archaeology of the Modern City Series.* Sydney. Historical Houses Trust.

DALLAS, M. 1984. *An Archaeological Study of the Proposed F4 Extensions at Emu Plains, NSW*. Unpublished report to the Department of Main Roads, NSW.

DICKSON, F. 1971. *Old glass from Kurnell. Mankind* 8: 60-61.

DONLON, D. AND J. COMBER. 1991. *Archaeological Survey of Prospect Water Treatment Works Pilot Plant and Prototype Plant*. Unpublished report to Water Board.

FLYNN, M. 1997. *Holroyd History and the Silent Boundary Project.* Unpublished report to Holroyd City.

FOLLEY, D. 2001. *Repossession of Our Spirit: Traditional Owners of Northern Sydney.* Canberra. Aboriginal History Inc.

FREEMAN, J.A. 1993. *A preliminary analysis of the glass found on the Onkaparinga River Estuary*. Graduate Diploma Thesis. Flinders

University Archaeology Department.

FULLAGAR, R, 2006. Residue and usewear. J. Balme and A. Paterson (eds.). *Archaeology in Practice: A Student Guide to Archaeological Analysis*. Oxford. Blackwell.

GIBBS, M. AND R. HARRISON. 2008. Dynamics of dispersion revisited?: archaeological context and the study of Aboriginal knapped glass Artefacts in Australia. *Australian Archaeology*: 61-68.

GOODALL, H. 2002. Morning, resemblance and politics of place: A study in the significance of Collarenebri Aboriginal cemetery. *Public History* 9: 72-96.

GOODALL, H. AND A. CADZOW. 2009. *Rivers and Resilience. Aboriginal People on Sydney's Georges River*. Sydney. UNSW Press.

GORMAN, A. 1995. Gender, labour and resources: The female knappers of the Andaman Islands. J. Balme And W. Beck (eds.) *Gendered Archaeology: The Second Australian Women in Archaeology Conference.* Canberra. ANH Publications RSPAS: 87-91.

HARRISON, R. 1996. *It's the Way it Shatters that Matters: an Analysis of the Technology and Variability of Aboriginal Glass Artefacts in the Shark Bay and Swan Regions of Western Australia.* Honours thesis. University of Western Australia Archaeology Department.

HARRISON, R. 2000. '"Nowadays with glass": regional variation in Aboriginal bottle glass artefacts from Western Australia'. *Archaeology in Oceania* 35(1): 34-47.

HARRISON, R. 2002. Archaeology and the colonial encounter:

Kimberley spear points, cultural identity and masculinity in the north of Australia. *Journal of Social Archaeology* 2: 352-377.

HARRISON, R. 2003. The magical virtue of these sharp things: Colonialism, mimesis and knapped bottle glass artefacts in Australia. *Journal of Material Culture* 8: 311-336.

HARRISON, R. 2004. *Shared Landscapes: Archaeologies of Attachment and the Pastoral Industry in New South Wales*. Sydney: UNSW Press.

HARRISON, R. 2005. Contact archaeology and Native Title in Australia. *Australian Aboriginal Studies* 1: 16 - 29.

HARRISON, R. 2006. An Artefact of Colonial Desire? Kimberley Points and the Technologies of Enchantment. *Current Anthropology* 47 (1): 63- 88)

HARRISON, R. AND WILLIAMSON, C. 2004. *After Captain Cook: the archaeology of the recent indigenous past in Australia.* Sydney. N.S.W. Archaeological Computing Laboratory, University of Sydney in association with NSW National Parks and Wildlife Service.

HEAD, L. AND R. FULLAGAR. 1997. Hunter-gatherer archaeology and pastoral contact: Perspectives from the Northwest Northern Territory, Australia. *World Archaeology* 28 (3): 418-428.

HINKSON, M. 2002. Exploring 'Aboriginal' sites in Sydney: A shifting politics of place? *Aboriginal History* 26: 62-77.

HOLDAWAY, S. AND N. STERN. 2004. *A Record in Stone: The study of Australia's Flaked Stone Artefacts*. Melbourne. Aboriginal Studies Press.

HUNTER, J. 1973. *An Historical Journal of the Transactions at Port Jackson and Norfolk Island*. Piccadilly. John Stockdale.

IRISH, P. 2011. Hidden in plain view: The Sydney Aboriginal Historical Places Project. Spetch, J. and R. Torrence (eds.). *Changing Perspectives in Australian Archaeology*. Australian Museum Online 23.

JO MCDONALD CULTURAL HERITAGE MANAGMENT. 2005. *Archaeological Salvage Excavation of Site CGI (*AHIMS# 99538*) at the Corner of George and Charles Streets, Parramatta NSW*. Unpublished report to Meriton Apartments Pty Ltd.

JONES, O. AND C. SULLIVAN. 1989. *The Parks-Canada Glass Glossary for the Description of Containers, Tableware, Flat Glass and Closures.* National historic parks and sites, Ottowa. Canadian Parks Service, Environment Canada.

JURAKIC, I. AND A. MARTINDALE. 2005. Identifying expedient glass tools from a post-contact Tsimshian village using low power (10-100x) magnification. *Journal of Archaeological Science* 33: 414-427.

KAMMINGA, J. 1982. Over the edge: Functional analysis of Australian stone tools. *Occasional Papers in Anthropology No. 12*. University of Queensland.

KARSKENS, G. 2009. *The Colony: a history of early Sydney*. Crows Nest (NSW). Allen and Unwin.

KOHEN, J. 1981. *Excavations and surface collections at an Aboriginal Campsite on Jamisons Creek, Emu Plains, New South Wales*. Report to National Parks and Wildlife Service.

KOHEN, J. 1992. *Penrith Lakes Scheme: Routine Inspection of Quarry Operation.* Unpublished report.

LAWRENCE, S. 2006. Historic artifacts, in a student guide to archaeological analyses. J. Balme and A. Paterson (eds.). *Archaeology in Practice: A Students Guide to Archaeological Analysis* Boston. Blackwell Publishing

LIGHTFOOT, K. 1995. Culture contact studies: redefining the relationship between prehistoric and historical archaeology. *American Antiquity* 60: 199-217.

MARTINDALE, A. AND I. JURAKIC. 2006. Identifying expedient glass tools from a post-contact Tsimshian village using low power (10-100x) magnification. *Journal of Archaeological Science* 33: 414-427.

MARY DALLAS CONSULTING ARCHAEOLOGISTS. 2010. *Due Diligence Aboriginal Heritage Assessment Cobham Juvenile Justice Centre, Werrington NSW (*AHIMS#102079). Unpublished report to Housing NSW.

MCBRYDE, I. 2000. 'Barter...immediately commenced to the satisfaction of both parties' : Cross-cultural exchange at Port Jackson 1788 - 1828. R. Torrence & A. Clark (eds.). *The Archaeology of Difference: Negotiating Cross-cultural Engagements in Oceania*. London. Routledge.

MCCARTHY, F.D. AND DAVIDSON, F.A. 1943. The Elouera Industry at Singleton, Hunter Valley, NSW. *Records of the Australian Museum* (2): 226-227.

MCDONALD, J. 2008. Rock art and cross cultural interaction in Sydney. Veth, P., P. Sutton and M. Neale (eds.). *Strangers on the Shore: Early Coastal Contacts in Australia*. Canberra. Nation Museum of Australia Press: 94-112.

MEGAW, J. 1968. Trial excavations in Captain Cook' s landing Place Reserve, Kurnell, NSW. *Australian Institute of Aboriginal Studies Newsletter* 2 (9): 17-19.

MEREDITH, J., 1989. *The Last Kooradgie: Moyengully Chief Man of the Gundungurra People*. Kenthurst (NSW): Kangaroo Press.

MITCHELL S. 2000. Guns or barter? Indigenous exchange networks and the mediation of conflict in post-contact western Arnhem Land. R. Torrence & A. Clark (eds.). *The Archaeology of Difference: Negotiating Cross-cultural Engagements in Oceania.* London. Routledge.

NGARA CONSULTING PTY LTD. 2003a. *Archaeological Assessment of Aboriginal Heritage: Reservoir Entry Lands* (AHIMS#102059)*, Prospect.* Unpublished report to Conybeare and Morrison.

NGARA CONSULTING PTY LTD. 2003b. *An Archaeological Field Assessment of Aboriginal Heritage, Northern Boiler Paddock Blacktown/ Huntingwood (*AHIMS# 100503). Unpublished report to Conybeare Morrison and Partners.

NIEMOELLER, G. AND D. GUSE 1999. Inter-regional variation in glass bottle reduction technology in the Northern Territory. *Australian Archaeology* 48: 47-48.

PATERSON, A. 1999. *Confronting the Sources: The Archaeology of*

Culture- Contact in the South-Western Lake Eyre Basin, Central Australia. Unpublished PhD Thesis. Department of Archaeology. University of Sydney.

PATTERSON, A. 2008. *The Lost Legion: Culture Contact In Colonial Australia.* Lanham. AltaMira Press.

PHILLIP, A. 1789. *The Voyage of Governor Philip to Botany Bay: With Contributions from Other Officers of the First Fleet and Observation on Affairs of the Time by Time by Lord Auckland.* London. John Stockdale. Reprinted 1970. Angus and Robertson.

PROUDFOOT H., A. BICKFORD, B. EGLOFF AND R. STOCKS. 1991. *Australia's First Government House.* Crows Nest (NSW). Allen and Unwin.

RICHARDSON, N., 2004. An Assessment of Glass Fragments from the Corner of George and Charles Streets, Parramatta for evidence of Utilisations as Flaked Artefacts. Appendix 5 in Jo McDonald Cultural Heritage Management. *Archaeological Salvage Excavation of Site CG1 (NPWS* 45-5- 2648), at the Corner of Charles and George Streets, Parramatta NSW*. Unpublished report to Meriton Apartments Pty Ltd.

ROLFE, J.S. 1931. An Aboriginal midden at Quibray Bay. *Mankind.* December: 61- 63.

ROMERO, F. G. M. & CONTE, I. C. 2008. Microwear analysis of retouched glass fragments from Fortlet Miana, Azul, Argentina, 1860-1863. *International Journal of Historical Archaeology,* 12: 248-262.

RUNNELS, C. 1976. More on glass implements from Greece. *Newsletter of Lithic Technology*. 5(3): 27-31.

SMITH, P. 1989. *Prospect Reservoir Proposed Water Channel 2: Archaeological Survey for Aboriginal Sites*. Unpublished report to the NSW Water Board.

TAINTER, J. 1998. Surface archaeology: Perceptions, values and potential. A. Sullivan (ed.). *Surface Archaeology.* Albuquerque. University of New Mexico Press: 169-179.

TENCH, W. 1789. *Sydney's First Four Years: Being a Reprint of a Narrative of the Expedition to Botany Bay.* Reprinted 1961. Angus and Robertson.

THINEE, K AND T. BRADFORD. 1998. *Connecting Kin: Guide to Records*. New South Wales Department of Community Services.

TINDALE, N. 1941. A Tasmanian stone implement made from bottle glass. *Papers and Proceedings of the Royal Society of Tasmania*: 1-3.

TORRENCE, R. AND A. CLARKE (eds.). 2000. *The Archaeology of Difference: Negotiating Cross-cultural Engagements in Oceania*. London. Routledge.

ULM, S., T. EALES AND S. L'ESTRANGE 1999. Post-European Aboriginal occupation of the Southern Curtis Coast, Central Queensland. *Australian Archaeology* 48: 42-43.

VETH, P. AND S. O'CONNOR. 2005. Archaeology, claimant connection to sites, and Native Title: Employment of successful categories of data with specific comments on glass artifacts. *Australian Aboriginal Studies*: 2-15.

WICKMAN, S. 1993. *Message in the Bottle: The Innovative use of Glass in Aboriginal Technology.* Honours thesis, Australian National University Archaeology Department.

WILKIE, L. A. 1996. Glass-knapping at a Louisiana Plantation: African-American Tools? *Historical Archaeology* 30 (4): 37-49.

WILLIAMSON, C. 2004. Finding meaning in the patterns: The analysis of material culture from a contact site in Tasmania. R. Harrison and C. Williamson (eds.). *After Captain Cook*: *The Archaeology of the Recent Indigenous Past in Australia*. Sydney. Archaeological Computing Laboratory.

WOLSKI, N. AND T.H. LOY. 1999. On the invisibility of contact: Residue analyses on Aboriginal glass artefacts from western Victoria. *The Artefact* 22: 65-73.

APPENDICES

Appendix A- Sites Containing Aboriginal Glass Artefacts in Sydney

Appendix B- Recording Sheet

Appendix C- Diagnostic Glass Bottle Characteristic

APPENDIX A- SITES CONTAINING ABORIGINAL GLASS ARTEFACTS IN SYDNEY

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
AMP IF 1 (Summer Hill)	52-2-3212	IF	1	70mm diametrex 70 long and 20mmthick	Bottle	Black		Base	
AP A4 (Appin)	52-2-3529	Open scatter	Several (5 in photo)	37x45x?/ 50x30x?/22x30x?/ 30x15x?/13x8x? (based on photo)	Champagne Bottle	Black (Dark green)	19th century	Base	
Balls Head	45-6-0027	Closed site, art, burial and midden	Some'	Thick'		Heavily patinated	Early colonial		
Bella Vista 3	45-5-2409	Open scatter	1	26x16x4		Colourless			Backed flake

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
AMP IF 1 (Summer Hill)	Yes (7 negative scars)		None.		Disturbed	Hill slope
AP A4 (Appin)	Yes (3 small flake scars recorded)		5m from another site containing quartz tool. Other numerous quartz tools in the area. also historic material which is interpreted as 19th century rubbish. (Fine grained very small tools, transfer print willow ware (c1820+), brown transfer ware (c1830+), yellow ware (c1830-1900), bristol glazed ware, angular banded earthen ware, solarised amethyst glass (c1880-1920), a champagne bottle (1850-1920) and a gin bottle).	Open forrest	Disturbed (machine clearance)	
Balls Head	Yes		450 stone tools (raw material not specified). Backed blades(bondi point, elouera), geometric microliths, scrapers, thumbnail scrapers, fabricator/scalar core. Undated midden material, burial of adult female, rock art(white hand stencils), melted lead.	Bushland	Undisturbed (section of midden)	Rockshelter
Bella Vista 3	Yes (25mm backing and opposite margin flaked)		2 chert stone tools.	Woodland	Disturbed	Hill slope

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
AMP IF 1 (Summer Hill)		1 Photo with site card 	Site card only	M. Mebberson and E. Raper	2004
AP A4 (Appin)		2 photos with site card  	(c-100570) Heritage Concepts Pty Ltd. 2007. Aboriginal and Historical Archaeological Assessment of Proposed Rezoning, Macquariedale Rd, Appin NSW. On behalf of Walker corp.	L. Sciusco and C. de Rocefort (G. Chalker)	2007
Balls Head	Maria Collin's records of Aboriginal occupation of the penninsula.		Bowdler, Sandra, 1971. Balls Head: the excavation of a Port Jackson rock shelter. *Records of the Australian Museum* 28(7): 117 - 128.	Bowdler	1971
Bella Vista 3	Bella Vista historic estate and Elizbeth McCarthur's Seven Hills Farm		(C-4153) Brayshaw, H. 1997. Norwest Bussiness Park Bella Vista: Arch Survey for Aboriginal Sites. Repor to Northwest Business Park.	Brayshaw and Haglund	1997

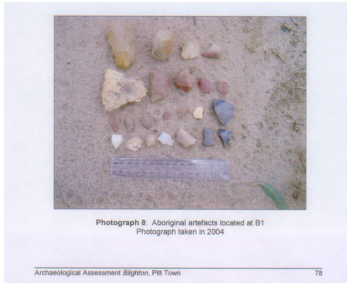
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Blacktown Northwest 5	45-5-0576	Open scatter, scarred tree and mound	1	55x25x? (based on sketch)	Bottle	Black		Body	Concave scraper
Blighton 1	45-5-3154	Open scatter	4	30x22x?/23x18x? (based on photo)	Bottle	Black (Dark green)		Body (based on photo)	Flake
Blighton 4	45-5-3157	Open scatter	2	50x 25x ?/ 30x 25x? (based on photo)	Bottle	Black (Dark green/ black), light green		Base, body (Based on photo)	Flake

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Blacktown Northwest 5	Yes (based on sketch-continuous retouch along working edge)		2 scared trees, 1 large burial mound, possible stone arrangement, 4 stone tools (silcrete and chert)Large pebble core, but glass is decribed as isolated just below crest spur?	Forrest	Undisturbed	Ridge crest
Blighton 1	Yes	Yes (based on photo-dodgy)	26 stone artefacts (silcrete, tuff and quarts).	Cleared forrest	Disturbed (agricultural landscape)	Crest of small ridgeline
Blighton 4		Yes (based on photo-dodgy)	20 stone artefacts (Silcrete, tuff, quartz and chert). Backed blade in photo on site card.	River flat forrest	Disturbed (ploughing)	Flat

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Blacktown Northwest 5	Prospect hill camp	Sketch on p64 of report.	(C-1007) Kohen, J.L. 1986. An Archaeological Survey of Aboriginal Sites within the Ctiy of Blacktown.	J. L Kohen	1986
Blighton 1		1 Photo on site card 	Comber, J. 2004. Arch assessment of Pitt Town, Blighton.	Jillian Comber	2004
Blighton 4		1 Photo on site card 	Comber, J. 2004. Arch assessment of Pitt Town, Blighton	Jillian Comber	2004

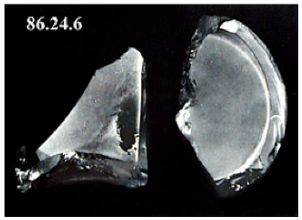
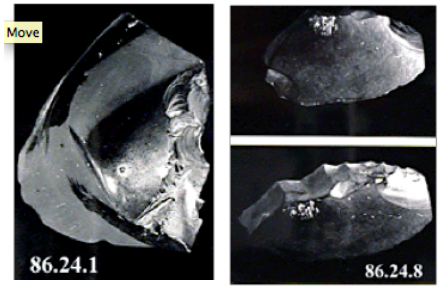
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Broken Bay/ Palm Beach Sand Dunes	45-6-1433	Midden	14	Thick (based on photo)	Demi John bottle	Black (most)	1820-1890	Bases (mainly)	Possible scraper/ utalised flakes
Captain Cook's Landing Place/ Skeletone cave	52-3-0220	Closed site, midden, burials	Unspecified				18th century		
Captain Cook's Landing Place/ Watering Place	52-3-0219	Midden and burials	Unspecified		Bottle (Weathered glass form a cylindrical rum of wine bottle)		Late 18th of early 19th century		
Cataract River 2	52-2-2111	Open scatter	Not specified	Thick'	Moulded Bottle				

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Broken Bay/ Palm Beach Sand Dunes	Yes (continuous retouch on working edge)	Yes (based on photo)	Stone artefacts (silcrete and chert), midden material, animal bone, possibly grinded pumice/sandstone. Pottery, metal, wood, button, possible pipe stem, cermic sherds, nails.	Dune system	Undisturbed	Dunes
Captain Cook's Landing Place/ Skeletone cave	Unmodified glass fragments		Midden material, fish and mammal bone, skeletons (18-19), Stone tools include: fabricators, stone fish hook files and bone points, scrapers.	Shelter	Undisturbed	
Captain Cook's Landing Place/ Watering Place	Unmodified glass fragments		Midden material dated to < few hundred yrs, 2 adult burials, bone button, hand made square section iron nail, weathered glass, stone tools. Edge-ground axe, hammerstone, fabricators, sandstone fish hook files (in association with 130 finishe/ partially finished fish hooks), bi and uni bone points, backed blades.			
Cataract River 2	Yes		Sherds of decorated earthenware (late 19th century), stone tools.	Forrest	Undisturbed	Ridge crest

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Broken Bay/ Palm Beach Sand Dunes	Although first land grant in 1816 Palm Beach was little frequented by Euros until the late 19th century	6 Photos with Macleay Catalogue)  	(c-774) Byrne, D. 1984. Aboriginal Sites of the Palm Beach Barriers. / (c-4253) Lautrec, D. 1982. BarrenJoey Headland Palm Beach: An Aboriginal Contact Site? Hisorical Archaeology major Project. (also Apparently these artefacts were studied by Judy Birmingham and Eugene Stockton)	Tessa Corkill	1982
Captain Cook's Landing Place/ Skeletone cave	Landing place of edeavour 1769		(c-1607) Rich, E. 1989. .Aboriginal Sites on Kurnell Peninsula: Management Plan, Stage One.	Megraw	1967
Captain Cook's Landing Place/ Watering Place	Landing place of edeavour 1770		Megaw, J. 1968. Trial excavations in Captain Cook’ s landing Place Reserve, Kurnell, NSW. Australian Instsitute of Aboriginal Studies Newsletter 2 (9): 17-19.	J.V.S Megaw (Dickson also)	1968-1971
Cataract River 2	Cataract River Massacre (Boughtons Farm 1816)		Site card references 'Eastern Gas pipeline project'	F.W Shawcross	2000

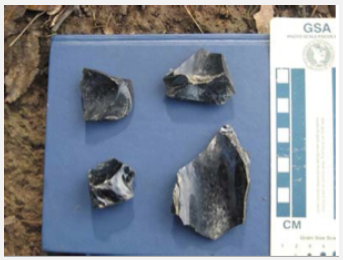
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Claremont Meadows/ CMSW1	45-5-3393	Open site	28	Average of 28.2mm max dimension (18.3/17/27.1/31/22.3/31.8/30.2/18.7/33.6/16.4x9.9x3.4/37.8/21.3/16.3/17.3/63.4/31.6x27.3x4/22/41.1/29.3/14.5/11.1/28.4/33.3/26.8/10.4/26.3/54/	Moulded baffle plate seam bottle	Green	1890-95	Base, Body	Angular Fragments, blade and 1 scraper
Clay Cliff Creek/ STC Car Park	45-6-2559	Open scatter	1	50x55	Bottle	Green			
Cobham OC1	45-5-3953	Open scatter	2 (initially identified as artifactual)	75x60x?/50x40x?/44x40x?/50x44x? (based on photo)	Bottle	Black			

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Claremont Meadows/ CMSW1	Yes (some recorded as scalar and along one edge) Number of scars in artefacts catalogue.	Yes	Stone tools (Silcrete, chert, mudston and volcanic). Baffle plate seam bottle indicates 1890-95. Geometric microliths, blades and backed blade present.	Woodland	Undisturbed	Flat
Clay Cliff Creek/ STC Car Park	Yes (erailure scar, steep retouch)	Yes (2 edges but possible trampling damage)	30 Stone artefacts (silcrete, mudstone, quartz, chert), shell.	Forrest	Undisturbed	Terrace
Cobham OC1	Damage? Negative scars/ concgoidal fractures on all surfaces/ abrasion		50 stone artefacts (silcrete, chert quartz), Flakes were the only specified tech. Other historic debris.	Cleared woodland	Disturbed	Hill slope

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Claremont Meadows/ CMSW1			(C-102084) ERM. 2010, Claremont Meadows South West 1 Section 90 Excavation: Aboriginal Heritage Excavation Report. Report to Investa Property Group.	originally T. Davies in 2004 but later by ERM	2010
Clay Cliff Creek/ STC Car Park	Aboriginal camps associated to annual feast and blanket distributions.		JMcDCHM. 2001. Parramatta Rail Link EIS: Survey and Assessment of Indigenous Heritage Issues.	JMcDCHM	2001
Cobham OC1		1 photo in report 	(c- 102079) MDCA. 2010. Due dilligence Ab Heritage Assessment Cobham Juvenile Centre, Werrington, NSW. Report to housing NSW.	P. Irish	2010

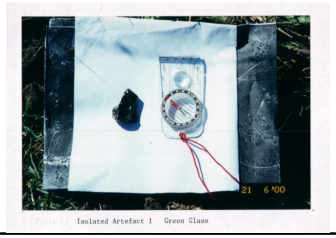
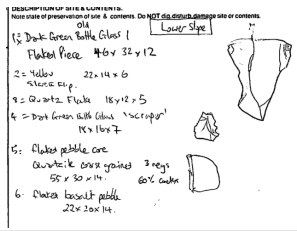
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Corner of Charles and George St		Open scatter	34			Black (27 dark green), green (5), colourless (2)			
CP IF 01 (Cumberland Plains)	52-2-3234	IF	1	50x30x? (based on photo)		Black (Dark green)		Base	
CP OS 04 (Cumberland Plains)	52-2-3251	Open scatter	2	46x32x12/ 18x16x7	Bottle	Black (Dark green)			Scaper and flake
CP OS 11 (Cumberland Plains)	52-2-3243	Open scatter	2	34x34x6/	Bottle	Light green			Scrapers

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Corner of Charles and George St	Assessed as incidental	Assessed as incidental	Aboriginal artefacts'.		Undisturbed	
CP IF 01 (Cumberland Plains)	Yes (based on photo)		None.		Disturbed (ploughed paddock)	Flat
CP OS 04 (Cumberland Plains)	Yes (based on sketch)	Yes (based onsketch)	4 stone tools (Quartz, silcrete, quartzite, basalt). Coarse grained pebble core, basalt flaked pebble.		Disturbed (Ploughed paddock)	Hill slope
CP OS 11 (Cumberland Plains)	Yes (one unimarginal and other bimarginal)		2 stone tools (chert and silcrete). Microliths (based on photo).		Disturbed	Flat

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Corner of Charles and George St			(c-99538) JMcHM. 2005. Archaeological Salvage Excavation of Site CGI (AHIMS# 99538) at the Corner of George and Charles Streets, Parramatta NSW. Unpublished report to Meriton Apartments Pty Ltd.		
CP IF 01 (Cumberland Plains)		1 Photo on site card 	Site card references 'Cumberland Plains Regional Study. Cubbitch Barta Native Title Claimant Corporation Project' (word of mouth suggests this project was never finish).	P. Hunt and G. Chalker	2000
CP OS 04 (Cumberland Plains)		Sketch on site card 	As above.	P. Hunt and G. Chalker	2000
CP OS 11 (Cumberland Plains)	McCarthur Family Land or 'Cowpasture' records of santioned Aboriginal camping on property	1 Photo with site card 	As above.	P. Hunt and G. Chalker	2000

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Cranebrook Creek CC1	45-5-0281	Open scatter	Few'		Bottle		19th century		
CSRA 7	45-5-0125/ 45-5-0063	Engraving and IF	1 (but other frags at site)	70mm thick					
Denbigh OPD 7 (Denbigh 1,2,3,4)	45-5-3360	Open scatter	10	76x55x40/ 78diametrerx46height/ 86x45x47/50x33x8/42x24x9/40x30x18/76diametrex40height/70x22xx18/78x44x46	Bottle	Black (Dark green/black), green, olive green, younger brown	19th century	Base, body	Core and flake

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Cranebrook Creek CC1	Unmodified glass fragments.	No evidence of use'	Silcrete and chert stone tools includes scraper.		Undisturbed	Terrace
CSRA 7	Yes (retouch along two margins)		Stone tools, contact rock-art, other glass fragments.	Woodland	Disturbed (agricultural grazing since 1800)	Ridge top
Denbigh OPD 7 (Denbigh 1,2,3,4)	Yes (includes step retouch, blade prep, negative scars, both ventral and dorsal surfaces, percussion flaking?)	Yes	1 silcrete frag and 1 basalt edge-ground hatchet.	Eucalypt and small shrub	Undisturbed	Ridge crest

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Cranebrook Creek CC1			Site card only	J. L Kohen	1981
CSRA 7			Happ, G. & Haglund, L. 1983. An Aboriginal Sites Survey at Cattai State Recreation Area. Report to NPWS.		
Denbigh OPD 7 (Denbigh 1,2,3,4)	Historic Denbigh Homestead had an Aboriginal camp on property.	3 Photos in reports Bottle Base fragment 52 x 39 x 10mm  Figure 6: Worked bottle glass artefact #2.  Figure 7: Worked bottle glass artefact #3 Version 1.0 July 2003 Prepared by Mary Dallas & Dan Tuck 12  Figure 8: Worked bottle glass artefact # 4	Dallas, M. & D. Tuck. 2003. Denbigh Curtilage Study: Aboriginal Cultural Heritage./ JMcDCHM. 2007. Archaeological investigation of the Oran Park Precinct in the South West Growth Centre, Camden, NSW. Report to APP.	Amy Stevens and Andrea Ward	2007

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
DR15 (Marroota Historic Site)	45-2-0238	Open scatter	5	25x?x10 (largest/ based on photo) 20x?x5 (smallest/ based on photo)	?	Colourless			Flake
EG 6	45-5-2562	Open scatter	1						
Emu Plains EP 1-3	45-5-0493/ 45-5-0288	Open scatter	148		Bottle	Black (79), other (69)	1860s		
Emu Plains F4-1	45-5-0052	Open scatter			Bottle	Black, Solarised (purple), brown, green (green embossed), blue (blue embossed), colourless	Late 19th century- 1920 (black, green, blue, maganese)/ 1920 to present (clear and beer bottle)	Various	

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
DR15 (Maroota Historic Site)	Yes (based on photo)		294 Aboriginal stone artefacts (grey medium-grained volcanic, chert, mudstone, silcrete, quartz, quartzite). <150m from post-contact rock art site (DRM).	Woodland	Disturbed	Terrace
EG 6			5 stone artefacts (silcrete).	Cleared woodland	Disturbed (construction of transmission line)	Hill slope
Emu Plains EP 1-3	Yes	Yes	45 Ceramic with use-wear and retouch. 15 stone tools (quartz and other unspecified). Core tools, bipolar quartz.	Recently cleared woodland	Disturbed	Hill slope
Emu Plains F4-1	Unmodified glass fragments.		Mid to late 19th century ceramic brick and iron sickle blade. 3 stone artefacts (silcrtete, green volcanic and FgS) backed blade.	Light woodland	Disturbed (bulldozing)	Ridge crest

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
DR15 (Maroota Historic Site)		1 Photo with site card 	(C-916) McDonald, J. 1986. Maroota Historic Site Archaeological Survey.	Attenbrow	1987
EG 6			Site card references AASC for Dukes Energy by Annie Nicholson 1998.	Annie Nicholson	1999
Emu Plains EP 1-3			(C-524) Kohen, J. 1981. Excavation and Surface Collectiosn at an Aboriginal Campsite on Jamisons Creek, Emu Plains, NSW.	J. L Kohen	1981
Emu Plains F4-1		1 photo in report 	(C-820)Dallas. 1984. An Archaeological Study of the Proposed F4 Extensions at Emu Plains, NSW.	Mary Dallas/Anne Bickford	1984

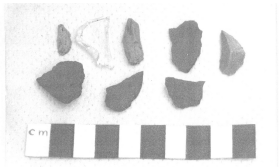
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
First Gov House	45-6-2299	Open scatter	1	30x25x? (based on photo) thick	Bottle	Black		Base	
Glaisher Point; Gunnamatta Bay	52-3-0188	Midden and burial	1	23x15x? (based on photo)	Bottle	Colourless			
GLC 1	45-5-2561	Open scatter	1						Flake
H362 (Holsworthy Military Area)	45-5-2947	Open scatter	7	30x22x7/ 15x15x5 and 5 other' smaller pieces'		Solarised (purple), colourless			Flake (possible backing)
Jamisons Creek 1 Emu Plains	45-5-0222	Open scatter	442		Bottle	Black (Dark Green/Black)	Early 19th century		

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
First Gov House	Yes (bi facial extensive)	Yes	Yellow-brown flaked flint.			
Glaisher Point; Gunnamatta Bay	Yes (along 10mm of margin)		9 stone tools (silcrete? photo) elouera, backed blades and microblades, midden material, burial, red ochre.		Undistubed	
GLC 1	Yes		26 stone tools (silcrete and chert).	Cleared woodland	Disturbed (track construction)	Ridge crest
H362 (Holsworthy Military Area)	Yes (on all edges)	Yes	18 stone artefacts (8 Silcrete, 3 tuff, 2 pet wood, 3 volcanic, 1 chert 1 quartz). Microliths, backed blades, core pebbles, geo microliths, microblade cores, multiplatform cores.	Cleared woodland	Disturbed	Risge crest
Jamisons Creek 1 Emu Plains	Yes		The surface collection yielded 9348 stone tools, Bondi points and fabricators, elouera, geo microliths, thumbnail scrapers, other scrapers, axe blanks, edge trimmed point, adze flake? 120 pieces of bone, 9 shell and 1429 post-contact materials . Hand made nails, beads, ceramic		Disturbed	Terrace

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
First Gov House	3 aboriginal burial sanctioned by the govenor (Tench, 1793)/ Arabanoo or Manly lived in separtate hut in yard (1788), also housed Bennelong and Colebee.	Photos with repc 	PROUDFOOT H., A. BICKFORD, B. EGLOFF & R. STOCKS. 1991. Australia’s First Government House. Sydney. Crows Nest (NSW). Allen and Unwin.	Anne Bickford- Excavation director	1990
Glaisher Point; Gunnamatta Bay		Photo in report 	Haglund, L. 1977. Archaeologists Report on Aboriginal Middens, CSIRO Division of Fisheries and Oceanography, Cronulla, NSW.	Laila Haglund	1977
GLC 1			Site card references AASC for Dukes Energy by Annie Nicholson 1998	Annie Nicholson	1999
H362 (Holsworthy Military Area)		Sketches on site card	Site card references 'Aboriginal Cultural Heritage 11, proposal for a Second Sydney Airport at Badgery's Creek or Holsworthy Military Area'.	G. Chalker	1996
Jamisons Creek 1 Emu Plains			McCarthy, F.D. 1946. The Lapstone Creek Excavation. Aust Museum / (c-524/822) Kohen, J.L. 1984. An Arch Re-appraisal of the Jamisons Creek Site Complex, Emu Plains/ (c-820) Dallas, M. 1984. An Archaeological Study of the Proposed F4 Extensions at Emu Plains, NSW	James Kohen	1979

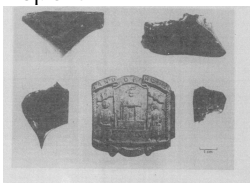
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Jamisons Creek 1/1LT Emu Plains	45-5-0222	Open scatter	61		Bottle	Black (Dark Green/Black)	Early 19th century		
Jamisons Creek 1/E Emu Plains	45-5-0222	Open scatter	188		Bottle	Black (Dark Green/Black)	Early 19th century		
Jamisons Creek Emu Plains JC 2	45-5-0287/ 45-5-0495	Open scatter	Not specified		Bottle				
Junction Lane	45-6-2580	Open scatter and deposit	2						Flake
Killarney 1	45-6-2201	Open midden	1			Solarised (Purple)			
Lapstone Creek/ Emu Plains	45-5-0070	Open scatter	17 (recorded as having R/U but 4 in photo)	30x40x?/ 25x55x?/30x40x?/20x20x? 'thick'	Bottle	Black (Black/dark green 8/43) Colourless (8/50) Blue (1/6)	Early 19th century (on had pontil indicating pre 1840)	Base (pontil)	
Little Bay 4	45-6-2156	Open midden	1	70x46x21	Bottle	Black		Base	

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Jamisons Creek 1/1LT Emu Plains			As above.		Disturbed	
Jamisons Creek 1/E Emu Plains			As above.		Disturbed	Terrace
Jamisons Creek Emu Plains JC 2			Chert stone tools.			Terrace
Junction Lane			Stone tools including one possible blade.	Estuarine	Disturbed	Flat
Killarney 1	Yes		Midden material.			
Lapstone Creek/ Emu Plains	Yes (continuous edge- based on photo)	Yes	Ceramic fragments (1820-1840), eartheware bottles, buckle (dated to 1935-1843) , shell, bone, stone tools. A scraper, eloera and hammerstones, bondi point, burins, fabricators?		Disturbed	Hill slope
Little Bay 4	Yes (2 flakes on base)	Yes (along both edges)	Midden material: Worked cockle shell and other shell.	Blown out dune system.	Undistubed	Dune

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Jamisons Creek 1/1LT Emu Plains			As above	James Kohen	1979
Jamisons Creek 1/E Emu Plains			As above	James Kohen	1979
Jamisons Creek Emu Plains JC 2			(C-524) Kohen, J. 1981. Excavation and Surface Collectiosn at an Aboriginal Campsite on Jamisons Creek, Emu Plains, NSW.	J. L Kohen	1981/1986
Junction Lane			(C-3872) Brayshaw and Haglund. 1997. Eastern Distributor Aboriginal Archaeoloyl Monitor. Report to Leighton Contractor Pty.	H. Brayshaw	1997
Killarney 1			Site card only	Guider	1990
Lapstone Creek/ Emu Plains		1 Photo in report 	(C-524) Kohen, J. 1981. Excavation and Surface Collectiosn at an Aboriginal Campsite on Jamisons Creek, Emu Plains, NSW.	James Kohen	1977
Little Bay 4	Leprosy Lazaret (established 1880s) and Coastal Hospital		Rich, E. 1990. Prince Henry Hospital Conservation Plan.	Rich, E and L. Smith	1990

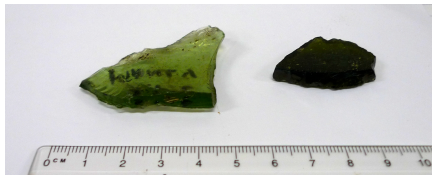
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Lyell Dam 15/ LD 15	45-1-0248	Open scatter	6		Bottle			Base (3) Unspecified (body?) Flake (3)	Flake
Manly Stockton site	Not registered	Unknown	1	40x32x?/ 34x19x?		green		Body	Flake
Manly, Spring Cove Shelter/ North Head	45-6-0728/ 45-6-0726/ 45-6-2039/ 45-6-2495	Closed site and midden	Unspecified						
Mountain St Ultimo	45-6-2663	Open scatter	1		Bottle	Green			
Mulgoa 2	45-5-0409	Open scatter	Not specified		Bottle		19th century		

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Lyell Dam 15/ LD 15	Yes (on one flake)		European artefacts and Aboriginal stone tools (chert chalcedony and quartz). One bondi point included.	Cleared woodland	Disturbed (Vehicular traffic over deposit)	Hill slope
Manly Stockton site	Yes	Yes				
Manly, Spring Cove Shelter/ North Head	Unmodified glass fragments.		Midden material (kitchen midden),pecked fish motif (18inches long), Iron nail, bone tool, 4 burials (one skull of baby), shell fishhook, wad of paper bark. Stone artefacts (basalt, chert, quartz) included fabricators, eloueras, fish hooks, steep scrapers, bone point, white ohcre.	Shelter	Undisturbed	Shelter
Mountain St Ultimo			2 stone tools (tuff and chert).		Disturbed	Flat
Mulgoa 2	Unmodified glass fragments.		Ceramic and stone tools (silcrete, quartz and chert). Blade, bipolar/scalar piece.	Woodland	Disturbed	

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Lyell Dam 15/ LD 15			Pearson, M.1995. No. 2 Stockade Cox's River Archaeological Survey and Excavation. Report to Pacific Power.	M. Pearson	1995
Manly Stockton site		Photos in folder 	Footnote in Attenbrow. 2010.		
Manly, Spring Cove Shelter/ North Head	Cave is reputed to be the one where Gov Phillip landed and was speared in Manly. Also near where Nan Watson and family lived at Little Manly Cove			E. Stockton	
Mountain St Ultimo			Dallas. 2003. Aplication for a Section 90 Heritage Report and Permit with Salvage for the Archaeological Investigation of 22-36 Mountain St Ultimo.	M. Dallas	2003
Mulgoa 2			Dallas, 1981. An Archaeological Survey of the South Perith Development Site.	M. Dallas	1981

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Northern Boiler Paddock 1/ NBP1	45-5-3309	Open scatter	1	65x37x25	Hand blown, sand mould bottle	Black (Dark green)	1830-1890	Base	
PA 1	45-5-0805	Open scatter	1	40x18x3		Black (Dark Green)			Focal platform flake
PA 2	45-5-0806	Open scatter	1	20x20		Black (Dark Green)			Core
Parramatta Park Governors Dairy	Historical arch excav	Open scatter	1			Black	1880's fill		Possible point
Penrith Lakes 39	45-1-0219	Open scatter	6						

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Northern Boiler Paddock 1/ NBP1	Yes (unidirectional continuous scarring)	Possible	Worked ceramic. 5 stone Microliths (4 silcrete, 1 tuff).	Cleared forrest	Disturbed	Hill slope
PA 1	Yes (retouch and erailure scar)		13 stone tools (silcrete and mudstone).	Riverine	Undisturbed	Flat
PA 2	Yes		5 stone tools (quartz and silcrete).		Undisturbed	Hill slope
Parramatta Park Governors Dairy	Yes	Yes (based on photo)	2 stone tools (silcrete and chert? Based on photos).		Undisturbed	
Penrith Lakes 39	Unmodified glass fragments.		386 stone tools (chert, silcrete, quartz, quartzite, basalt) Bondi points, geomethric microliths, elouera adze flakes, scapers. Ceramic also.	Woodland	Undisturbed	Ridge crest

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Northern Boiler Paddock 1/ NBP1		2 photos with report  Photo 4: Study Area B – Site NBP1 - Glass fragment displaying evidence consistent with flake production	MDCA. Cultural Heritage Survey and Assessment Report, Huntingwood East Precinct, Huntingwood, NSW. Report to DBL./ Ngara Consulting. 2003. Archaeological Field Assessment of Aboriginal Heritage, Norther Boiler Paddock, Blacktown-Huntingwood. Report to Conybeare Morrison and Partners.	Paul Irish/ Ngara	2007
PA 1	Prospect Hill		Comber, J. 1990. Prospect Reservoir Bypass Stage Two Alternative Route.	Comber	1990
PA 2	Prospect Hill		As above	Comber	1990
Parramatta Park Governors Dairy		2 photos in folder 	Bickford, A. 1987. Parramatta Park the Governors Dairy Excavation of Portion of Room 4C. Report to Brian MacDonald Architect Pty.		1987
Penrith Lakes 39			Kohen, 1992. Penrith Lakes Scheme: Routine Inspection of Quarry Operation.	Kohen	1992

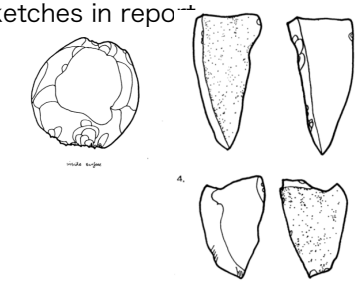
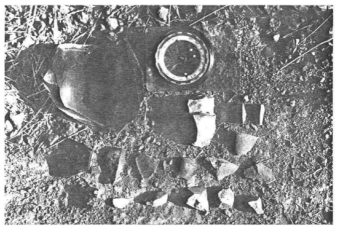
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Pitt Town 2/ PT2	45-5-3040	Open scatter	1						
Prospect Lagoon 1	45-5-0870	Open scatter	4	60x60x30/40x35x20/65x30x10/50x30x10		Green		Bases (2)	2 cores, 2 amophous flaked pieces
Prospect Resevoir PP 1		Open scatter	7	30x20/35x20/20x2x10/30x15x4/20x5/20x3x2/70x5	Bottle	Black (Dark green)5, light green 1, solarised (coulourless with purple tinge)1.		Base, body	2 cores, 2 amophous flake, broad platform flake
Prospect Resevoir PP2	45-5-0869	Open scatter	1	15x10x5		Solarised (colourless with purple tinge)2			Broad platform flake

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Pitt Town 2/ PT2			19 stone artefacts (silcrete quartz, rhyolithic tuff, chert, basalt). Hand ground axe.	Cleared open forrest	Disturbed	Flat
Prospect Lagoon 1	Yes (one one edge)		Stone tools (silcrete, fg volcanic/basalt).			
Prospect Resevoir PP 1	Yes (both lateral margins, on edge, flake scar)		Stone microliths (silcrete, basalt, quartz, chert, indurated mudstone).	Woodland	Disturbed (quarrying)	Hill slope
Prospect Resevoir PP2	Yes (retouch on both lateral edges)		Basalt micro-core.		Undisturbed	Hill slope

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Pitt Town 2/ PT2			Aboriginal Heritage Impact Assessment for Lots 11-18 DP1021340, Hall Street Pitt Town, NSW. For Johnson property group (JPG).	Fiona leslie	2004
Prospect Lagoon 1	William lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)	Sketches in report 	(C-2225) Comber, J. Archaeological Survey of Areas Proposed for the Siting of Pumping Stations and Residual Lagoon at Propect Resevoir. Report to Sinclair Knight.	Denise Dolon	1991
Prospect Resevoir PP 1	William lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)	Photos with report  Photograph 8: Site PP1: Sample of artefacts from cutting.	As above.	Jillian Comber and Louise Gay	1991
Prospect Resevoir PP2	William lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)		As above.	Jillian Comber and Louise Gay	1991

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Prospect Resevoir PR 2	45-5-0766	Open scatter	>1000 in 7 clusters	512x11x4/ 39x29x9/ 75x53x9/25x31x3	Hand blown champagne bottles and perfume bottle	Black (Dark green), olive green, solarised (purple perfume bottle)	Early 19th century	Base (12-18), body, neck	Cores and flakes
Prospect Resevoir PR 3	45-5-0767	Open scatter	>2000 in 4 clusters	65x40x15/ 32x45x17/ 31x18x6/59x37x18	Hand blown champagne and moulded bottles	Black (Dark green), light green (few)	Early 19th century	Body (fragments outnumbered neck and base fragments 'in unexpectantly large numbers')	Cores, scrapers, flakes
Prospect Resevoir TPP 1	45-5-0866	Open scatter	15 artefactual over 40 fragments	40x35x15/ 45x35x15/ 70x45x10/65x35x5/ 42x20x15	Bottle	Black (Dark green)4, blue1		Body, base	2 Cores, 1 body frag and 2 amorphous flaked pieces.
Quakers Hill	45-5-0490	Open scatter	4	<20mm length	Slag	Solarised (purple)			

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Prospect Resevoir PR 2	Yes	Yes	4 stone artefacts (silcrete). Focal, lamented, broad platformed flakes.	Open forrest	Undisturbed	Ridge crest
Prospect Resevoir PR 3	Yes	Yes	None.	Open forrest	Undisturbed	Ridge crest
Prospect Reservoir TPP 1	Yes (old and new breaks, no of flakes removed recorded)		None.	Woodland	Disturbed (Possible vehicle damage)	Hill slope
Quakers Hill			31 silcrete, 4 fine grained basic?, 1 quartzite. One backed blade.	Open woodland	Undisturbed	Flat

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Prospect Resevoir PR 2	William lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)		(C-1723) Smith, L. 1989. Prospect Resevoir Proposed Water Channel: A/S for Aboriginal Sites.	Rich and Smith	1989
Prospect Resevoir PR 3	William lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)	Various photos in report 	As above.	Rich and Smith	1989
Prospect Reservoir TPP 1	Prospect Hill		(c-2246) Comber and Donlan. A/S Prospect Water Treatment Works- Pilot Plant and Prototype Plant/ (c-2225) Comber, J. 1991. Archaeological Survey of Areas Proposed for the Sitting of Pumping Stations and Residuals Lagoon at Prospect Reservoir. Report to Sinclair Knight.	D. Donlan	1991
Quakers Hill	Record of Aboriginal man Tarbot living in nearby shelter in 1870s		(C-874) Smith, L.1985. An Archaeological Survey of the Pye Road carrier at Quakers Hill, NSW. Report to MWS&DB.	J. McDonald	1985

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Quibray Bay/ MaCue Midden	52-3-0211	Midden	7(Rolfe) several (Dickson 1 Bondi point)	26mm (bondi point), 30mm (piece with prunt)	British Wine bottle, French bottle	Black, bronze (Superficially devitrified to a bronze colour, dark green), patinated	Late 18th century based on vintner's prunt of French bottle/ British bottle dated 1810-1820	Base	Bondi points, 'groover' (Rolfe), scrapers
Reef Beach 1- Manly	45-6-0261	Open midden and burial	several			Black (Dark green)			
Roughwood Park EKC 34	45-5-0270	Open scatter	1		Bottle			Base	
RV 28 (East of First ponds Creek)		Open scatter, scarred tree and deposit	1		Bottle		19th century		Core

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Quibray Bay/ MaCue Midden	Yes (transverse flaking on bondi point)		Midden. Pieces of clay pipe (1840), brass regimental button,crushed silver thimble, 2 musket balls. Stone tools included elourera, backed blades) scrapers.	Dune system	Undisturbed (but sand-blasting possible and deep scratches on surfaces)	Dunes
Reef Beach 1- Manly	Unmodified glass fragments.		Associated with an infant burial dated by association with metal military button and 1 piece of glass, coin bearing impression of woven cloth, midden dated to AD 800. above 560mm much metal and glass (20th century).	Beach	Undisturbed (subsurface deposit)	Dunes
Roughwood Park EKC 34	Yes (around edge but may be trampling)		Silcrete and Basalt stone artefacts including a bifacially flaked pebble.	On small tributary	Disturbed (Paddock trampling possible)	
RV 28 (East of First ponds Creek)	Yes (several dorsal scars and edge retouch)		Young scarred tree, 15 stone artefacts (silcrete, mudstone, quartz).		Undisturbed	Flat

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Quibray Bay/ MaCue Midden	Thought to be a relic of the La Perouse Expedition. The particular wine is recorded as being supplied to this expedition.	1 Photo in Mankind article 	(C-2045) Bradshaw McDonald Pty. 1991. Additional Information to Dickson's Archaeological Survey: Sydney Destination Report. Report to Besmaw Ltd/ (C-1307) Byrne, D. 1987. Test Excavation and Assemblage Analysis at Quibray Bay #2 an Open Site at Kurnell. Report to Monier Pty & Pioneer Concrete Pty./ C-270)	F.P. Dickson	1991
Reef Beach 1- Manly			Site card references 'Attenbrow, 1990 (forthcoming)'	Found during lab analysis by M. Walker in 1970s.	1970s
Roughwood Park EKC 34			Site card only.	M. Koettig	1981
RV 28 (East of First ponds Creek)			HLA ENSR. 2008. Aboriginal Heritage Assessment: Sydney Water Infrastructure in the Northwest Growth Centre's of Riverstone and Alex Ave.		2008

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
RWP 2 Riverstone	45-5-3641	Open scatter	1						
Site REL 3 (Prospect)	45-5-2893	Open scatter	5	38x23x5/35x22x6/	Beer/wine bottle	Black (Dark green)	Pre 1830/ post 1850/ early 20th century	Base (2), unspecified flakes (2)	Flake
South Creek SC 2	45-5-0289/ 45-5-0524	Open scatter	2		Bottle				

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
RWP 2 Riverstone			Silcrete stone tools and large amount of unworked silcrete.		Undisturbed	Hill crest
Site REL 3 (Prospect)	Yes (distinct recent breakage and old flake removal, one artefact had 7 continuous flake scars)	Yes (possibly)	Possible clay pipe stem frags. Ceramic frags (ginger beer 1850-90 and crockery). Bricks (pre1850), badge(1918) and coin(1896). Silcrete, chert, basalt , quartz and quartzite artefacts of unspecified amount. Bipolar cores, geo microliths, thumbnail scrapers, elouera, adze flake.	Open forest/woodland	Disturbed	Ridge crest
South Creek SC 2			Silcrete and chert artefacts including Scrapers.	Recently cleared medium woodland	Disturbed	Flat (flood plain)

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
RWP 2 Riverstone			Godden Mackay Logan Heritage Consultants. 2008. Aboriginal Heritage Assessment for the Riverstone Meatworks Complex/ Riverstone West Precinct, Sydney. Aboriginal Archaeological Heritage Assessment (Report to Northwest Transport Hub).	L. Farquharson and M. Rowney	2009
Site REL 3 (Prospect)	William Lawson's land west of prospect hill in 1806. Veteran Hall estate. Site of Aboriginal resistance (GovArch, 2008)		(c-102059) Ngara Consulting. 2003. Archaeological Assessment of Aboriginal Heritage: Reservoir Entry Lands, Prospect. Report to Sydney Water.	Andrew Knight	2003
South Creek SC 2			Site Card only.	J. L Kohen	1981

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Spring farm 19	52-2-3797	IF	1	42x16x?		Black (Dark green/black)			Anvil/ broken blade
Tonalli Cove 2	52-1-0131	Open scatter and scarred tree	1	20x6x3 (based on photo and recordings)	Bottle	Green			

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Spring farm 19	Yes (significant retouch on edges, borderline denticulation)		None.	Woodland	Undisturbed	Hill slope
Tonalli Cove 2	Yes ('heavily'- around complete inner edge and some on outer edge-almost backed)	Yes	Scarred tree and 12 stone artefacts (Chert, quartz, quartzite and mudstone). Multiplatform core, focal and broad platform flakes (photos of artefacts on site card).	Woodland	Undisturbed	Hill slope

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Spring farm 19		4 photos with site card  	(c-101807) Kyandel Arch Services. 2009. Aboriginal Archaeological Assessment: Spring Farm Bush Corridor. Prepared for Leah and Hayward Pty Ltd.	K. Mann	2009
Tonalli Cove 2		1 Photo on site card 	(C-1720) Brayshaw. 1989. Waragamba Dam Archaeological Study Sample Investigation.	Brayshaw and Dallas	1989

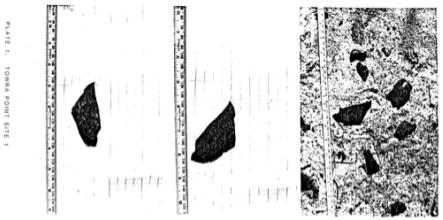
Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	AHIMS #.	Site type	MNF	Dimensions mm	Glass Type	Colour	Specified age of glass	Portion of bottle	Tool type
Towra point 1/ TP 1	52-3-0335	Open scatter	7 (based on photo but only the two are described as flaked)	74x35x6/ 40x23x4	Bottle	Black (Dark green)			
Wallacia Weir 01/ WW01	52-2-3627	Open scatter	2	12.8x14.7x6.8/27.7x14.4x7.7		Black (Black/green)			Distal flakes
Wilton park 12/ BC 12	52-2-3036	Open scatter	1			Solarised (Purple)	Late 19th century		
Yarra Point (La Perouse)	45-6-0292	Midden	1						

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Working/Retouch	Usewear	Associated Material Culture	Environmental context	Disturbance	Topographic context
Towra point 1/ TP 1	Yes (several flake removals)	Yes	None	Low Dune	Undisturbed	Ridge crest
Wallacia Weir 01/ WW01	Yes (based on photo)		43 stone artefacts (mudstone, quartz, chert silcrete, chalcedony, fgs). Backed artefacts, blade prep core, geometric microlith, elourera.	Riverine?	Undisturbed	Ridge
Wilton park 12/ BC 12	Yes (one margin)		17 stone artefacts (silcrete, tuff, chert, quartz. Most stone tools < 22x13x10.	Open woodland	Disturbed (animal grazing)	Hill slope
Yarra Point (La Perouse)	Yes		Midden: 2 pieces of flakes ceramic, 97 stone artefacts (quartz, silcrete, fgs, quartzite and mudstone)		Undisturbed (subsurface deposit)	

Appendix A- Aboriginal Glass Artefacts- Sydney

Site name	Historical context	Photographed/ Sketch	Reference	Recorder	Year recorded
Towra point 1/ TP 1	CCLP Historic Site?	3 photos with report (plate 1) 	(C-584) Travers Morgan. 1984. Preliminary Archaeological Survey of Towra Point Nature Reserve	Sue McIntyre	1984
Wallacia Weir 01/ WW01		1 Photo with site card 	(c-101401) AMBS. 2009. Aboriginal Archaeological Heritage Assessment for Therosa Parkand Wallacia Weirs. Prepared for SMEC Aust Pty Ltd.	J. Weston	2009
Wilton park 12/ BC 12			Navin Officer. 2003. Proposed Wilton Park Residential Subdivision.	J. Dibden	2002
Yarra Point (La Perouse)	La Perouse		(C-585) Rich, 1986. Yarra Point Site 45-6-0292 Archaeological Investigation. Prepared for Randwick Municipal Council.	C. M. Kinross	1983

APPENDIX B- RECORDING SHEET

FIELD RECORDING SHEET

SITE: ARTEFACT NUMBER:

PHOTO NUMBER/S: RECORDER:

General site information (once per site)

LOCATION:

EXTENT OF SITE:

TOPO/ ENVIRO:

VISIBILITY:

Glass datable to the late 18th - mid 19th century

Raw material type
Bottle/ slag/ insulator/ other

Bottle Portion
Base/ wall/ neck/ shoulder/ lip

Manufacture
Hand blown/ mould seems/ pontil mark/ other/ indeterminate
Describe:

Maker's mark or Design
Text/ Symbol
Description:

Colour
Black/ olive/ blue/ patinated/ solarised/ colourless/ other

NOTES:

Presence of macroscopic usewear and/or residue

Limited to one or two working edges
Usewear/ Residue/ Neither
Edge/ Edge surface/ Platform/ surface
No. of edges:

NOTES:

Presence of 'Convincing' Retouch

Scar location predominantly on edges
Location:
Dorsal/ ventral /Bifacial/ indeterminate
Number of edges:

Continuous retouch
No. of continuous scars:

Scar size regularity
Size of scars:

Regularity of orientation/initiation of negative flake scars
Orientation:

Relative age of scars
No. of flaking events:

NOTES:

Presence of Stone Artefact Attributes

Bulb of percussion
Size:

Erailure/ Bulbar scar
Present/ absent

Acute external platform angles
Edge angle:

Stress fractures or ripple marks
Present/ Absent

Termination type
Feather/ hinge/ step/ bending/ indeterminate/ other

Reflection of stone tool type
Core/ flake/ scraper/ point/ blade/other

NOTES:

Presence of Thick Glass

Thicker parts of the glass are more likely to be used
Base core/ base flake/ shoulder/ wall/ neck/ lip/ other

Dimensions (mm)
Length:
Breadth/ thickness:
Width:

Lack of wall/ body attached to base
Amount attached? (mm):

NOTES:

Absence of attributes related to unintentional damage

High point crushing
Location of crushing:

Intermittent retouch
Space between scars (mm): / / / /

Irregular sized flake scars
Size of scars (mm): / / / /

Flaking on more than one or two margins
No. of margins: 1/ 2/ 3/ 4

Steep flaking (forming edges close to 90 degrees)
Edge angle:

Large isolated flake scars
No. of scars:
Size (mm):

NOTES:

Evidence of reduction sequence

Cores and flakes
Present/ absent
No. of Cores:
No. of Flakes:

Worked and unworked fragments from the same bottle
MNF:
MNI:

Refitting
No. of flakes/ fragments:

NOTES:

Presence of associated material culture

Stone tool/s
Raw materials:
Technology:

Other modified European material
Describe:

Other associated material
Describe:

NOTES:

Absence of taphonomic processes related to incidental flaking

Animal trampling/ Vehicular traffic/ Agricultural activity/ Construction work/ European rubbish/ weathering

NOTES:

APPENDIX C- DIAGNOSTIC GLASS BOTTLE CHARACTERISTIC

Adapted from:

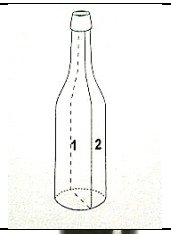
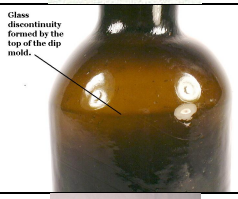
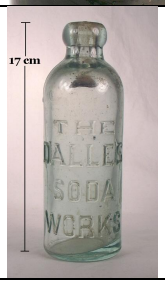
JONES, O. AND C. SULLIVAN. 1985. *The Parks Canada Glass Glossary for the Description of Containers, Tableware, Flat Glass and Closures. Studies in Archaeology, Architecture and History.* Parks Canada, Ottawa.

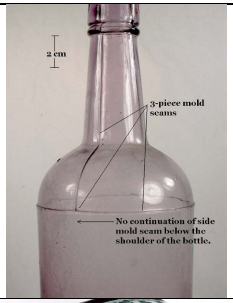
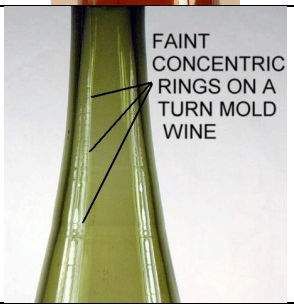
BURKE, H. AND C. SMITH, 2004. *The Archaeologists Field Handbook.* Allen and Unwin.

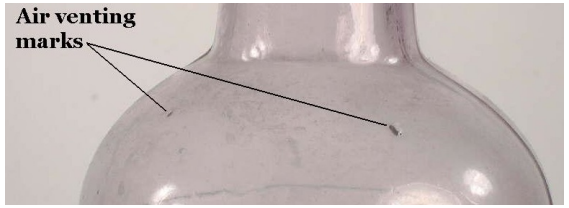
Lindsey, B. 2011. *Historic Glass Bottle Identification & Information Website:* http://www.sha.org/bottle/dating.htm

Colour	Metallic Oxide	Date	Example
Black or dark green or dark olive	High amount of iron oxide in the sand from which the bottle is made.	1830- 1870	
Aqua	Low amounts of iron oxide in the sand from which the bottle is made.	Uncommon after the 1920s except in soda bottles.	

Milk or white	Very rare. Mad by addition of tin or zinc oxide, fluorides and phosphates.	After 1870s	
Colourless or white or clear	Decolorizing agents e.g. manganese dioxide, selenium dioxide and arsenious oxide- or some combination of these.	See next two.	
Purple tint	Originally colourless but, tint caused by activation of manganese in the glass due to solarisation through prolonged exposure to UV light.	c1890- 1916	
Bronze or amber tint in thickest parts of glass.	Originally colourless, tint caused by activation of selenium or arsenious oxide in the glass due to solarisation through prolonged exposure to UV light.	After 1916	

Attributes associated with manufacture	Description	Date	Example
Full length two- piece mould	Mould seams extend from below the lip finish through the base and up the other side of the bottle.	c1750- c1900- 1930	
Dip mould	Faint circular mark or bulge on the upper body or near the shoulders of the bottle.	1760- c1860- 1870	
Embossed lettering	Raised letters or symbols on the outside of the bottle.	1821- 1920s	
Ricketts mould	Horizontal mould seams around the shoulder and neck of bottle. Two vertical seams between these. Another circular seam and embossing on the base.	1820- 1920s	

Three piece mould	One horizontal seam at the shoulder of the bottle and two vertical seems that run between it and the lip finish.	1820- 1840 to 1900-1920	
Pontil mark or scar	Small scar or bump inside a 'pushed up' base.	Before 1870	
Tooled finish	Bottle is refired and mouth finish attached to neck of bottle.	1820- 1925	
Turn-or-mould-paste	No seems. Possibly some faint horizontal rotational lines on the body of the bottle.	1870- 1920	

Vent marks	Small marks or bumps that can be found just about anywhere on the surface of a bottle but are most common on the shoulders, body corners, base and mould seams.	1877-1920	
Continuous full length two-piece mould	Mould seams on both sides of lip finish and sides of bottle and across the base.	1903 or later	
Valve mark	Circular mark on the base of the bottle.	1910- 1940s	
Stippled base	Raised stippling on the base of the bottle.	1940- present