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AECOM

LAND DISTURBANCE

Aboriginal Cultural Heritage Assessment
Hydro Aluminium Smelter Site & Associated Buffer Land
Kurri Kurri, New South Wales

FIGURE 17

5.0 Archaeological Context

5.1 Regional Context - The Hunter Valley

Formal archaeological interest in the Aboriginal archaeological record of the Hunter Valley can be traced to the late 1930s, with then Curator of Anthropology at the Australian Museum Fred McCarthy undertaking an archaeological reconnaissance of the Valley in 1939 (Moore, 1970: 29). McCarthy's subsequent investigation, with F.A. Davidson, of an extensive open artefact site on a terrace of the Hunter River at Gowrie, near Singleton, is widely regarded as the first serious archaeological study of stone artefacts in the Hunter Valley proper (McCarthy & Davidson, 1943). MCarthy's early endeavours aside, more detailed investigation of the Valley's Aboriginal archaeological record did not begin until the mid-to-late1960s, a period that witnessed a series of archaeological surveys and site excavations completed as part of the Australian Museum's long term and wide ranging archaeological research project into the Aboriginal prehistory of the Valley (Moore, 1969, 1970, 1981).

Intensive development activities since this time have secured the Hunter Valley's place as one of the most intensively investigated archaeological regions in Australia, with hundreds, if not thousands, of Aboriginal archaeological investigations involving survey and/or excavation having now been undertaken, the majority as part of larger environmental impact assessments associated with coal mining projects. Not surprisingly, these investigations have varied significantly in scale and scope, ranging from targeted small-scale surveys to complex, multi-phase survey and excavation projects over large areas. Nonetheless, together, they have generated a large and diverse body of evidence for past Aboriginal occupation, with thousands of Aboriginal sites now registered on OEH's Aboriginal Heritage Information Management System (AHIMS) database. Together with Dean-Jones and Mitchell's (1993) pioneering environmental study, existing syntheses of the Aboriginal archaeological record of the Hunter Valley (e.g., ERM, 2004; Hughes, 1984; Koettig, 1990; MacDonald & Davidson, 1998) provide a suitable interpretive framework for the current assessment. Key research themes are detailed in brief below.

5.1.1 Open Artefact Sites: Distribution, Contents and Definition

Surface and subsurface distributions of stone artefacts, variously referred to as open artefact sites, open sites and open camp sites, are by far and away the most common and widely distributed form of Aboriginal archaeological site in the Hunter Valley (ERM 2004; Hughes, 1984; MacDonald & Davidson, 1998). Other site types, such as scarred trees, shell middens, quarries, grinding grooves, burials and rock shelters with deposit and/or art or PAD, have also been identified but are comparatively rare. Accordingly, open artefact sites remain the most intensively investigated component of the Aboriginal archaeological record of the Hunter Valley, with site distribution, site structure and the technology of backed artefact manufacture, in particular, comprising key research topics (Baker 1992a, 1992b, 1992c; Hiscock 1986a, 1986b, 1993a; Koettig 1992, 1994; Moore 1997, 2000; White 1999, 2012).

As highlighted by Hughes (1984) and reiterated by numerous other researchers (e.g., ERM 2004;Koettig & Hughes, 1983, 1985; Koettig 1992,1994;Kuskie, 2000; Rich, 1992), existing archaeological survey data for the Hunter Valley indicate a strong trend for the presence of open artefact sites along watercourses, specifically, on creek banks and 'flats' (i.e., flood/drainage plains), terraces and bordering slopes. Although this distribution pattern can be attributed in part to geomorphic dynamics and archaeological sampling bias, with extensive fluvial erosion activity along watercourses resulting in higher levels of surface visibility and, by extension, concentrated survey effort, an occupational emphasis on watercourses is supported by the results of several large scale subsurface salvage projects (e.g., Koettig, 1992, 1994; Kuskie & Clarke, 2004; Kuskie & Kamminga, 2000; MacDonald & Davidson, 1998; OzArk, 2013; Rich, 1992; Umwelt, 2006,Umwelt, in prep). Collectively, these projects have also shown that assemblage size and complexity tend to vary significantly in relation to both the proximity and permanency of potable water sources as well as landform and slope, with larger, more complex[6] assemblages concentrated on elevated, low gradient landform elements adjacent to higher order streams. In the Lower Hunter Valley, a similar pattern has been identified for the permanent to semi-permanent wetlands of the Hunter 'delta' (e.g., Kuskie, 1994; Kuskie & Kamminga, 2000; Umwelt, 2006, in prep). Outside of these contexts, surface and subsurface artefact distributions have typically been found to be sparse and discontinuous and are often referred to as 'background scatter'.

Flaked stone artefacts dominate archaeological assemblages from recorded open artefact sites within the Hunter Valley (Hiscock 1986), with heat fractured rock also well represented. Items such as complete and fragmentary grindstones, hammerstones, edge-ground hatchet-heads, ochre and shell have also been identified though

[6] Those containing a wider variety of raw materials and technological types and/or higher mean artefact densities and features such as knapping floors and hearths.

comparatively infrequently. With the notable exception of 'knapping floors', a relatively common component of the open artefact site record of the Hunter Valley, associated archaeological features (e.g., hearths and heat treatment pits) remain regionally rare phenomena (for examples see Koettig, 1992; Kuskie & Kamminga, 2000).

Defined in slightly different ways by different researchers, knapping floors can be broadly defined as spatially-discrete activity areas in which primacy was given to the reduction of one or more stone packages (White, 1999:152). Recorded knapping floors in the Hunter Valley vary considerably in size and complexity, with some of the largest and most complex examples identified through excavation as opposed to survey. Backed artefacts are a common feature of knapping floors and most of these features were likely specifically associated with their production. At Narama, near Ravensworth, a detailed analysis of the contents of knapping floor and non-knapping floor assemblages revealed significant differences between the two, including variation in the frequency of backed artefacts, other retouched and/or utilised tools and cores, and the application of different reduction strategies (Rich, 1992). Together with differences in the spatial distribution of the two forms of assemblage, this evidence was used to suggest that backed artefact production within the Narama landscape was a highly structured activity, and that knapping floors assemblages were the product of a more restricted range of behaviours than more generalised scatters. Although limited to a single landscape, evidence from other parts of the Valley (e.g., Hiscock, 1986; Koettig, 1992, 1994) provides further support for the suggestion that backed artefact manufacture in the Hunter Valley was a highly structured activity.

Although relevant to a variety of site types, geomorphic processes such as soil erosion, colluvial/fluvial aggradation and aeolian transportation are of particular relevance to the identification and definition of open artefact sites. As in other archaeological contexts (e.g., Attenbrow 2010; Fanning & Holdaway 2004; Fanning *et al*. 2009; Holdaway *et al*. 2000), it is now widely accepted by archaeologists working in the Hunter Valley that the visibility of open artefact sites within the Valley is, for the most part, a product of contemporary and historic geomorphic processes which have variously exposed and obscured them. As demonstrated by numerous large scale archaeological salvage projects within the Valley (e.g., Koettig, 1992, 1994; Kuskie & Clarke, 2004; Kuskie & Kamminga, 2000; MacDonald & Davidson, 1998; OzArk, 2013; Rich, 1992; Umwelt, 2006,Umwelt, in prep), surface artefacts invariably represent only a fraction of the total number of artefacts present within recorded surface open artefact sites, with the majority occurring in subsurface contexts. Artefact exposure, unsurprisingly, is highest on erosional surfaces and lowest on depositional ones. At the same time, in many areas, surface artefacts have been shown through large-scale subsurface testing to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as distance to water, stream order and landform.

Such evidence has posed a significant analytical and interpretive dilemma for archaeologists working in the Hunter Valley. Defining sites on the basis of surface artefacts alone is clearly problematic, with modern site boundaries frequently reflecting the size and distribution of surface exposures as opposed to the actions of Aboriginal people in the past. Nonetheless, for pragmatic reasons, this has been the most commonly used approach, with 'distance' and 'density-based' definitions dominating. In the Hunter Valley, two of the most commonly employed distance-definitions are '*two artefacts within 50m of each other*' and '*two artefacts within 100 m of each other*'. Neither definition is derived from a particular theoretical approach or body of empirical research - they are simply pragmatic devices for site definition. Definitions based on artefact density also vary in their particulars. However, one of most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 m², higher density clusters that are subsequently defined as 'sites'.

Kuskie's (1994, 2000) system of open artefact site definition, developed for use in the Hunter Valley and other surrounding regions, is also worthy of note here. In short, this system is predicated on the definition of 'survey areas' within broader 'Archaeological Terrain Units' (ATUs), with the latter comprising discrete, recurring areas of land defined on the basis of landform element and slope class, and the former, an area of a single ATU bounded on all sides by different ATUs (Kuskie, 2000: 65-67). Within this overarching environmental scheme, open artefact sites are defined by the presence of one or more stone artefacts within a survey area, with site boundaries corresponding the boundaries of the broader survey area irrespective of the visible extent of artefacts within it. Spatially discrete occurrences of stone artefacts within a given site boundary are referred to as 'loci' (Kuskie, 2000: 65-66).

5.1.2 Flaked Stone Artefact Technology

Flaked stone artefacts are a ubiquitous element of the Aboriginal archaeological record of the Hunter Valley and, such as, have assumed a preeminent role in archaeological reconstructions of past Aboriginal land use in the region. To date, hundreds, if not thousands, of surface-collected and excavated chipped stone assemblages from the Valley have been analysed, with individual assemblage sizes, research questions, aims, analytical

methodologies and terminological schemes varying significantly between researchers and projects. Studies to date have ranged from basic descriptive accounts of assemblage composition in typological terms to detailed reconstructions of specialised knapping techniques through rigorous technological analyses (including conjoining) and, in some instances, experimental research. Particularly informative analyses in the context of the Hunter Valley include those undertaken by Hiscock (1986a, 1986b, 1993a), Koettig (1992, 1994), Moore (1997, 2000), White (1999, 2012) and Baker (1992a, 1992b, 1992c).

As highlighted by Koettig (1994) and others (e.g., Hiscock 1986a; Hughes 1984), available technological and typological data for surface collected and excavated flaked stone artefact assemblages from the Hunter Valley suggest that the majority of these assemblages belong to what is known as the 'Australian small-tool tradition', a term coined by Gould (1969) to describe what was then thought to be first the first appearance, in the mid-Holocene[7], of a new suite of chipped stone tool forms in the Aboriginal archaeological record of Australia, including Bondi points, geometric microliths, adzes and points (both unifacially and bifacially flaked). Complex, hierarchically-organised reduction sequences associated with the production of these tools contrast markedly with the simple sequences of earlier periods (Moore, 2011). Tools of the Australian small-tool tradition, it has been suggested, formed part of a portable, standardised and multifunctional tool kit aimed specifically at risk reduction (Hiscock, 1994, 2006). Stone artefact assemblages from late Pleistocene and early Holocene contexts, in contrast, are described by archaeologists as belonging to the 'Australian core tool and scraper tradition', a term first used by Bowler *et al*. (1970) to describe the Pleistocene assemblages recovered from Lake Mungo in western New South Wales. Bowler *et al*. (1970) saw the main components of these assemblages - core tools, steep-edged scrapers and flat scrapers - as characteristic of early Australian Aboriginal assemblages and as being of a distinctly different character to those associated with small-tool tradition.

In southeastern Australia, including the Hunter Valley, the Australian small-tool and core tool and scraper traditions are most commonly described in terms of McCarthy's (1967) *Eastern Regional Sequence* (ERS) of stone artefact assemblages. Based on appreciable changes in the composition of chipped stone artefact assemblages over time, the ERS hypothesises a three phase sequence of 'Capertian' (earliest), 'Bondaian*'* and 'Eloueran' (most recent) assemblages and was developed on the basis of McCarthy's (1948, 1964) pioneering analyses of stratified chipped stone assemblages from Lapstone Creek rockshelter, on the lower slopes of the Blue Mountains eastern escarpment, and Capertee 3 rockshelter in the Capertee Valley north of Lithgow. At present, the most widely cited characterisation of the ERS is that of a four-phase sequence beginning with the *Pre-Bondaian* (McCarthy's *Capertian*) and moving successively through the Early, Middle and Late phases of the *Bondaian*, the last of which equates to McCarthy's (1967) *Eloueran* phase. The tripartite division of the Bondaian is based principally on the presence/absence and relative abundance of backed artefacts (Attenbrow, 2010: 101). However, other factors, such as changes in the abundance of bipolar artefacts and different stone materials, and the presence/absence of edge-ground hatchet-heads are also relevant.

Table 9 McCarthy's Eastern Regional Sequence (ESR) of stone artefact assemblages

Current phasing	McCarthy's (1967) Phasing	Approximate date range	Backed artefact frequency	Bipolar artefacts	Edge-ground hatchet heads
Pre-Bondaian	Capertian	30,000-8,000 BP	Absent	Rare	Absent
Early Bondaian	Bondaian	8,000-4,000 BP	Very low	Rare	Absent
Middle Bondaian		4,000-1,000 BP	Very high	Increasingly common	Present
Late Bondaian	Eloueran	1,000 BP to European contact	Very low	Very common	Present

Existing assemblage data indicate that Aboriginal knappers occupying the Hunter Valley utilised a diverse range of lithic raw materials for flaked stone artefact manufacture (Hughes, 1984). However, two rock types - silcrete and silicified tuff (also known as mudstone) - overwhelmingly dominate the region's existing stone artefact record and appear to have been routinely selected for this task, likely due to both basic raw material abundance and their desirable flaking qualities (Hiscock, 1986a). Alongside other, less-commonly exploited raw materials, such as quartz, quartzite, chalcedony, chert, petrified wood and various fine-grained volcanics, both are available in

[7] Note that more recent research into the chronology of backed artefacts and points in Australia (e.g., Hiscock & Attenbrow, 1998, 2004; Hiscock, 1993b) has demonstrated a long history of production and use for these implement types, with both now known to have been produced in the early Holocene and likely in the late Pleistocene as well.

alluvial and colluvial gravel deposits[8] associated with the Hunter River and its tributaries as well as other terrestrial conglomerate units (Raggatt, 1938; see also Hiscock 1986a:14-16). Widely distributed and easily accessible, it would appear that these deposits functioned as the primary source of lithic raw materials for Aboriginal flaked stone tool manufacture in the Hunter Valley proper.

In the Hunter Valley, asymmetrical and symmetrical backed artefacts dominate the retouched components of surface collected/recorded and excavated flaked stone assemblages. Accordingly, the technology of backed artefact manufacture has been a particular focus of research (e.g., Baker, 1992a; Hiscock, 1993a; Koettig, 1992, 1994; Moore, 2000). Studies by Hiscock (1993a), Moore (2000) and others (e.g., Baker, 1992a; Koettig, 1992, 1994; White, 1999, 2012) have demonstrated that backed artefact manufacture in the Hunter Valley was a highly structured activity involving a complex system of raw material procurement, transportation, preparation and reduction. Differences in the technological character of recovered cores and conjoin sets across the Valley indicate a significant degree of variability in the strategies used by Aboriginal knappers to produce blanks for backed artefact manufacture (**Figure 18**). Heat treatment, notably, appears to have been integral component of the backed artefact manufacturing process, with evidence for the thermal alteration of stone packages throughout the reduction process both abundant and widespread. As Hiscock (1993:66) has observed, “the thermal alteration of Hunter Valley silcrete drastically improves flaking qualities and increases the lustre and smoothness of the fracture surface”. Compared with silcrete, evidence for the thermal alternation of indurated mudstone blanks is rare (e.g., Koettig, 1992) and likely reflects the generally higher ‘raw’ flaking quality of this material.

Alongside the reconstruction of backed artefact manufacturing processes, the identification of diachronic change in Bondaian lithic technology in the Hunter Valley has also received considerable analytical and interpretive attention (e.g., Baker, 1992c; Haglund, 1989; Hiscock, 1986a, 1986b). Hiscock’s (1986a) pioneering attribute analysis of a sample of unretouched mudstone flakes recovered from the Sandy Hollow 1 rockshelter excavated by Moore (1970) is of particular significance in this regard and can regarded as the foundation upon which subsequent studies have been carried out. This analysis sought to test a tripartite division of the Sandy Hollow 1 (SH1) assemblage made on the basis of chronological changes in the frequency of backed artefacts. Three phases were recognised: the *Pre-Bondaian*, with no backed artefacts, the *Phase I Bondaian*, with numerous backed artefacts and the *Phase II Bondaian*, with few backed artefacts. Attribute analysis of a sample of 742 complete mudstone flakes from Square AA revealed technological changes consistent with this division, including, but not limited to, changes in the relative frequency of platform preparation and overhang removal as well as flake shape and platform size (see **Table 10**).

Table 10 Hiscock’s relative dating scheme for the Sandy Hollow 1 flaked stone assemblage (after Hiscock, 1986a: 100)

Phase	Date range	Flake type	Knapping practices employed for flake production	Backed artefact frequency
Pre-Bondaian	>1300 BP	Medium-sized, relatively squat flakes with very large platforms	• Large amounts of force applied with little control; • Most normal or inward directions of force application; • Imprecise blow application; • Use of relatively low platform angles on cores; • Very little platform preparation of any kind; • Many blows delivered to cortical surfaces; • No platform faceting; • Infrequent overhang removal; and • Low to moderate amounts of core rotation.	Absent
Phase I Bondaian	1300-800 BP	Larger and more elongate flakes with medium sized platforms	• Relatively high amounts of force; • Mostly normal or inward directions of force application; • Imprecise blow applications; • High platform angles; • Large amounts of platform preparation (principally facetting and larger platform flaking); • Infrequent overhang removal; and	Numerous

[8] I.e., point and mid-channel gravel bars as well as terrace and ridge/slope gravel deposits.

Phase	Date range	Flake type	Knapping practices employed for flake production	Backed artefact frequency
			• High amounts of core rotation.	
Phase II Bondaian	800 BP - Contact	Relatively small and squat flakes with small platforms	• Low to moderate amounts of force; • Outward directions of force application; • Precise application of force; • High platform angles; • Moderate amounts of platform preparation (flaking onto platform but no faceting) • Frequent overhang removal; and • Moderate to low amounts of core rotation.	Few

Having established the validity of the three phase Bondaian sequence at SH1, Hiscock applied the same attribute analysis to a series (n = 15) of flaked stone assemblages recovered from open artefact sites on the Mount Arthur North and Mount Arthur South coal leases and found that individual assemblages could be assigned to one of the three Bondaian phases recognised at SH1. On this basis, Hiscock (1986b) proposed that the attribute analysis employed at SH1 could serve as a relative dating system for open sites in the Hunter Valley. Given the number of open artefact sites within the region, this argument was particularly ground-breaking and has prompted several archaeologists to apply Hiscock's analysis to assemblages from other areas, albeit with mixed success (e.g., Dean-Jones, 1992; Baker, 1992c; Haglund, 1989; Rich, 1991). Difficulties in replicating Hiscock's results, Holdaway (1993:29) has suggested, likely stems from spatial variability in the methods used by Aboriginal knappers to reduce stone, variability itself linked to variables such as raw material type and accessibility, site function and stylistic differences between Aboriginal groups.

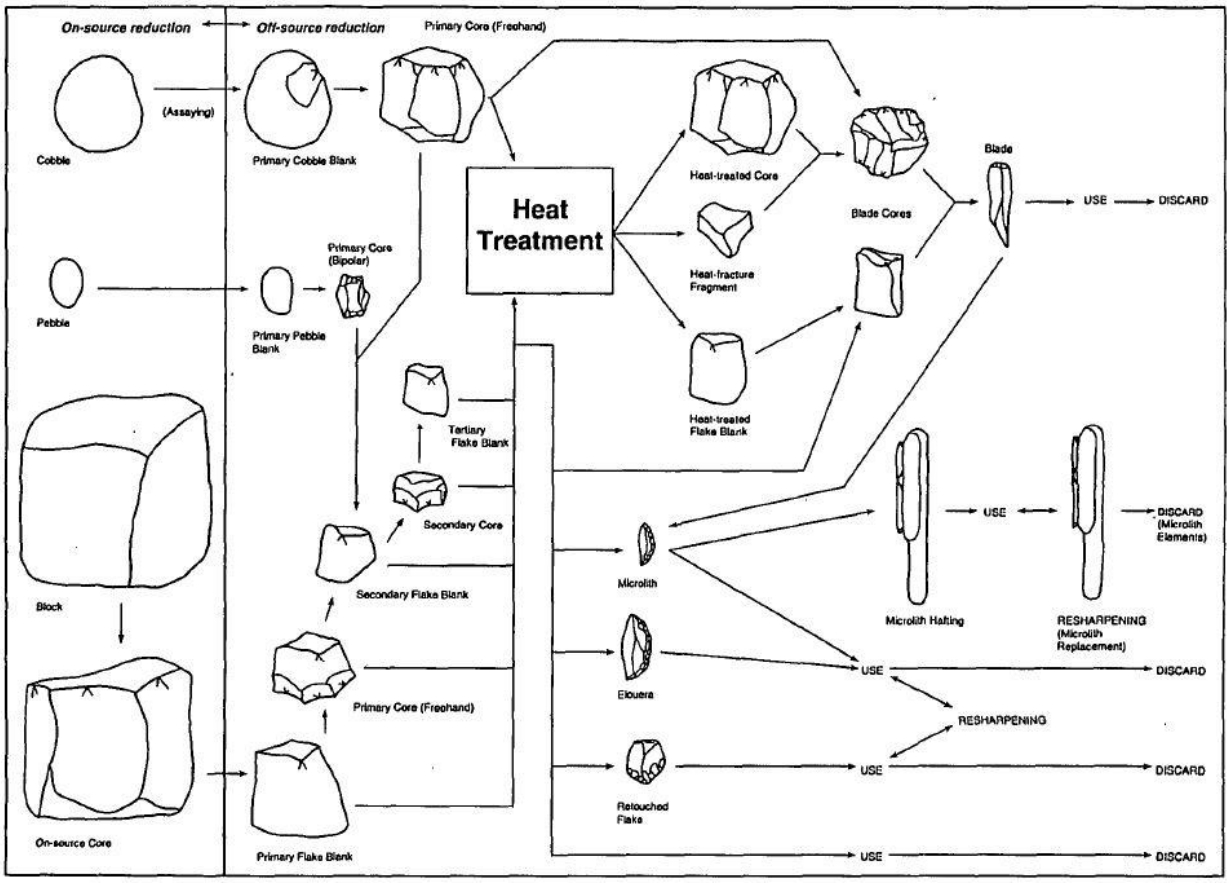

Figure 18: Moore's (2000) reduction model for the technology of Hunter Valley microlith assemblage (from Moore 2000: 29, Fig. 5)

5.1.3 Chronology and Texture-Contrast Soils

As in other parts of the state (e.g., Attenbrow, 2010), evidence for late Pleistocene and/or early Holocene Aboriginal occupation of the Hunter Valley is rare, with dated and undated evidence from these periods obtained from only a handful of sites, two of which (i.e., Moffats Swamp Dune & Galloping Swamp) are located on the Valley's coastal plain (AMBS, 2002; Baker, 1994; Hughes & Hiscock, 2000; Koettig, 1986; Kuskie, in prep.; Rich, 1993; Scarp Archaeology, 2009). In a recent review, Hughes et al. (2014) have attributed the dearth of early sites in the central lowlands of the Hunter Valley to long term geomorphic and soil formation processes, which have acted, they propose, to either remove completely or widely disperse older archaeological materials.

Studies by Koettig (1990), Baker (1994) and Kuskie (in prep) suggest that the chipped stone technology employed by Aboriginal knappers occupying the Hunter Valley during the terminal Pleistocene/early Holocene was focused on the opportunistic or non-specific reduction of early reduction cores (*sensu* Moore 2000) - some of which were very large. Core reduction appears to have geared towards the production of robust flakes for immediate use or retouch into simple scrapers, with no evidence for the complex, hierarchically-organised reduction sequences typical of the mid-to-late Holocene. Tool edges, Moore (2000:36) notes, were refurbished by unifacial retouching. A preference for volcanic materials over silcrete and mudstone has also been noted (Baker, 1994; Koettig, 1990;1992:5), as has the paucity of evidence for deliberate heat treatment (Moore, 2000)

In stark contrast to the late Pleistocene/early Holocene, evidence for mid-to-late Holocene Aboriginal occupation of the Hunter Valley abounds, with numerous excavated sites producing assemblages that can be confidently ascribed to these periods on the basis of radiometric dates and/or their typological/technological profiles. Taken at face value, available radiocarbon determinations suggest a progressive increase in the Aboriginal population of the Hunter Valley over the course of the Holocene (Attenbrow, 2004). However, as argued by Hiscock (2008) on a national scale, it seems likely that the directional population growth suggested by such data is, to a certain extent at least, a product of differential site preservation, with younger sites better preserved than older ones. Other factors, such as the burial of older sites through sediment deposition and aeolian processes and bias in the location of archaeological surveys and excavations, may also be relevant.

Critical to any discussion concerning the antiquity of Aboriginal occupation within the Hunter Valley is the genesis of the texture contrast or duplex soils that are associated with the majority of the Valley's known open artefact sites/deposits. As Kuskie and Clarke (2004: 228) have noted, an understanding of the genesis of these soils, defined by Hughes (1984: 26) as those consisting of "an A horizon of massive, sandy to silty material which gives way abruptly down the profile to clayey material with a blocky structure", is critical for determining both the antiquity and integrity of any Aboriginal archaeological materials contained within them.

Of particular relevance to archaeologists is the observation that while the 'A' and 'B' horizons of some texture contrast soils do, in fact, form a pedogenetic entity, having formed from *in-situ* weathering of parent materials, this is not always the case, with some 'A' horizons representing later colluvial deposits (Dean Jones & Mitchell, 1993). In the Hunter Valley, available radiocarbon determinations and typological data for flaked stone assemblages recovered from excavated 'A' soil horizons have tended to support Hughes' (1984:28) widely cited suggestion that these horizons accumulated over the last 5,000 years. Nonetheless, the potential for older A horizon soils has also been demonstrated (Koettig, 1992: 61; see also Kuskie & Clarke, 2004).

Drawing, in particular, on the research of Humphreys and Mitchell (1983) and Mitchell (1988), Dean Jones and Mitchell (1993) have considered in detail the archaeological implications of existing genesis models for texture contrast soils, both within and outside of the Hunter Valley. Key observations to be drawn from Dean Jones and Mitchell's (1993) review are as follows:

1. Duplex soils do not necessarily indicate great age;
2. Open sites located on texture contrast soils can never be truly stratified in a chronologically useful sense;
3. Stone artefacts on open sites will behave in the same way as natural stones on a hill slope and will be subject to surface dispersion, downslope movement, and differential burial or exposure by bioturbation agents and will commonly form a stone layer; and
4. The only possible means of dating open sites in any meaningful way will be from artefact cultural sequences developed on the basis of stratified assemblages and/or intact hearths. All other dates, especially those based on detrital charcoal, will be spurious.

More broadly, Dean Jones and Mitchell (1993: 63-64) have highlighted a series of geomorphic contexts within the Hunter Valley that they believe represent favourable locations for the preservation of Pleistocene and/or early Holocene archaeological evidence. These include:

- Rock shelters and large middens;
- Aeolian sand deposits (e.g., source bordering dunes);
- The distal portions of low angle alluvial fans;
- Stream junctions where each tributary has a different rate of sediment supply; and
- Colluvial deposits at the base of steeply inclined surfaces.

To date, the two contexts that been shown to have the potential to contain recognisable older archaeological materials include late Pleistocene windblown sand dunes/sheets (e.g., AMBS, 2002) and late Pleistocene/early Holocene colluvial deposits (e.g., Hughes & Hiscock, 2000).

5.1.4 Occupation models

A number of Aboriginal occupation models have been proposed for the Hunter Valley over the past three decades, with existing models based on varying combinations of archaeological, environmental and ethnohistoric data. Key models for the Central and Lower Hunter Valley include those developed by Haglund (1992), Koettig (1992, 1994), Kuskie (2000) and Kuskie and Kamminga (2000). These models are summarised in **Table 11** below.

Table 11 Aboriginal occupation models for the Hunter Valley

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
Koettig	1992 & 1994	Salvage of sites within the Camberwell and Bulga Coal Mine Leases	Central lowlands	• Repeated occupation of an area is likely to be represented by continuous, or near continuous, distributions of archaeological sites and/or features; • Sporadic or less intensive occupation of an area is likely to be represented by non-continuous or more widely dispersed archaeological sites and/or features; • Continuous to near- continuous distributions of archaeological evidence along watercourses suggest that Aboriginal people did not camp at specific locations; • Frequency of occupation at a given location is likely to have been related to the availability of subsistence resources (e.g., food, water, lithic raw materials); • Some locations may have been foci for Aboriginal occupation owing to the presence of particular resources (e.g., sandstone exposures suitable for grinding hatchet-heads); and • The duration of occupation at a given location may be evidenced by levels of disturbance to associated archaeological deposits, with sites occupied for shorter duration potentially having more intact deposits, as the length of stay may have been insufficient to disperse artefacts or mask the original form of knapping floors.	Koettig, 1992, 1994
Haglund	1992	Salvage of sites along Doctors Creek, Warkworth	Doctors Creek area, Central Hunter Valley	• Kangaroos, wallabies, and other large and small game would have been abundant in the area during dry periods, and would have been hunted by small hunting parties of men who would prepare and repair their hunting equipment in close proximity to watercourses; • Larger family groups likely visited the area during wetter periods when watercourses would be flowing more reliably and moisture dependent plants occurred in greater abundance; • Women and children would procure and process plant foods, such as ferns, yams and other tubers, in the vicinity of creeks and watercourses; • Sporadic visits would have resulted in debris left behind being incorporated into the turf or buried by leaf litter and Casuarina needles more quickly than more intensive, long term visits; and • While some equipment such as grindstones may have been retained and carried throughout the landscape, flakes and other implements were likely manufactured, utilised and discarded on an “as needed” basis.	Haglund, 1992
Kuskie	2000	Archaeological survey of Mount Arthur North Coal Mine Lease	Mount Arthur Area, Central Hunter Valley	• The area has been occupied for at least the past 5,000 years; • Occupation may extend as far back as 30,000 - 40,000 years; • The area has predominantly been occupied by tribes of the Wonnarua language	Kuskie, 2000

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				group, although members of neighbouring groups may also have sporadically visited and occupied the area. • The Mount Arthur North area was likely utilised and occupied by Aboriginal people at varying intensities on a seasonal basis; • Occupation was most intensive within 50m of the main watercourses (3rd and 4th order streams); • Aboriginal occupants had a strong preference for camping on level ground adjacent to reliable water sources and potentially more abundant subsistence resources; • Individual campsites were mainly occupied by single nuclear family groups and multiple family groups (bands); • Larger campsites from broader gatherings of people likely took place along the nearby Hunter River flats; • A greater range and frequency of activities were undertaken at camp sites, rather than in the surrounding landscape; • Camp sites along the major watercourses were occupied by small groups of people for varying lengths of time, during both the course of the seasonal round and in different years. • Occupation of camp sites throughout the entire Mount Arthur north area was predominantly sporadic rather than continuous; • Occupation, such as focussed camping, likely also occurred along level to very gentle drainage depressions (particularly 1st and 2nd order streams). These water sources were likely to be intermittent and occupation along these lower order streams may only have occurred when standing water was available; • Most camp sites involved overnight visits of small hunting parties rather than entire family groups; • Other than focussed camping, activities engaged in across the Study Area involved hunting activities (larger game) by small hunting parties of men, and gathering activities by small parties of women and children, along with transitory movement, procurement of lithic resources, and cultural activities. • The utilisation of areas such as simple slopes, ridge crests, spur crests and minor watercourses was less intense than the valley flats where base camps were situated; • Simple slopes were used during hunting or gathering activities in the course of the normal daily or seasonal round, to access higher ground or stone resources, or to move between camp sites. Ridge and spur crests were also used for these purposes and for accessing vantage points or moving to special ceremonial sites;	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Vantage points were important to the Aboriginal occupants of the area, particularly gentle to steep upper slopes adjacent to several ridges, which were mainly accessed by groups of men on hunting expeditions, or for security and/or cultural purposes; • Silcrete and tuff were the preferred stone materials, both of which are locally available and likely procured from local sources during the course of the normal daily or seasonal round, with tuff being the preferred material for manufacture of flaked stone tools; • These materials were also procured from other sources within the region, most notably the alluvial gravels of the nearby Hunter River; • Chert, quartz, petrified wood, chalcedony, and porcellanite were also utilised to a lesser extent and were also procured from local sources, probably during the course of the normal seasonal round; • Silcrete was deliberately heat treated to improve its flaking properties. This may have been undertaken at single locations (e.g. a campsite adjacent to a watercourse) or in different locations reflecting the stages of procurement, heat treatment, reduction and use); • Manufacturing stone tools, particularly flaked implements, was likely a casual or opportunistic activity, conducted on an “as needed” basis; • There was little emphasis on rationing or conservation of the use of most stone materials, due to their wide availability; and • The manufacture of microblades (e.g. hunting spear barbs) was also widely undertaken. While likely a planned and organised activity, it did not necessarily occur at base camps, but may also have occurred in places traversed during the course of hunting expeditions on a more casual or opportunistic basis.	
Kuskie & Kamminga	2006	Salvage of sites impacted by the construction of the Hunter Expressway, near Black Hill	Black Hill - Woods Gully - Hexham Wetlands Locality, Lower Hunter Valley	• The locality was occupied by Aboriginal people of the Pambalong Clan and potentially clans of the broader Awabakal language group; • Occupation focussed on wetlands, swamps, lakes, estuaries, the coastline, and potentially also the junctions of multiple resource zones; • Occupation of the area has predominantly occurred within the past 4,000 years; • Occupation may have extended as far back as 30,000 – 40,000 years, but few landscape contexts exist in which archaeological evidence of older occupation would be conserved; • Occupation encompassed the entire region, but at varying intensities, on a seasonal basis, and across different time periods within the overall time-span of occupation; • Seasonal occupation of some resources and localities may not be evidenced in the	Kuskie & Kamminga, 2000

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				extant archaeological record; • Occupation of the area reflects a wide range of activities, including transition between locations, hunting, gathering, procurement and utilisation of lithic and other resources, camping, ceremonial and spiritual activities, and burial practices; • Activities conducted and engaged in by the Aboriginal occupants of the area likely included: food procurement, processing, and consumption; production and maintenance of stone and wooden tools and implements; resource procurement; erection of shelters, children's play, ceremonial and spiritual activity, and social and political activity; • Landscape features and variables such as topography, resources, proximity to water, aspect, slope, and cultural preference likely influenced the activities conducted by the Aboriginal occupants of the area; • Few of the activities engaged in by past Aboriginal people are likely to be evident within the archaeological record, other than those involving the use of stone or where preservation conditions permit. • Locally available indurated rhyolitic tuff was the preferred material for knapping and stone tool production, followed by silcrete, which was also able to be procured locally in terrace and alluvial gravels; • Both tuff and silcrete were likely obtained during both daily and seasonal movements throughout the landscape on an "as needs" basis, not during "special purpose trips", and conservation of these materials was not a priority due to their wide availability; • Other locally available stone materials including quartz, quartzite, acidic volcanics, chalcedony and chert were also utilised to a lesser extent; • Non-locally available stone materials such as dacite and rhyodacite (used for grindstones) may have been obtained through trade or exchange with other cultural groups, through special purpose trips, or during visits to other areas during the seasonal round; • Ochre was utilised for ceremonial purposes and may have been procured from sources near Lake Macquarie, the Hunter River, or from outside the region; • Heat treatment of silcrete was undertaken to improve flaking qualities and possibly to obtain desired colours; • A reasonably high proportion of silcrete used in knapping activities was deliberately heat treated, but tuff was not; • Microblade production was a widespread, likely planned and organised, activity with the primary goal of producing microliths (e.g. bondi points) for hunting	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				implements/purposes. • Microblade production may have occurred at both campsites and also in places on transitory routes during hunting expeditions, which may represent more casual or opportunistic behaviour; • Production of microliths was time-consuming and the end result was likely highly desirable and socially valuable; • The investment of time and energy in activities such as heat treatment of silcrete and production of microliths for hunting and fighting spears may have more social than utilitarian values, as floral and smaller faunal subsistence resources would probably have been most prominent in the economy of the local Aboriginal people.; • Casual and opportunistic knapping or selection of flakes to meet requirements on an "as needs" basis was widespread. • A high proportion of knapping products were likely discarded at the site of their manufacture, without use; • Use of bipolar technique was uncommon; • Floral subsistence resources were locally abundant, predominantly obtained and processed by women, and were consumed at campsites and at the site of procurement. • Ferns may have been a staple of the local diet, along with the bulbs and roots of other wetland plants; • Plant preparation sites may include camping places around the margins of Hexham Wetland and other swamps. Tools such as Worimi cleavers were utilised to pound the starch-rich rhizomes of bracken and swamp fern and the roots of other plants obtained from the wetlands; • Eloueras may have been used for extracting the perennial herb cumbungi (*Typha australis*), abundant in the freshwater parts of wetlands, or less likely, tall spike rush (*Eleocharis sphacelata*); • Less portable special tools such as Worimi cleavers and grindstones may have been deliberately stored at base camps; • Faunal resources were processed and consumed at temporary hunters or gatherers camps, at nuclear base camps, campsites of larger congregations of people, and at the site of procurement; • Men hunted for larger game, while women played a key role in gathering plants and obtaining smaller game; • Hunting was a planned and coordinated event;	

Researcher(s)	Year(s)	Project(s)	Area to which the model applies	Summary of model	Reference(s)
				• Fish were obtained by several methods, including boating, hooks and lines, spearing, using hand nets, and creating fish traps; • Strategic management of resources such as fish traps were aimed at increasing the reliability and productivity of food resources; • Nuclear family base camps may have been strategically positioned in relation to food resources, at the conjunction of two or more subsistence zones, close to potable water, and on level or very gently inclined ground. Visual aspect and security may have also been important considerations. • Site occupants of nuclear family base camps may have foraged within an area of up to 10km radius from the campsite; • Campsites in more favourable locations may have been subject to more intensive occupation; and • Community base camps or camps of larger congregations of people tended to be situated on level ground adjacent to plentiful food resources and potable water such as river terraces or flats.	

5.2 Local Context

5.2.1 AHIMS Database

The AHIMS database, administered by OEH, contains records of all Aboriginal objects reported to the Director General of the Department of Premier and Cabinet in accordance with Section 89A of the NPW Act 1974. It also contains information about Aboriginal places which have been declared by the Minister to have special significance with respect to Aboriginal culture. Previously recorded Aboriginal objects and declared Aboriginal places are known as 'Aboriginal sites'.

A search of the AHIMS database on 5 February 2014 for a 10 x 10 km area centred on the Project area (AHIMS search area) identified 107 registered Aboriginal sites, 33 of which can be confirmed - by way of a targeted review of associated site cards and reports - as being located in or within 50 m the Project area.

As is typical for the Hunter Valley, open artefact sites (i.e., artefact scatters and isolated finds) are the most common site type represented within the AHIMS search area, accounting for 80.3% of known sites. Remaining site types include eight areas of Potential Archaeological Deposit (PAD), four grinding groove sites and one Aboriginal Resource and Gathering Area.

AHIMS registered sites in and within 50 m of the Project area are listed in **Table 12**. These sites include 12 artefact scatters, 19 isolated finds and one area of PAD. All are listed on AHIMS as 'valid' sites. However, a review of associated reports suggests that ten have, in fact, been destroyed under approved AHIPs. The remaining 22 sites are presumed extant. Centroid site locations for all AHIMS registered sites within and adjacent to the Project area are shown on **Figure 19**.

Table 12 AHIMS registered sites within the Project area

AHIMS Site ID	Site name	MGAE	MGAN	Site type	Current status
37-6-0865	KK-IF-2	357745	6369639	Isolated find	Presumed extant
37-6-0866	KK-IF-1	358645	6371329	Isolated find	Presumed extant
37-6-1325	Swamp Creek RTA 10 IF (SWC RTA 10IF)	356552	6370460	Isolated find	Destroyed
37-6-1341	Black Waterholes Creek RTA 1 IF	355931	6371919	Isolated find	Destroyed
37-6-1342	Black Waterholes Creek RTA 2 IF	355493	6372397	Isolated find	Destroyed
37-6-1343	Black Waterholes Creek RTA 3 IF	356398	6371297	Isolated find	Destroyed
37-6-1344	Black Waterholes Creek RTA 4 IF (BWC RTA 4 IF)	355521	6372291	Isolated find	Destroyed
37-6-1356	Swamp Creek RTA 4	356662	6370877	Artefact scatter	Destroyed
37-6-1360	Swamp Creek RTA 8 IF	357374	6370471	Isolated find	Destroyed
37-6-1361	Swamp Creek RTA 9	357110	6370738	Artefact scatter	Destroyed
37-6-1362	Swamp Creek RTA 11 IF (formerly PAD9 Swamp Creek)	357735	6369889	Isolated find	Destroyed
37-6-1363	PAD11 Black Waterholes Creek	356196	6371545	PAD	Destroyed
37-6-1644	Swamp Creek Catchment 5 (SCC5)	357054	6370763	Artefact scatter	Presumed extant
37-6-1645	Swamp Creek Catchment 4 (SCC4)	357708	6370097	Isolated find	Presumed extant
37-6-1650	Northern Swamp Tributaries 4 (NST4)	356829	6371946	Artefact scatter	Presumed extant
37-6-1652	Northern Swamp Tributaries 2 (NST2)	356742	6372396	Artefact scatter	Presumed extant
37-6-1953	KK03	359355	6370790	Artefact scatter	Presumed extant
45-3-3387	KK04	357942	6371717	Artefact scatter	Presumed extant
37-6-1954	KK05	358577	6371627	Artefact scatter	Presumed extant

AHIMS Site ID	Site name	MGAE	MGAN	Site type	Current status
37-6-1957	KK09	358372	6371638	Isolated find	Presumed extant
37-6-1958	KK10	357407	6371800	Artefact scatter	Presumed extant
37-6-1959	KK11	357079	6371849	Artefact scatter	Presumed extant
37-6-1960	KK12	356887	6371887	Isolated find	Presumed extant
37-6-1961	KK13	356713	6372765	Isolated find	Presumed extant
37-6-1962	KK14	356727	6372857	Isolated find	Presumed extant
37-6-1963	KK15	356790	6373144	Isolated find	Presumed extant
37-6-1964	KK16	357035	6374632	Isolated find	Presumed extant
37-6-2004	KR01	357959	6370106	Artefact scatter	Presumed extant
37-6-2005	KR02	357528	6370404	Isolated find	Presumed extant
37-6-2006	KR03	357491	6370454	Artefact scatter	Presumed extant
37-6-2007	KR04	357367	6370539	Isolated find	Presumed extant
37-6-2008	KR05	357171	6370683	Isolated find	Presumed extant
37-6-2009	KR06	356187	6371481	Artefact scatter	Presumed extant

5.2.2 Previous Aboriginal Heritage Assessments

Existing AHIMS data indicate that a relatively large number of Aboriginal cultural heritage assessments incorporating survey and/or subsurface investigations have been undertaken in the greater Kurri Kurri area since the early 1980s. Although the number of investigations undertaken in the vicinity of Kurri Kurri is small when compared with areas to the northeast around Maitland, northwest around Singleton and east around the Hunter Estuary, those that have been carried out have resulted in the identification of a significant number of Aboriginal archaeological sites, both in surface and subsurface contexts.

To date, archaeological investigations undertaken for development works located either wholly or partially within the current Project area have included surveys by AMBS (2009a, 2009b), Brayshaw McDonald (1994), Umwelt (2003), ERM (2004) and Mills (1999) as well as excavations by AMBS (in prep) and Umwelt (2006c, in prep).

Umwelt's (2006c) subsurface investigation, undertaken as part of a broader archaeological salvage program for the recently completed Hunter Expressway, was limited to a program of test excavation within and adjacent to the boundaries of AHIMS registered PAD 'PAD11 Black Waterholes Creek' (37-6-1363), now destroyed. Detailed results for this program are pending (Umwelt, in prep). However, preliminary results are available (Umwelt, 2006c). Excavations by AMBS, meanwhile, are understood to have been undertaken as a mitigation response to EnergyAustralia's proposed upgrade to the 33kV Kurri-Rutherford Feeder Split and to have involved targeted salvage excavations of up to 2.25 m^2 (1.5 x 1.5 m) at 25 pole locations along the feeder route. AECOM understands that AMBS is in currently in the process of finalising their reports for this excavation program. Although detailed results are pending, AMBS have provided AECOM with some baseline data concerning the location, extent and results of these excavations.

The results the above-mentioned investigations are summarised in **Table 13** below. Those of a selection of other local assessments are also provided for contextual purposes.

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AECOM

AHIMS REGISTERED SITES

Aboriginal Cultural Heritage Assessment
Hydro Aluminium Smelter Site & Associated Buffer Land
Kurri Kurri, New South Wales

FIGURE 19

Table 13 Previous Aboriginal Heritage Assessments

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
L.K. Dyall	1980	Proposed Alumax aluminium smelter, Farley	Survey	Pedestrian survey of proposed smelter site and associated buffer land. Particular attention paid to creek banks, sandstone exposures in creek beds and sandstone-mantled ridgelines. Eighteen open artefact sites and three grinding groove sites identified. Former included one isolated artefact and seventeen artefact scatters. Counts for recorded artefact scatters ranged from two to 195. Largest site located on Stoney Creek. Most sites (n = 12) contained less than ten artefacts. Raw materials recorded as cherts, rhyolite [silicified tuff], quartzites and quartz. Retouched implements restricted to backed blades (n = 4) and scrapers (n = 17). All three grinding groove sites located on exposed sandstone bedrock in creek beds. Largest site contained 68 grooves in three spatially discrete 'lots' of 42, 25 and one groove respectively. Remaining two sites contained 38 and nine grooves respectively, the former in four lots.	Dyall (1980)
H. Brayshaw	1982	Proposed residential development, near Stanford Merthyr	Survey	Pedestrian and vehicle survey of proposed urban development site. No Aboriginal archaeological sites identified during survey. Generally poor GSV conditions noted. "Considerable disturbance" associated with localized bulldozing, rubbish dumping and the construction of transmission lines (n = 5), a bitumen road and railway embankment observed. Brayshaw (1982: 4) concluded that while Aboriginal people were likely to have frequented the study area to hunt and forage the lack of a major resource features(s) would have precluded intensive occupation.	Brayshaw (1982)
A. Djekic	1984	Kurri Kurri to Alcan 132Kv transmission line	Survey	Pedestrian survey of entire transmission line route. Generally poor GSV conditions noted. Five open artefact sites consisting of one isolated artefact and four artefact scatters identified in exposures in vicinity of unnamed creek to north of Kurri Kurri substation. All considered opportunistic surface expressions of associated subsurface deposits. Chert [silicified tuff] dominant raw material, with four quartzite hammerstones also recorded. Areas adjacent to watercourses and swamplands assessed as having high archaeological potential.	Djekic (1984)
E. Rich	1990	Proposed recycling facility, Alcan Aluminium Smelter	Survey	Pedestrian survey of proposed recycling facility site on Lot 811 of DP 728985. Three transects completed across *c*.2.5 ha study area. All areas of exposed ground inspected for stone artefacts. No Aboriginal archaeological sites identified during survey. Lack of sites attributed, in part, to landscape position.	Rich (1990)
M. Koettig	1990	ICI Mining Services Technology Park, near Richmond Vale	Survey	Pedestrian survey of proposed ICI Mining Services Technology Park site. GSV conditions generally poor but several tracks and associated exposures present. No Aboriginal archaeological sites identified during survey. Flood prone alluvial flats on eastern side of 'main' unnamed creek within study area assessed as unsuitable for occupation (Koettig, 1990: 3). Survey results interpreted as a reflection of an absent or "extremely sparse" Aboriginal archaeological record.	Koettig (1990b)
I. Stuart	1994	Proposed Dross Mill, north of Mitchell	Survey	Targeted pedestrian survey of proposed Dross Mill site comprising 8 ha parcel of land bordered to north by Swamp Creek and the south by Mitchell Avenue and a disused railway line. Survey	Stuart (1994)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
		Avenue and south of Swamp Creek		restricted to pre-existing tracks owing to dense vegetation cover. 6.4% of study area surveyed with effective coverage of 3.2%. Single open artefact site identified. Site comprised two stone artefacts - a yellow coarse-grained chert core and a grey chert flake - *c*.9 m apart on vehicle track. Absence of any 'substantial Aboriginal sites' attributed to poor GSV.	
T. Griffiths	1995	Proposed optic fibre cable, Kurri Kurri to Mulbring	Survey	Pedestrian survey of *c*.9 km fibre optic route. GSV along route ranged from 0 to 90% and was highest at creek and gully crossings. No Aboriginal archaeological sites identified.	Griffiths (1995)
R. Mills	1999	Proposed wastewater treatment plant	Survey	Full coverage pedestrian survey of impact areas associated with proposed wastewater treatment plant. Survey area situated on gently sloping land approximately 300 m southeast of Swamp Creek. Unnamed tributary of Swamp Creek also present in the north-eastern portion of the survey area. Southern section of this tributary had been modified by the construction of concrete canal. Western bank noted as having been disturbed via the dumping of soil, brick and concrete materials but retaining some relatively undisturbed sections. Area within and adjacent to existing treatment plant assessed as grossly disturbed. GSV in vicinity of Swamp Creek tributary was poor (<10%) but generally higher on gently inclined hillslope unit owing to presence of vehicle and animal tracks, drainage lines and areas of surface disturbance associated with dam construction. Two isolated stone artefacts and one area of PAD identified. Isolated artefacts consisted of yellow/red 'chert' [silicified tuff] flake and a quartzite hammerstone. Area of PAD encompassed the southern bank of the unnamed tributary of Swamp Creek. Portions of PAD noted to have been subject to considerable impacts from spoil/rubble dumping and the mounding of topsoil. Undisturbed sections of PAD assessed as having "potentially high archaeological sensitivity" (Mills 1999: 12).	Mills (1999)
ERM	2003	Hunter Economic Zone (HEZ)	Test excavation	Archaeological test excavations conducted within the boundary of the Hunter Economic Zone (HEZ). Three landform areas identified as being of archaeological interest prior to fieldwork: 1) valley side slopes along Chinamans Hollow Creek; 2) the north-south trending ridgeline comprising the watershed between Chinamans Hollow Creek and several unnamed tributaries of Wallis Creek (the 'eastern tributaries'); and 3) the headwaters of the 'eastern tributaries'. Geomorphological investigations undertaken prior to test excavation identified previously undescribed aeolian sand deposits on the western side of Chinamans Hollow Creek and confirmed a marked contrast between extant soil units on the eastern and western sides of this watercourse. Topsoils on the ridgeline were assessed as deriving from a combination of *in-situ* weathering of sandstone/conglomerate bedrock and colluvial processes. A horizon sands along the western side of Chinamans Hollow Creek were assessed as being of Holocene antiquity on the basis of their looseness and lack of weathering.	ERM (2003)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				Two transects consisting of up to 21 backhoe-excavated test pits (2 x 1 m) completed within each targeted landform area. Stone artefacts identified in most test pits with good outlook over Chinamans Hollow Creek. Total of 66 stone artefacts and 57 'shattered fragments' of artefactual stone recovered from test pits along Chinamans Hollow Creek. Artefacts generally recovered from 20 cm below the ground surface to a depth of 1 m. No indications of cultural or natural stratification evident in excavated sand deposits. Artefact-bearing deposits assessed as likely being of Holocene antiquity. Excluding 'shattered pieces', silcrete was the dominant raw material (n = 44), followed by silicified tuff (n = 17), quartz (n = 4) and quartzite (n = 1). In typological terms, the assemblage was dominated by flake debitage (i.e., complete flakes and flake fragments). Formed objects were limited to three backed artefacts. No artefacts were identified in the ridgeline transects and only one in eastern tributary transects. Results interpreted as a reflection of the presence of a "dispersed but readily detectable distribution of artefacts along western side of Chinamans Hollow Creek interfluve" (ERM: 2003: 45). Two surface sites (HEZ1 and HEZ2) also fortuitously identified during fieldwork.	
ERM	2004	Proposed gas pipeline, Seahampton to Rutherford	Survey	*c.*37 km long gas pipeline route assessed via pedestrian and vehicle survey. 4.2 km section of route within Hunter Employment Zone (HEZ) excluded from survey. Four broad landscape units identified for interpretive purposes: 1) Mt Sugarloaf rugged terrain; 2) Wallis Creek gently undulating terrain; 3) Swamp Creek catchment undulating terrain; and 4) Northern swamp tributaries gently undulating terrain. Alluvial and aeolian sands noted as occurring in Units 2, 3 and 4. Total of 21 Aboriginal archaeological sites, consisting of twelve artefact scatters and nine isolated finds, identified during survey. Mudstone [silicified tuff] dominant raw material, with silcrete also well represented. Undisturbed soils within 150 m of Wallis Creek, Swamp Creek and associated 'major' tributaries assessed as having high archaeological potential. Northern swamp tributary area identified as "perhaps the most archaeologically sensitive area" (ERM 2004: 78) due, in part, to the presence of aeolian sands.	ERM (2004)
Umwelt and others	1994-2010	Hunter Expressway	Survey and test excavation	Surface collections and subsurface investigations of Aboriginal sites, areas of PAD and landform units identified as a result of archaeological surveys/inspections undertaken for the F3 to Branxton Highway Link (i.e., Hunter Expressway). Route alignment divided into two sections for the purposes of archaeological assessment, with 'Section 1' comprising the easternmost 4 km of the route near Southampton and 'Section 2' that portion of the route west of Southampton to the Belford Deviation west of Branxton. Archaeological salvage and subsurface testing works completed in three stages prior to development of the Hunter Expressway Aboriginal Cultural Heritage Plan of Management (Umwelt, 2010a). Stage 1 (Section 1) investigations were undertaken under Section 90 Consent #1940 (approved 7 June 2004) and included surface collection of three open artefact sites within the Blue Gum Creek	(Brayshaw, 2001; Brayshaw McDonald, 1994; Umwelt, 2003, 2006a, 2006b, 2006c, 2010a, in prep)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				catchment, surface collections and subsurface investigations excavations at two sites in the Blue Gum Creek and Minmi Creek catchments, and subsurface testing within the Bluegum Creek landform unit. Stage 2 (Sections 1 & 2) investigations were undertaken under Section 90 Consent #2102 (approved 14 February 2005) and Section #87 Consent #2096 (approved 14 February 2005) and included surface collection of 68 open artefact sites within the Anvil Creek, Bishops Creek, Black Creek, Black Waterholes Creek, Sawyers Gully, Surveyors Creek and Wallis Creek catchments, subsurface investigations of four sites in the Anvil Creek, Black Creek, Swamp Creek and Wallis Creek catchments, subsurface testing of nineteen areas of PAD and subsurface testing of nine landform units across nine different creek catchments. Testing of PAD11 Black Waterholes Creek (37-6-1363) and adjacent landform elements within the current Project area yielded no artefacts. Stage 3 (Section 2) investigations were completed under Section 90 Consent #2562 (approved 19 December 2006) and involved the surface collection of six open artefact sites in the Anvil Creek, Black Creek, Sawyers Gully, Swamp Creek and Wallis Creek catchments and open area excavations at six sites in the Anvil Creek, Sawyers Gully, Surveyors Creek, Wallis Creek, Black Creek and Redhouse Creek catchments. Detailed results for Umwelt's Stage 1, 2 and 3 archaeological salvage/investigation programs are pending (Umwelt, in prep). However, for sites, PADs and landform units subject to subsurface investigations in Stages 1 and 2, Umwelt (2006c): 4.51, Table 4.4) report artefact totals ranging from 0 to 409. Subsurface testing undertaken within the current Project area, completed within and adjacent to previously recorded PAD Black Waterholes Creek PAD 11 (37-6-1363) did not identify any subsurface artefacts and Umwelt recommended that this site should be removed from the AHIMS register.	
Mary Dallas Consulting Archaeologists	2007-2008	Proposed residential development, Lot 114 on DP703265	Survey and test excavation	Pedestrian survey of *c.*30 ha study area located on a prominent north-south trending ridgeline on the eastern side of Cessnock Rd. Study area divided into three survey units for purposes of field survey. Survey Unit 1 comprised the elevated land associated with the prominent north-south trending ridgeline and an associated arm extending eastward into the study area. Survey Unit 2 comprised the east facing and generally steep slopes above Wallis Creek while Survey Unit 3 comprised south facing gently to moderately inclined slopes. Effective survey coverage in all units was very low (1-7%) to dense grass cover. One artefact scatter (GH Campsite 1) and three areas of PAD (GH PAD 1 to 3) identified during survey. GH Campsite 1 located near the base of an east trending spur running from main ridgeline. Site comprised a scatter of "at least 30" artefacts over an area of approximately 75m^2 (15 x 5m). Silcrete dominant raw material. Artefact types included complete and broken flakes and blades, flake/blade fragments and cores. Identified PADs comprised part of a southerly trending spur off main ridgeline (GH PAD 1), an undisturbed low	Mary Dallas Consulting Archaeologist (2007, 2008)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				mound on the Wallis Creek floodplain (GH PAD 2) and a portion of the main ridgeline trending in an easterly direction (GH PAD 3). Subsequent to the survey described above, in 2008, a program of archaeological test excavation was undertaken within GH PAD1 under Section 90 Consent #2962. This involved the hand excavation of fifteen 1 m^2 pits. Flaked stone pieces representing at least 50 individual stone artefacts were recovered from 13 pits, with an average density of less than eight stone pieces or four individual artefacts per square metre. Silcrete and mudstone co-dominant raw materials. Formal implements restricted to backed artefacts. Results interpreted as a product of transitory movement/casual discard over time.	
Australian Museum Business Services (AMBS)	2009-2010	33kV Kurri-Rutherford Feeder Split	Survey & salvage excavation	*c.*8.25 km long electricity easement between Kurri Kurri and Rutherford subject to full pedestrian survey in 2009. Easement divided into fourteen survey units (transects). Most of the easement (study area) comprised crests and simple slopes over 20 m elevation. The study area also traversed the upper reaches of Swamp Creek and four unnamed drainage lines. Levels of effective coverage uniformly low due to generally poor GSV conditions. Total of eighteen sites, consisting of ten artefact scatters and eight isolated finds, identified during survey. Three previously registered on AHIMS. Artefact counts for scatter sites ranged from two to 103, with three sites (KK04, 37-6-1650 and 37-6-1651) containing over fifty artefacts. Six sites identified as having PAD. Distribution and contents of recorded sites interpreted as reflecting an occupational emphasis on Wentworth Swamp. Of the eighteen identified sites, ten were assessed as being of low scientific significance, four as being of moderate significance and four as being of high significance. Artefacts identified on vehicle tracks at sites KK01, KK02, KK04, KK07, 37-6-1650 and 37-6-1652 subsequently moved off-track under AHIP#1103798. Subsequent to the survey described above, in 2010, salvage excavations were undertaken at 25 pole locations along the feeder route, eighteen of which were located within the Project area for this assessment. In all but one instance, in which excavation was restricted to a 1m^2 pit, excavations at each pole consisted of a 2.25 m^2 (1.5 x 1.5 m) hand excavated pit. Detailed results for these excavations are pending. However, preliminary results data provided to AECOM by AMBS indicate that a total of 300 flaked stone artefacts and six pieces of ochre of potential cultural origin were recovered from 12 pits, with the highest artefact frequencies occurring within AMBS's creek terrace landform unit. Of the eighteen pits excavated within the current Project area, ten yielded artefacts, with counts ranging from 1 to 169. Artefacts recovered from the four test pits excavated in the creek terrace landform unit adjacent to Swamp Creek occurred in deep (>1 m) sand deposits interpreted as being of aeolian origin.	AMBS (2009a)
AMBS	2009	Kurri-Redbank	Survey	*c.*54 km long electricity easement between Kurri Kurri and Redbank subject to full pedestrian	AMBS (2009b)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
		Feeder 953/95R (132kV) upgrade		survey in 2009. Topography of route characterised by undulating terrain with intermittent watercourses as well as large creek flats associated with permanent water courses. Easement divided into 21 survey units on the basis of available soil landscape mapping. Total of 65 sites containing 321 flaked stone artefacts one ground stone hatchet-head and one grinding slab identified during survey. Sites types comprised artefact scatters (n = 41), isolated finds (n = 19), artefact scatters with PADs (n = 4) and one grinding slab site. Artefact counts for scatter sites ranged from two to 40. Silcrete dominant raw material (n = 158, 49.2%), with silicified tuff also reasonably well represented (n = 109, 33.9%). Majority of sites (82%) located within 200 m of watercourses and on flats (n = 35, 53.9%). Results of site distribution analyses interpreted as indicating a similar frequency/intensity of occupation between upland and lowland areas.	
RPS Harper Somers O'Sullivan (RPS HSO)	2009	Farley Waste Water Treatment Works, Owlpen Lane off Wollombi Road	Survey	Full coverage pedestrian survey of Farley Waste Water Treatment Works site. Study area located on alluvial flats associated with Wentworth Swamp. Land to west and north of the site reported as 'elevated' and forming part of a flat-topped ridge. Study area divided into two Survey Units: the area comprising the main waste water works treatment compound (SU 1) and two maturation ponds to the east (SU 2). GSV within SU1 was recorded as 'good' owing to widespread erosion activity. GSV in SU2 was likewise recorded as 'good' with extensive exposures occurring along the banks of the two maturation ponds. Total of five sites identified during survey, all isolated finds within SU2. None considered to be *in-situ*. Study area, in general, assessed as highly disturbed.	RPS HSO (2009)
McCardle Cultural Heritage Pty Ltd	2010	Farley Investigation Area, c. 2km southwest of Rutherford	Survey	Study area included a ridge grading into gently-inclined slopes with numerous drainage lines running north into Stony Creek and south into an unnamed 3rd order creek that discharges into Wentworth Swamp. Study area divided into fourteen survey units for survey. GSV across all survey units was very low due principally to grass cover. Overall effective coverage of 2.15% achieved. Disturbances noted during survey included clearing, fences, grazing, and construction for housing, infrastructure and dams. Total of three sites identified: one artefact scatter (FIA/1) and two isolated finds (FIA/2 and FIA/3). Scatter located on 3rd order stream in an area of exposure measuring 2 m x 1m. Artefacts included three silcrete flake pieces, one silcrete proximal flake and one mudstone complete flake. Area of PAD (PAD FIA/1) comprising the unnamed 3rd order creek situated in the southern portion and land within 50 metres of this creek also identified. PAD assessed as having been subject to minimal disturbance.	McCardle Cultural Heritage (2010)
Umwelt Australia Pty Ltd (Umwelt)	2010-2011	Saddlers Ridge housing subdivision, Gillieston Heights	Monitoring of ground disturbance works	Subsurface testing and monitoring programs undertaken for Mirvac's Stage 1 to 3 and Stage 4 to 11 development areas. Archaeological works for Stage 1 to 3 area included monitoring, test pitting and limited open area excavation. Forty-two test pits (50 cm^2) excavated on slope adjacent to unnamed, spring-fed drainage line. Artefacts located in seven pits, with the highest numbers occurring in TP38 (n = 5) and TP39 (n = 17). TP38 and 39 were subsequently expanded resulting in the recovery of an additional 307 artefacts (10 from TP38 and 297 from TP39). Silcrete dominant	Umwelt (2010a, 2010b)

Consultant	Year	Project / Location	Assessment type	Summary of assessment & results	Reference(s)
				raw material, with silicified tuff and chert also represented. Artefact types included complete and broken flakes, retouched flakes, flaked pieces and cores. Subsurface testing program for Stage 4 to 11 involved the manual excavation of 98 50 cm^2 test pits across a range of landform units. Total of seven artefacts recovered, with the highest number coming from test pits in the simple slope landform unit. High levels of historic disturbance inferred from excavated soil profiles. Subsequent to the completion of the Stage 1 to 3 and Stage 4 to 11 investigations described above, in March 2009, a program of archaeological monitoring was undertaken within the Stage 4 to 11 investigation area under AHIP #3077. AHIP#3077 was issued to cover proposed impacts to AHIMS registered Aboriginal site 38-4-1044 (GillMirv 1) identified during the Stage 4 to 11 subsurface testing program. Total of four artefacts - two mudstone flakes, one broken mudstone flake and one broken quartz flake - recovered from monitoring area. Results deemed consistent with earlier subsurface investigations results (see above) and supportive of the hypothesis that the Stage 4 to 11 area was "subject to less activity by Aboriginal people that resulted in the discard of artefactual material than within the Stage 1 to 3 area".	
Eureka Heritage	2011	Darcy's Peak residential development, Gillieston Heights	Monitoring of ground disturbance works	Aboriginal archaeological monitoring program carried out for GH PAD 1 (AHIMS ID #38-4-1039) (see Mary Dallas Archaeological Consultants 2007, 2008 above) under AHIP#1097239. Monitoring completed alongside historical archaeological investigation owing to overlap between proposed historic excavation areas and registered PAD area. Thirty-four historic excavation squares - each measuring 20 x 20 m - inspected for Aboriginal archaeological materials. One half square (10 x 20) also inspected. Total of 279 flaked stone artefacts recovered from fourteen (41.2%) of the 34 full squares. Most (n = 9, 64.3%) artefact-bearing squares also contained historic (i.e., non-Aboriginal structural remains and/or artefacts) leading the excavators to suggest that "areas suitable for Aboriginal occupation and use, were also considered suitable for occupation and use by the colonists" (Eureka Heritage, 2011:17). Silcrete dominant raw material (n = 221, 79.2%) followed by silicified tuff (n = 51, 18.3%) and chert (n = 4, 2.5%). Formed objects limited to nine backed/retouched artefacts and eighteen cores. Cortex rare suggesting importation of largely to fully decorticated blanks. Mid-Holocene antiquity proposed on typological grounds. Technological and typological character of monitoring assemblage deemed consistent with that recovered by Mary Dallas Archaeological Consultants (2008).	Eureka Heritage (2011)

5.2.3 Synthesis

In common with other regions of the Hunter Valley, previous archaeological surveys and subsurface investigation programs in the greater Kurri Kurri area have identified surface and subsurface deposits of stone artefacts, variously referred to as open artefact sites, artefact scatters, isolated artefacts and open camp sites, as the most common form of evidence of past Aboriginal occupation. Other archaeological site types, including scarred trees and grinding groove sites, have also been identified but are comparatively rare.

Previously identified open artefact sites in the greater Kurri Kurri vary significantly in size and content and have identified in variety of a landform contexts. Although widely distributed, existing survey and excavation data indicate a strong trend for the presence of such sites near water sources, namely wetlands and creeks. At the same time, artefact distribution has been shown to vary significantly in relation to landform and the permanency of water sources, with the largest and most complex sites/deposits identified on elevated, low gradient landform elements adjacent to wetlands and higher order watercourses.

Dominant lithic raw materials for flaked stone artefact production in the area include silcrete and silicified tuff (also known as mudstone), both of which are available in locally occurring alluvial and colluvial gravel deposits. Other, less commonly exploited materials such as quartz, chert, quartzite and petrified wood are likewise available in these deposits. Local flaked stone assemblages have tended to be dominated by items of flake debitage (i.e., complete and broken flakes and flake shatter fragments), with formed objects (i.e., cores and retouched tools) and non-flake debitage items less common.

Previously recorded Aboriginal sites within the Project area consist exclusively of open artefact sites. AHIMS data obtained for the current assessment indicate a total 33 Aboriginal sites in or within 50 m of the Project area, all of which are listed on AHIMS as 'Valid' sites. However, a review of associated reports indicates that ten of these sites have, in fact, been destroyed under approved AHIPs. In keeping with broader local and regional trends, the results of previous archaeological surveys and subsurface investigations within the Project area are collectively suggestive of an occupational emphasis on elevated low gradient landforms overlooking Wentworth Swamp and its associated higher order creek systems.

5.3 Archaeological Predictions

Key archaeological predictions for the Aboriginal archaeological record of the Project are as follows:

- Material evidence of past Aboriginal activity within the Project area is likely to be restricted to flaked stone artefacts in surface and subsurface contexts. However, there remains reasonable potential for the presence of grinding groove sites, stone quarries and scarred trees;
- Most areas, irrespective of the presence or absence of associated surface evidence, will contain subsurface archaeological deposits, albeit of highly variable character and extent;
- Most, if not all, of the Aboriginal archaeological materials present within the Project area will be of mid-to-late Holocene antiquity;
- Should their presence within the Project area be confirmed, aeolian sand deposits retain the greatest potential for the preservation of older evidence of Aboriginal occupation;
- Grinding groove sites, if present, will occur in direct association with watercourses;
- Burial sites, if present, will occur in fluvial or aeolian sand deposits;
- The dominant raw material for flaked stone artefact production within the Project area will be silcrete, with silicified tuff the second most common material;
- Flaked stone assemblages will be dominated by flake debitage (*sensu* Andrefsky 2005), with formed objects (i.e., cores and retouched flakes) comparatively poorly represented;
- The majority of silcrete artefacts will exhibit evidence of thermal alteration;
- Knapping floors, if present, will exhibit evidence indicative of systematic backed artefact manufacture;
- Complete and/or fragmentary backed artefacts will dominate the retouched components of surface and excavated assemblages;
- Tool types of demonstrated temporal significance, if present, will be limited to edge-ground hatchet heads and backed artefacts;

- Surface and subsurface artefact distribution within the Project area will vary significantly in relation to landform, distance to water and stream order; and
- Elevated, low gradient landform elements adjacent to Wentworth Swamp and the Project area's higher order watercourses (e.g., Swamp Creek, Black Waterholes Creek) will contain larger and more complex flaked stone assemblages than landform elements in other contexts.

6.0 Ethnohistoric Context

6.1 Introduction

Information regarding the ways in which Aboriginal people likely used pre-contact landscapes is available to archaeologists through two primary sources: archaeological (i.e., survey and excavation) data and historical records. **Section 5.0** has summarised the Aboriginal archaeological context of the Project area on both a regional and local scale. This section builds on this foundation by summarising relevant ethnohistoric information for the Project area and environs. As in other parts of New South Wales and Australia more broadly, non-Aboriginal people occupying the Lower Hunter Valley began to document Aboriginal culture from first contact, with explorers, missionaries, settlers and the like recording their observations of Aboriginal people and/or their material culture in letters, journals and official reports. Many of these accounts are overtly Eurocentric in tone and the content and veracity of some is, at best, questionable. Nonetheless, taken together, they form an important source of information on Aboriginal lifeways at the time of British colonisation and can, in conjunction with available archaeological data, be used to generate working predictive models of prehistoric Aboriginal land use.

Key sources, both primary and secondary, for the post-contact languages and lifeways of the Aboriginal people occupying the Lower Hunter Valley at contact include: Backhouse (1843), Barrallier (1802), Brayshaw (1987), Caswell (1841), Capell (1970), Dawson (1830), Ebsworth (1826), Enright (1900, 1901, 1932, 1933, 1936, 1937), Elkin (1932), Fawcett (1898a, 1898b), Ford (2010), Gunson (1974) , Hale (1846), Fraser (1892), Haslam et al. (1984), Larmer (1898), Lissarrague (2006), Matthews(1898, 1903), Miller (1887), McKiernan (1911), Threlkeld (1827, 1834, 1836, 1850), Scott (1929) and Sokoloff (1980). Although a detailed review of these sources is beyond the scope of this report, information of particular relevance to the current assessment is summarised below.

6.2 Language Groups & Boundaries

As highlighted by Brayshaw (1987) and a number of other researchers (e.g., ERM, 2004; Kuskie 2012), reconstructing the social and territorial organisation of the Aboriginal groups occupying the Hunter Valley at contact is extremely difficult given the enormous social upheaval that preceded any formal investigations into their languages and lifeways. The sometimes contradictory nature of primary historical records has likewise complicated the situation as has the tendency of early observers to describe all named groups of Aboriginal people, regardless of size and/or composition, as ‘tribes’ (Brayshaw, 1987: 36).

According to Tindale’s (1974) oft-cited tribal map, the current Project area is located at the western extremity of Awabakal territory, very close to the Awabakal’s boundary with the Wonnarua (**Figure 20**). Tindale (1974 describes the territory of the Awabakal as an 1,800 km^2 area centred on Lake Macquarie, south of Newcastle, while that of the Wonnarua is described as a 5,200 km^2 area stretching from “a few miles” above Maitland west to the Dividing Range and south to the divide north of Wollombi. To the south and west of the Awabakal, Tindale (1974) places the Darkinjung, whose tribal territory is described as a 4,700 km^2 area extending south of watershed of Hunter River, from “well south” of Jerry's Plains, east toward Wollombi and Cessnock, south to Wisemans Ferry on the Hawkesbury River, and west to the divide east of Rylstone. To the north of the Awabakal were the Worimi who, according to Tindale (1974), occupied a 3,900 km^2 area extending from the Hunter River to Forster, near Cape Hawke, inland to near Gresford and south to Maitland. Finally, to the north on the Wonnarua, Tindale (1974) places the Geawegal tribe, who are described as occupying the northern tributaries of the Hunter River to Murrurundi and being present at Muswellbrook, Aberdeen, Scone and Mount Royal Range.

Although widely cited, it should be noted that Tindale’s boundaries for the Awabakal ‘tribe’ do not accord with those provided by the missionary Reverend Lancelot Threlkeld, who established an Aboriginal mission at Belmont on Lake Macquarie in 1826[9] (the ‘Bahtahbah’ mission) and is widely regarded as one of the pioneers of Aboriginal studies in New South Wales owing to his detailed recordings, with the assistance of influential Awabakal leader Biraban (aka John McGill), of the language and lifeways of the Awabakal people. Writing in 1828, for example, Threlkeld described the territory of the Awabakal as consisting of:

> The land bounded (to the South) by Reid’s Mistake the entrance to Lake Macquarie, (to the North) by Newcastle & Hunter’s River, (to the West) by five islands on the head of Lake Macquarie 10 miles

[9] Subsequently relocated to Toronto in 1831and named ‘Ebenezer’ mission

> west of our station. This boundary, about 14 miles N and S by 13 E and W, is considered as their own land (Threlkeld 1828 in Ford, 2010: 339) (**Figure 21**)

Tindale's (1974) and Threlkeld's (1828) contradictory accounts notwithstanding, it is clear from available historical records that the former's oft-cited and arguably simplistic division of the Awabakal and Wonnarua into two separate 'tribes' does not adequately capture what was at contact a complex system of social and territorial organisation involving numerous local descent groups (i.e., clans) and bands who, critically, spoke the same language. As Lissarrague (2006: 7) has recently observed, "the evidence from archival sources suggests that the language described by Threlkeld as 'The language of the Hunter River and Lake Macquarie' was spoken by people now known as Awabakal, Kuringgai and Wonnarua". Lissarrague (2006), for her part, has named this language the Hunter River and Lake Macquarie language (HRLM language) and notes that it may also have been spoken by Tindale's (1974) Geawegal 'tribe'.

Figure 20 Excerpt from Tindale's (1974) tribal map (from Kuskie, 2012: 38, Fig. 7, after Tindale, 1974)

Critical to current interpretations of the boundaries of the HRLM language are the observations of Reverend Threlkeld. Threlkeld's own account of the boundaries of this language, which comes from his 1838 report to the then NSW Legislative Council's Committee on the Aborigines Question, is reproduced below:

> The native languages throughout New South Wales, are, I feel persuaded, based upon the same origin; but I have found the dialects of various tribes differ from those which occupy the country around Lake Macquarie; that is to say, of those tribes occupying the limits bounded by North Head of Port Jackson, on the south, and Hunter's River on the north, and extending inland about sixty miles, all of which speak the same dialect.
>
> The native of Port Stephen's use a dialect a little different, but not so much so as to prevent our understanding one another' but at Patrick's Plains the difference is so great, that we cannot communicate with each other; there are blacks who speak both dialects (Threlkeld 1838 in Ford, 2010).

Threlkeld's (1825) earlier observation that "the natives here [i.e., at Lake Macquarie] are connected in a kind of circle extending to the Hawkesbury and Port Stephens" is also worthy of note here (Threlkeld, 1825 in Ford, 2010: 328).

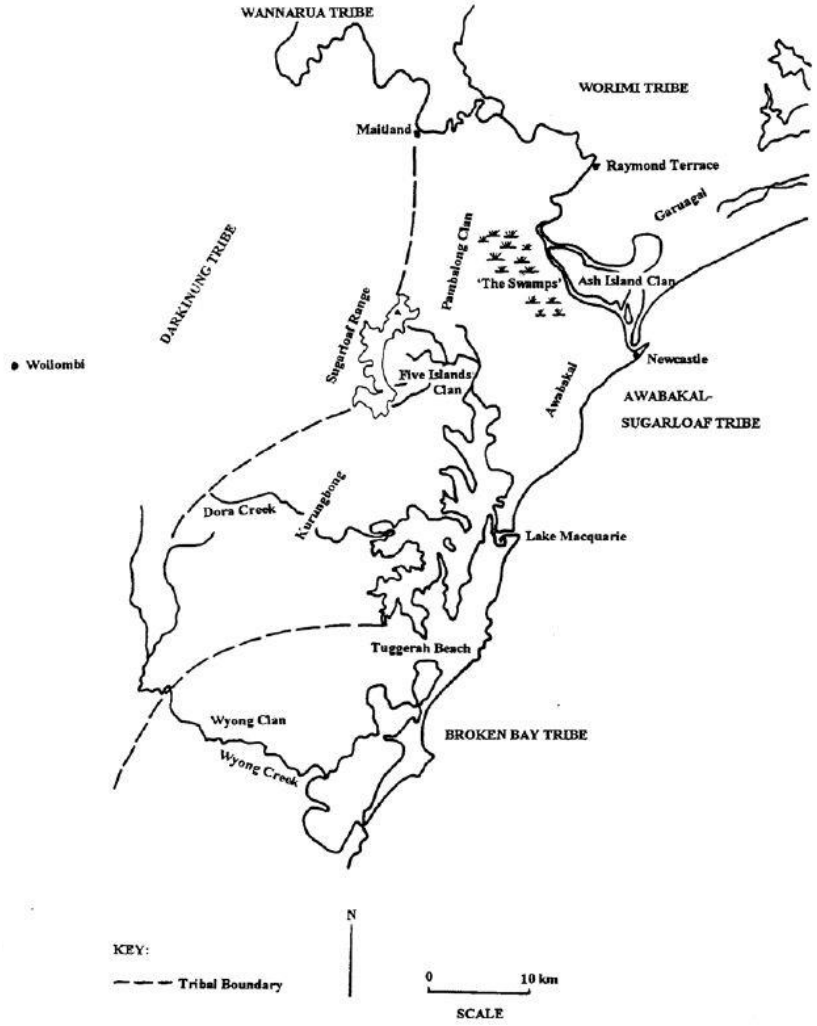

Figure 21 Gunson's (1974) tribal map for the lower Hunter Valley, based on the observations of Reverend Lancelot Threlkeld (from Kuskie, 2012: 39, Fig. 8, after Gunson, 1974).

Threlkeld's observations are clearly of particular relevance to the current assessment and provide strong *primary* evidence for the existence of a single shared language for Tindale's (1974) Awabakal and Wonnarua 'tribes'. At the same time, they suggest that this language differed from that spoken by the Worimi around Port Stephens, being the Kutthung or Kattang language described by Enright (1900, 1901), and those spoken by Aboriginal groups occupying the Mid and Upper Hunter Valley, namely Darkinjung and Kamilaroi (Brayshaw 1987; Ford, 2010). Although Threlkeld's proposed southern extent for the HRLM language does not accord with the observations of other early sources, principally R.H. Matthews, his suggestion of a single shared language for the Aboriginal groups occupying the catchments between the Hawkesbury River estuary of Broken Bay and the estuarine areas of the Lower Hunter River is well supported by available historical records and associated linguistic research (see, in particular, Capell, 1970; Ford, 2010)

Ford's (2010) recently completed historiographic analysis provides further insight into the social and territorial organisation of the Aboriginal groups occupying the Hunter Valley at contact and is also worthy of mention here. Based on his own detailed review of available historical records, Ford (2010) has convincingly argued that, contrary to popular beliefs, the actual 'tribal' and/or language name for the HRLM-speaking Aboriginal groups occupying the estuarine areas of the lower Hunter River at contact was *Wannungine* and not Awabakal, with the latter term coined, alongside 'Guringai' (now Kuringgai), by Scottish ex-school teacher and Maitland resident John Fraser in 1892 (Fraser, 1892). The term *Wannungine,* Ford (2010: 343) notes, was the term that celebrated surveyor and self-taught anthropologist R.H Matthews recorded as the language or tribal name for Aboriginal peoples occupying the coastline southward from the Hunter River estuary to 'Lane Cove', but not extending to the

north shore of Port Jackson, and east to the coastal range[10]. Matthews also identified the term *Wannerawa,* applying it to the southern part of the identified Wannungine area (i.e., around Broken Bay) (Ford, 2010: 344).

Thus, although correctly identified by Matthews, it is Ford's contention that it is Miller's (1887) misapplication of the term *Wannerawa*, *as* 'Wonnarua', to the Mid and Upper Hunter Valley, subsequently reinforced through the publications of disgraced journalist J.W. Fawcett (1898a, 1898b), that has resulted in the historical anomaly of the *Wannerawa* (Miller's (1887) 'Wonnarua') being placed in the Mid and Upper Hunter. Miller's (1887: 352) reference to the principal ornament of the Wonnarua being a "nautilus shell cut into an oval shape and suspended from the neck" is cited as further evidence that Miller should actually have meant his Wonnarua to be coastal people (Ford, 2010: 354). Contrary to Miller's (1887) and Fawcett's (1898a, 1898b) widely cited accounts, Ford's research suggests that, at the time of first European settlement, the mid Hunter was, in fact, occupied by Darkinjung-speaking peoples, whose territory encompassed the ranges bounded by the Hawkesbury River floodplain to the south and the Hunter River floodplain to the north and was bordered to the east/northeast by the coastal *Wannungine (*aka *Wannerawa*) (Ford, 2010: 10). Bordering the Darkinjung to the west/northwest, in the Upper Hunter, were Kamilaroi-speaking peoples, who Ford (2010: 467) suggests had penetrated over the Liverpool Range and were occupying the Hunter Valley as early as 1819.

6.3 Social Organisation

In common with other regions of New South Wales (e.g., Attenbrow, 2010) and Australia more broadly (Peterson, 1976), available historical records suggest that the primary units of social organisation amongst the Aboriginal language groups present in the lower Hunter at contact were the clan and band. Although these terms are often used interchangeably (e.g., Kohen, 1993), following Attenbrow (2010), a distinction can, in fact, be drawn between the two, with clans comprising local descent groups and bands, land-using groups who, though not necessarily all of the same clan[11], camped together and cooperated daily in hunting, fishing and gathering activities. Individual bands will have habitually occupied and exploited the resources of particular tracts of land within the overall territory of their clan. However, the territorial boundaries of each band will have been permeable or elastic in the sense of complex kinship ties facilitating inter-band territorial movements and the reciprocal use and/or exchange of resources (Brayshaw, 1987: 36).

The size of the individual bands occupying the lower Hunter at contact appears to have varied considerably and was no doubt activity and season dependent (Brayshaw, 1987). However, an upper limit of around 70 individuals, consisting of several families, is suggested by available historical records (see, in particular, Table B in Brayshaw, 1987). Individual band sizes notwithstanding, much larger groups of Aboriginal people, numbering in the hundreds, are known to have come together for events such as corroborees, ritual combats and feasts (e.g., Anon, 1877; Scott, 1929: 32; Threlkeld in Gunson, 1974: 55).

Fawcett (1898b) notes the existence of four exogamous clans amongst the Wonnarua, with different clan names for men and women:

> The Wonnah-ruah tribe, like most other tribes, was divided into four classes or clans, and the laws of consanguinity, which existed in this tribe, as other tribes, effectually barred a man's marriage with the women of his own class or clan and also with the class or clan of his mother. Every man in the Wonnah-ruah tribe was either an Ippye (Ipai), a Kumbo, a Murree (Murri), or a Kubbee (Kubbi); and every women an Ippatha (Ipatha), a Butha, a Matha or a Kubbeetha (Kubbitha) (Fawcett, 1898b: 180).

For the coastal Worimi, Elkin (1932) and Enright (1932) report the existence of four 'named local groups', two of which - the Garugal and Maiangal - were 'salt-water' groups and two - the Gamipingal and Buraigal - 'inland' groups. Although unspecified by either author, these groups were likely bands (*sensu* Attenbrow, 2010). Social organisation amongst the Worimi, Elkin (1932) notes, was based on exogamous patrilineal totemic clan membership, with at least twelve clans, known as *tambual*, recognised. Sex totemism was reportedly also practised, with *kulangulan*, the bat, comprising the men's totem and *dilmun*, the wood-pecker, the women's (Elkin, 1932: 361).

As with the Worimi, a total of four named local groups have been reported for the Awabakal (Gunson, 1974), each associated with a particular tract of land within the broader territory of the Awabakal 'tribe' (see **Figure 21**) and led by its own 'chief':

- The *Awabakal-Sugarloaf Tribe*, led by Biraban;

[10] From north to south: the Sugarloaf Range, the Watagan Rage and Peats Ridge.
[11] Some individuals may have been related through marriage.

- The *Pambalong Clan*, led by Gorman/Coleman;
- The *Ash Island Clan*, led by Wallungull; and
- The *Kurungbong*, led by King Ben.

6.4 Settlement & Subsistence

Available historical records attest to exploitation, for food and other resources (e.g., skins for clothing), of a large and diverse range of terrestrial, avian and aquatic fauna by Aboriginal peoples occupying the Lower Hunter Valley at contact. A broad economic division between 'coastal' and 'inland' groups is also evidenced, with the subsistence regimes of those living along the coast geared principally towards the exploitation of marine foods and those of inland groups based chiefly on the exploitation of land mammals (e.g., Ebsworth, 1826: 80).

Along the coast, the accounts of early observers such as Dawson (1830), Scott (1929) and Threlkeld (in Gunson, 1974) are suggestive of a diet based principally on fish and shellfish, with crustacea (i.e., crabs and crayfish) and marine mammals, namely whales and dolphins also consumed, the latter opportunistically (e.g., Threlkeld in Gunson, 1974: 55). Fish, a dietary staple, were caught in a variety of ways including angling (i.e., hook and line fishing), spearing, hand netting and trapping, and were cooked in fires, sometimes in canoes while still on the water (Threlkeld in Gunson, 1974: 190; Scott, 1929: 17-18). Angling was undertaken by women and spearing by men (Dawson, 1830: 314; Scott, 1929: 18; Threlkeld in Gunson, 1974: 54). Crayfish were obtained by diving amongst the rocks, an activity that was undertaken both sexes (cf. Scott, 1929: 19 & Threlkeld in Gunson, 1974: 55). Haslam et al. (1984: 22) report that shellfish were collected by women and children. However, Brayshaw (1987: 76) notes that there is no direct evidence as to who traditionally undertook this task.

The role of marine foods in the diets of Aboriginal groups occupying the lower Hunter at contact was complimented, or supplanted further inland, by a variety of freshwater animal foods, with kangaroos, wallabies, bandicoots, echidnas, possums, flying foxes, kangaroo-rats, koalas, dingos, lizards, goannas and snakes variously reported as having been hunted and/or eaten (see Brayshaw, 1987; Haslam et al., 1984 and Sokoloff, 1980 for primary references). Various species of freshwater and estuarine fish, eels and mussels were also consumed, as were turtles (e.g., Anon, 1877b; Cunningham, 1827: 151; Grant, 1803: 61). Possums appear to have been a favoured food, particularly in inland areas, with a number of early accounts detailing their method of capture and remarking on the tree climbing skills of the Aboriginal people involved (e.g., Dawson, 1830: 238; Scott, 1929: 21). Flying foxes, too, appear to have actively sought out by groups in both areas (e.g., Anon, 1877a; Scott, 1929: 23), though not by the Awabakal at Lake Macquarie who held the animal in high esteem (Threlkeld in Gunson, 1974: 206). Macropods were sometimes stalked and speared by individual huntsmen (Dawson, 1830: 216; Threlkeld in Gunson, 1974: 190). However, their capture was more commonly a communal exercise (Dawson, 1830: 182; Scott, 1929: 20; Threlkeld in Gunson, 1974: 191). Threlkeld (in Gunson, 1974: 206) and Fawcett (1898a: 153) report the burning off of particular tracts of land to promote new growth and attract kangaroos and wallabies.

References to the hunting and consumption of a variety of birds, including the emu, are also present in the writings of a number of early observers (e.g., Fawcett, 1898a; Scott, 1929: 23; Threlkeld in Gunson, 1974: 55, 65). Fawcett (1898a: 153) reports the use of nets to trap emus and use of returning boomerangs to bring down "ducks and other birds". Larvae, namely 'Cabra' or shipworm (Teredo navalis) and other tree dwelling grubs, appear to have been a popular foodstuff in both coastal and inland areas (Anon, 1877b; Scott, 1929: 21-22). Honey collected from the hives of native bees was both eaten directly and mixed with water to form a sweetened drink (Breton, 1833: 195; Dawson, 1830: 60; Scott, 1929: 34-35; Threlkeld in Gunson, 1974: 67, 124).

Compared with their faunal counterparts, the plant food resources of coastal and inland groups are poorly represented in the writings of early colonial observers. Nonetheless, available descriptions do suggest that plants formed a regular part of the diets of groups in both areas. Fern roots, likely those of the bracken fern (*Pteridium esculentum*) and various water ferns (*Blenchum spp.*), appear to have played an important role in the diets of those Aboriginal people occupying the estuarine reaches of the Hunter River (Barrallier, 1802: 81-82; Dawson, 1830: 92; Ebsworth, 1826: 71; Threlkeld in Gunson, 1974: 19). Other plant foods mentioned in the writings of early observers include yams, macrozamia seeds, various fruits and the stems of the water lily (Backhouse, 1843: 380; Caswell, 1841; Scott, 1929: 41; Threlkeld in Gunson, 1974: 74). Nectar obtained from the blossoms of the grass tree (Xanthorrhoea spp.) and flower spikes of the dwarf banksia was also consumed (Dawson, 1830: 244).

Regarding levels of residential mobility, available records suggest that this was generally quite high. Fawcett (1898a), for example, notes of the Wonnarua that: “they had no permanent settlements, but roamed about from place to place within their tribal district, in pursuit of game and fish, which was their chief sustenance, making use periodically of the same camping grounds, generation after generation, unless some special cause operated to induce them to abandon them”. Dawson’s (1830: 172) observation that “they [being the Aboriginal people of Port Stephens area] seldom…stay more than a few days at these places [their camps], frequently not more than one night” is similarly suggestive, as is the 1877 observation, by an anonymous long-term resident of Maitland, that the Aboriginal people with whom he was familiar in the Maitland area “appeared to lead a very restless kind of life, constantly on the move, shifting their camps from one place to another, seldom remaining more than three or four days in one camp” (Anon, 1877e). Along the coast, Sokoloff (1980: 8) has suggested seasonal differences in settlement duration, noting that “the relative abundance of marine sources of food in summer tended to make the natives more sedentary at this time”.

As for the selection of campsites, we limited are to Fawcett’s (1898a: 152) observation that “in choosing the site, proximity to freshwater was one essential, some food supply a second, while a vantage ground in case of attack from an enemy was a third important item”.

6.5 Material Culture

Aboriginal material culture is explicitly linked to the natural environment and resource availability. For the lower Hunter Valley, available historical records identify an extensive array of hunting and gathering ‘gear’ and provide detailed insight into associated materials and manufacturing processes. The form and construction of everyday domestic structures are likewise well documented. Brayshaw (1987), in particular, provides a useful synthesis of both forms of material culture and highlights regional variability in raw material acquisition and utilisation between coastal and inland groups.

Campsites and domestic structures are well-represented in the accounts of early observers and were often the subject of illustration (**Plate 1** and **Plate 2**). Huts, commonly referred to as "gunyers" or “gunyahs”, were of timber and bark construction. Fawcett (1898a: 152) describes the form and construction of huts as follows:

> A couple, or three, forked sticks, a few straight ones, and some sheets of bark, stripped from trees growing nearby, supplied the requisites for the construction of their home. The forked sticks were thrust into the ground and the straight ones placed horizontally in the forks. The sheets of bark were then set up against the horizontal poles in a slanting position, the bark of the structure being toward the windy point of the compass. The sides were frequently enclosed for further shelter, but the front was generally open. Before each one was a small fire, which was seldom allowed to go out, and which was used for warmth, or to cook by.

Similar hut forms and construction methods can be found in the accounts of several other early observers, for example, Scott (1929: 13), Dawson (1830: 171-72), Caswell (1841) and Threlkeld (in Gunson, 1974: 45).

Alongside its use in hut manufacture, tree bark also served as the primary construction medium for canoes, an integral component of the material culture repertoire of Aboriginal peoples occupying the lower Hunter Valley at contact. Available descriptions indicate that canoes were manufactured by bending, with the assistance of fire, a suitable sheet of bark into shape and securing the ends with bark cord or other ‘wild vines’ (Ebsworth, 1826: 82; Dawson, 1830: 79; Fawcett, 1898a; Mrs Ellen Bundock in Brayshaw, 1987: 60; Scott, 1929: 38-39; Threlkeld in Gunson, 1974;). Scott (1929: 39) reports that the gaps between the cord bindings at either end of the canoe were plugged with clay. Clay hearths were also added for warmth and cooking (Threlkeld in Gunson 1974; Scott, 1929: 39). At Lake Macquarie, leaking canoes were repaired by sewing patches of tea tree bark over damaged areas and sealing them with melted grass tree resin (Threlkeld in Gunson, 1974: 54).

Spears, which feature prominently in the literature, were an important component of men’s ‘gear’ and were used in hunting, fishing, combat and ceremony (Scott, 1929: 35; Threlkeld in Gunson, 1974: 67-68). Spears for all purposes, Brayshaw (1987: 65) notes, were of composite manufacture and alongside sea shells, iron tomahawks and pieces of bottle glass, were important trade items, with significant numbers traded inland for possum skin rugs and fur cord (Dawson, 1830: 135-136; Threlkeld in Gunson, 1974: 65). Various hard woods and grass tree stems served as primary spear shafts and were shaped using shell scrapers and pieces of glass (Dawson, 1830: 67, 135; Scott, 1929: 35; Threlkeld in Gunson, 1974: 67-68).

Plate 1 **Joseph Lycett's '*Aborigines resting by camp fire, near the mouth of the Hunter River*', *ca*.1820 (Source: National Library of Australia)**

Plate 2 **Augustus Earle's '*A Native Camp of Australian Savages near Port Stevens, New South Wales*', 1826 (Source: National Library of Australia)**

Threlkeld (in Gunson, 1974: 67) describes the manufacture and use of three different types of spears in the Lake Macquarie area, namely the fishing spear, the hunting spear and the battle spear. Primary shafts, in all three instances, comprised grass tree stems. However, differing types of points were added according to function. For the fishing spear, Threlkeld (in Gunson, 1974) describes the affixing of bone barbs onto three or four 'shorter spears' of fire-hardened wood, themselves fastened to the main spear shaft with bark thread and grass-tree gum, while the hunting spear is described as being equipped with a single hard wood point. The battle spear, Threlkeld (in Gunson, 1974: 67) reports, also had a single hard wood point but differed from its hunting counterpart in having "pieces of sharp quartz stuck along the hard wood joint on one side so as to resemble the teeth of a saw" (Threlkeld in Gunson, 1974: 66). The substitution of glass for quartz on battle spears is also known to have occurred. In common with the Lake Macquarie area, Scott (1929: 35) notes the use, around Port Stephens, of different types of spears for hunting, fishing and combat. Differing functions aside, spears of all varieties were launched using spearthrowers or woomeras, also of composite manufacture (Brayshaw, 1987: 66).

Hatchets, like spears, were an important component of men's 'gear' and were used for variety of tasks including bark and wood removal, animal butchery, cutting toeholds in trees to facilitate climbing and extracting game and honey from logs and trees (Anon, 1877a; Dawson, 1830: 202; Scott, 1929: 41; Threlkeld in Gunson, 1974: 67). Known as *mogo*, hatchets were composite implements consisting of an edge-ground stone hatchet head and withe or flat, hardwood handle, the former secured to the latter using grass tree resin and cord (Dawson, 1830: 202; Fawcett, 1898a: 153; Scott, 1929: 40). Hatchets, Scott (1929: 5) notes, were carried by men in belts worn around the waist. Post-contact, stone hatchets appear to have been rapidly replaced by iron substitutes (Brayshaw, 1987: 66; Dawson, 1830: 16).

Other notable items of men's gear described in the accounts of early observers include several types of hard wood clubs, two types of shield (one broad and one narrow) and returning and non-returning hard wood boomerangs (Anon, 1877b; Scott, 1929: 36-38; Threlkeld in Gunson, 1974: 41, 68). Threlkeld (in Gunson, 1974: 68) also describes the use of a "wooden sword" similar to a boomerang but with "a handle at one end with a bend contrary to the blade".

As for women's gear, Brayshaw (1987: 65) notes that, in addition to their daily use in gathering activities, digging sticks, also known as yamsticks, were status symbols that were sometimes used during altercations. These implements, up to 2m long and *c*.4cm in diameter, were manufactured out of hardwoods, were fire-hardened and typically not decorated (Brayshaw, 1987: 65). Cord used in the manufacture of fishing lines and nets was made by women using the bark of various trees (e.g., the Cabbage-tree (*Livistona australis*) and the Kurrajong (*Brachychiton populneus*) and is reported as having been extremely strong and durable (Ebsworth, 1826: 79; Dawson, 1830: 67; Scott, 1929: 17). Dilly-bags were used by women for carrying small items such as fish-hooks, prepared bark cord, lumps of grass tree resin and food (e.g., fish and shellfish) and were worn slung around the head and draped down the back (Ebsworth, 1826: 79-80).

Fish-hooks were reportedly manufactured out of oyster and pearl shell (Caswell, 1841; Dawson, 1830: 66, 308; Ebsworth, 1826: 79; Threlkeld in Gunson, 1974: 54). Threlkeld (in Gunson, 1974: 54) reports that a suitable shell was simply "ground down on a stone until it became the shape they wished". However, However, Dyall's (2004) analysis of excavated examples from the Birubi Point midden complex suggests a more complex, multi-stage production process. Pieces of fine sandstone, shale and quartzite were used for filing down the hooks (Sokoloff, 1980: 23).

Awls or 'needles' manufactured out of kangaroo bone were used in the repair of canoes and the sewing of skin cloaks (Fawcett, 1898a; Threlkeld in Gunson, 1974: 54). Items of clothing, where worn, included spun possum-fur belts, worn only by men, possum fur headbands and cloaks or rugs made from sewn kangaroo and possum skins (Dawson, 1830: 15-16; Scott, 1929: 5). Cloaks were worn by both men and women.

Alongside women's dilly bags, early accounts indicate the production and use of a variety of other containers, with tea tree bark a common construction material. Threlkeld (in Gunson, 1974: 67, 156), for example, refers to tea-tree bark 'cups' and wooden 'bowls' "formed from some large protuberance of a growing tree" while Dawson (1830: 250) refers to "small baskets" made from tea tree bark.

Although particularly well represented in the archaeological record of the lower Hunter Valley, references to the production and/or use of flaked stone artefacts are virtually absent from the historical record. Excluding hatchets, Threlkeld's (in Gunson, 1974: 67) reference to the use of "pieces of sharp quartz" for barbing battle spears remains the only known primary reference in this respect. Brayshaw (1987: 68), for her part, has proposed that effective absence of flaked stone artefacts from the historical record may be a product of the fact that such artefacts were not being used at the time of European settlement, having been replaced with other materials (e.g.

shell, glass, wood and bone)[12]. However, she also acknowledges that their use may simply have escaped the notice or interest of early observers.

6.6 Ceremony & Ritual

Evidence for ceremonial or ritual behaviour amongst the Aboriginal groups occupying the lower Hunter Valley at contact can be found in the accounts of a number early observers (e.g., Anon, 1877c; Dawson, 1830; Enright, 1936; Fawcett, 1898a, 1898b; Scott, 1929; Threlkeld in Gunson, 1974), with documented 'ceremonial' activities including corroborees, male initiation ceremonies, marriage, ritual combat and various burial, body adornment and modification practices. Although limited in number, references to spiritual beliefs of the Aboriginal groups occupying the region are also present and attest to regional variability in belief systems.

Male initiation ceremonies, in which boys were "initiated into the privileges of manhood" (Fawcett, 1898a: 153), are described by Enright (1936), Fawcett (1898a), Scott (1929) and Threlkeld (in Gunson, 1974). Amongst the Wonnarua, Fawcett (1898a: 152) notes that the male initiation ceremony was known as *Boorool*. Enright (1936: 86), writing on the Worimi people, refers to the ceremony as the *Keeparra* while Scott (1929: 29) cites the terms *poombit* and *bora* in his recollections, noting that the latter was a colloquial term for the former. Initiation grounds, referred to by Scott (1929: 29) as 'poombit grounds', were elaborately prepared and consisted of one or two[13] cleared circles in secluded areas of bushland. Images of animals and other designs were carved into surrounding trees and, in some cases, "figures of raised earth were created on the ground" (Brayshaw, 1987: 83). Threlkeld (in Gunson, 1974: 50-51, 63-65) describes attending, in November 1825, a ceremony "prepatrory to removing the front tooth of several young men who would then be capable of marrying a wife". The site of this ceremony, Threlkeld (in Gunson, 1974) reports, was known as the "Mystic Ring, or Porrobung" and consisted of a circle "thirty-eight feet in diameter" with a small hillock at is centre. Trees near the ring were marked with "representations of locusts, serpents &c on the bark chopped with an axe".

As for the ceremonies themselves, Enright (1936: 87) reports that the *Keeparra*, in which "candidates learnt all those laws which governed his future life", lasted approximately one month but was "only a prelude to a long system of instruction which lasted some five years". Fawcett (1898a: 154), meanwhile, describes a ceremony involving tests of skill and endurance, the teaching of tribal laws, "emblematical dances" and the restricted involvement of women. Scott (1929: 28-34), too, describes the restricted involvement of women and dancing in the poombit or bora ceremonies of the Port Stephens area. Alongside their other important roles, medicine men or native doctors, known as *Karaji* (also spelt *Karadjys*), appear to have played an active role in initiation ceremonies and, together with group elders, were responsible for overseeing initiates' observance of instructed laws (Enright, 1936; Fawcett, 1898a).

Alongside its use in the initiation ceremonies described above, body painting with animal fat and/or ochre was undertaken as part of corroborees and for the purposes of ritual combat. For men, tooth avulsion, body scarification and septum piercing appear to have been undertaken in ceremonies subsequent to that associated with initiation (Fawcett, 1898b; Scott, 1929). Regarding items of personal adornment, Miller (1887: 3543) notes that the "principal ornament" of the Wonnarua was a "nautilus shell cut into an oval shape and suspended from the neck" while Fawcett (1898a: 153), also writing on the Wonnarua, reports that "the girls often adorned themselves with flowers, bone or reed ornaments, and shell necklaces". References to the dressing of men's hair in a conical form with tufts of grass attached are present in Dawson (1830) and Anon (1877c).

Available historical records suggest that burial in the earth was the most common form of burial practised by Aboriginal groups occupying the Lower Hunter Valley at contact, with tea tree bark widely used as a burial shroud (Fawcett, 1898b: 180; McKiernan, 1911: 889; Miller, 1877: 354; Scott, 1929: 3; Threlkeld in Gunson, 1974: 47, 89, 100). Grave goods consisted of items of personal gear such as spear and hatchets (McKiernan, 1911: 889; Threlkeld in Gunson, 1974: 47, 89, 100). Cremation is also known to have been practiced but is poorly represented in the historical record (Threlkeld in Gunson, 1974: 99).

Regarding inter-group conflict, Haslam et al. (1981) have noted of the Hunter Valley as a whole that, although skirmishes were common, major clashes were infrequent. Ritual combat appears to have linked principally to unsanctioned territorial incursions and the abduction of women (Fawcett, 1898b).

[12] Historic references (e.g., Dawson 1830: 67, 135; Scott 1929: 35) to the use of shell scrapers and/or fragments of bottle glass for the shaping/sharpening of wooden spears provide some support for this suggestion.
[13] Where two circles were used, these were separated by a distance of up to 400 m.

Gunson (1974) notes a distinct difference between the spiritual beliefs of the Aboriginal groups occupying the inland and coastal portions of the Hunter Valley at contact. In contrast to the Awabakal of Lake Macquarie[14], for example, whose supreme spiritual entity was known as *Koun* (pronounced cone), the inland Wonnarua and Kamilaroi are understood to have venerated the prominent sky cult hero *Biame*. Threlkeld (1834 in Keary 2009) reports that Koun was known by three names - *Ko-in*, *Tip-pa-kál*, and *Pór-ráng* - and describes him as follows:

> in appearance like a black; he resides in the thick brushes or jungles; he appears occasionally by day, but mostly at night. In general he precedes the coming of the natives from distant parts, when they assemble to celebrate certain mysteries, as knocking out the tooth in the mystic rite, or when performing some dance. He appears painted with pipe clay, and carries a fire-stick in his hand; but, generally, it is the doctors, a kind of Magicians, who alone perceive him, and to whom he says, 'Fear not, come and talk.' At other times he comes when the blacks are asleep, takes them up as an eagle does his prey, and carries them away. The shout of the surrounding party often occasion him to drop his burthen; otherwise, he conveys them to his fireplace in the bush, where close to the fire he carefully deposits his load. The person carried tries to cry out, but cannot feeling almost choked: at daylight, Ko-in disappears, and the black finds himself conveyed safely to his own fire-side!

Available historical accounts indicate that that eagle-hawk (sea eagle) was a totem of particular importance to the Awabakal owing to its strong relationship with Koun, who resembled an eagle-hawk when in flight (Gunson, 1974: 3; Keary, 2009). Circular stone structures observed by Threlkeld on the Sugarloaf Range to the west of Lake Macquarie were explained by Threlkeld's primary informant Biraban as having been placed and assembled by eaglehawks (Keary, 2009).

Another important spiritual entity for the coastal Awabakal was *Puttikan*, a feared supernatural spirit who inhabited the Sugarloaf Range. Threlkeld (in Gunson, 1974: 61) describes *Puttikan* as follows:

> resembling a man but taller in stature; with arms, legs, face, and hair, very long on the head, but the feet are placed contrarily to the face being behind; and the body hairy, like an animal. The flesh is so hard in all parts of the body that it is imprenentrable [sic], except just between the legs, where a spear may penetrate, but at no other part. He is fierce, devouring men, and often pursuing the Aborigines in the mountains.

6.7 Post Contact History

As in other parts of NSW and Australia more generally, the post-contact history of the Aboriginal people of the lower Hunter is primarily one of dispossession and loss, with traditional hunting and camping grounds rapidly claimed and settled by Europeans and populations decimated by introduced diseases. However, active resistance and friendly relations are also attested in available records.

As highlighted by Brayshaw (1987), the introduction of European diseases had a devastating impact on the Aboriginal population of the Hunter Valley, with diseases such as smallpox, typhoid, influenza, scarlet fever, measles, diphtheria, whooping cough and croup causing or contributing to the deaths of large numbers of Aboriginal people. Major small pox epidemics between April and May 1789 and from 1829 to 1831 are known to have had a particularly deleterious impact on the valley's Aboriginal population (Butlin, 1983).

The loss of traditional hunting grounds and a decline in the abundance of game that populated these areas have also been identified as factors relevant to the marked population decline that accompanied European settlement of the Hunter Valley, as has the sexual violence perpetrated by non-Aboriginal men against Aboriginal women (Turner & Blyton, 1995). The destruction, over time, of the complex systems of social and territorial organisation that existed prior to contact has likewise been attributed to such factors, as has the collapse of traditional settlement and subsistence regimes.

Today, modern Awabakal, Wonnarua and Worimi people retain strong cultural connections to the Lower Hunter Valley and are actively involved in the protection and promotion of their culture for future generations.

[14] Dawson's (1830: 153, 158, 163 219, 220, 322) multiple references to an "evil spirit of woods" known as "Coen" suggest that the Worimi of the Port Stephens area, like the Awabakal, venerated *Koun* as opposed to *Biame.*

7.0 Archaeological Survey

7.1 Aims & Objectives

The overarching aim of the archaeological survey undertaken for this assessment was to identify and record any existing surface evidence of past Aboriginal occupation within the Project area. Nested-objectives were as follows:

- To relocate and reassess all extant AHIMS registered sites within the Project area;
- To sample - via pedestrian survey - all landform types within the Project area;
- To identify areas that, irrespective of the presence or absence of surface artefacts, are likely to contain subsurface archaeological deposit; and
- To provide sufficient data to facilitate the development of appropriate management recommendations for the known and potential Aboriginal archaeological resource of the Project area.

7.2 Methodology

In developing an appropriate survey methodology for the current assessment, three key factors were taken into consideration:

- Near-universally poor Ground Surface Visibility (GSV) conditions across the Project area, with areas of higher GSV largely restricted to cleared powerline easements, vehicle tracks and fire trails in the western half of the Project area;
- Very poor survey conditions in areas of regenerating native vegetation across the Project area, with dense undergrowth impeding pedestrian survey and posing a significant OH&S risk; and
- The demonstrably large size of the Project area at *c.*1,964 ha, precluding a full coverage survey;

In view of the above, it was decided that a targeted survey focusing on identified areas of higher GSV in the western half of the Project area should be undertaken. In accordance with Sections 4.3.1 and 4.3.2 of the Consultation Requirements, this was conveyed to all RAPs in the draft assessment methodology document. No objections were raised in relation to AECOM's proposed survey methodology.

Archaeological survey of Project area was undertaken over an eight day period between 23 June 2014 and 2 July 2014 by a combined field team of two AECOM archaeologists and up to six rostered RAP field representatives per day (for a list of RAP field representatives refer to **Table 4** in **Section 3.3.2**). In accordance with the draft survey methodology, the survey focussed on higher areas of GSV within the western half of the Project area. However, several transects were also completed in the eastern half of the site. In the northeastern and north central portions of the Project area, particular attention was paid to areas of higher GSV along the margins of Wentworth Swamp, namely cattle tread exposures and areas of exposed ground associated with wave erosion.

All survey was conducted on foot[15], with a total of 51 transects completed over the course of the survey. The location of each transect completed during survey, including start and end points, was recorded using one of two handheld differential GPS units, with associated transect data (e.g., levels of visibility and exposure) entered directly into the same unit upon the completion of each transect.

All Aboriginal archaeological materials identified during survey were recorded to a standard comparable to that required by the Code of Practice (Requirement 7), with individual artefact locations captured by differential GPS. As with that recorded for individual survey transects, attribute data for all identified Aboriginal artefacts within the Project area were entered directly into a GPS unit using AECOM's standard digital open site recording form.

7.2.1 Site Definition

The definition, in spatial terms, of Aboriginal archaeological sites is a topic of considerable importance to modern cultural heritage management and one that has generated significant discussion in Australian archaeology (e.g., Doleman 2008; Holdaway, 1993; Holdaway et al. 1998, 2000; MacDonald & Davidson 1998; McNiven 1992; Robins 1997; Shiner 2008). Aboriginal archaeological sites can be broadly defined as places in the landscape that retain physical evidence of past Aboriginal activity. Such evidence, of course, can assume a range of forms, depending on the nature of the activity or activities that produced it, and can vary dramatically in quantity and

[15] Although proposed in the draft assessment methodology, no vehicle transects were undertaken during survey.

extent. Some Aboriginal archaeological sites are, by their very nature, easy to define in spatial terms. Scarred trees and rockshelters, for example, can be readily delineated from their surrounding landscapes. Difficulties arise, however, for sites whose present-day physical extent is, more often than not, a product of geomorphic processes, as opposed to the actions of Aboriginal people in the past.

Although relevant to a variety of site types, geomorphic processes such as soil erosion and deposition, are of particular relevance to identification and definition of surface scatters of stone artefacts, commonly referred to as 'open camp sites' or 'artefact scatters'. It is, for example, now widely accepted that the visibility and preservation of such sites are, to a significant extent, products of such processes, both contemporary and historic (Dean-Jones & Mitchell 1993; Fanning et al. 2008, 2009; Shiner 2008). As demonstrated by countless large-scale excavations projects in south-eastern Australia, including the lower Hunter Valley, surface artefacts almost invariably represent only a fraction of the total number of artefacts present within these sites, with the majority occurring in subsurface contexts. Artefact exposure, unsurprisingly, is highest on erosional surfaces and lowest on depositional ones. At the same time, in many areas, surface artefacts have been shown to form part of more-or-less continuous subsurface distributions of artefacts, albeit with highly variable artefact densities linked to environmental variables such as stream order and landform.

Such evidence poses a significant analytical and interpretive dilemma. Defining sites on the basis of surface artefacts alone is clearly problematic, with modern site boundaries invariably reflecting the size and distribution of surface exposures as opposed to the actions of Aboriginal people in the past. Nonetheless, for pragmatic reasons, this is the most commonly used approach, with 'distance' and 'density-based' definitions dominating. In NSW, two of the most commonly employed distance-definitions are '*two artefacts within 50m of each other*' and '*two artefacts within 100 m of each other*'. Neither definition is derived from a particular theoretical approach or body of empirical research - they are simply pragmatic devices for site definition. Definitions based on artefact density also vary in their particulars. However, one of most commonly used definitions is that which isolates, within an arbitrarily defined 'background scatter' of one artefact per 100 m², higher density clusters that are subsequently defined as 'sites'.

Non-site or distributional archaeology offers an alternative approach to distance and density-based site definitions (Ebert 1992; Foley 1981), with individual artefacts, not sites, treated as the basic units of analysis (for published Australian examples see Doelman 2008; Holdaway et al. 2000; McNiven 1992; Robins 1997; Shiner 2008). While recognising the interpretive potential of non-site approaches with respect to data analysis and discussion, their implementation in the context of cultural heritage management studies is difficult. Here, the identification of 'sites' is required for reasons of recording (i.e., their entry into site databases such as AHIMS) as well as ease of relocation, protection, and ongoing management. The identification of spatially-discrete 'sites', therefore, offers the most pragmatic approach to Aboriginal heritage management in impact assessment contexts (but see McDonald (1996) for a different view).

Site definition for the current assessment has been based on the 50 m distance convention cited above. Subsurface archaeological potential, meanwhile, is addressed by the concept of 'archaeological sensitivity', with three levels of sensitivity recognised: nil, low and high (**Table 14**). Akin to the concept of Potential Archaeological Deposit (PAD), archaeologically sensitive areas can be broadly defined as those that retain potential for subsurface archaeological deposit. For the current investigation, levels of archaeologically sensitivity across the Project area have been assessed on the basis of observed archaeology (i.e., its distribution and character), the results of previous Aboriginal heritage investigations within and surrounding the Project are, levels of past land disturbance and the predicted complexity of deposits within each category.

Table 14 Archaeological sensitivity rating scheme

Rating	Definition
Nil	Land with no potential for subsurface archaeological deposit(s) due to past ground disturbance(s).
Low	Subsurface archaeological deposit(s) may be present. Relative to areas of high sensitivity, lower artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances.
High	Subsurface archaeological deposit(s) likely to be present. Relative to areas of low sensitivity, higher artefact counts, densities and assemblage richness values expected. Integrity of deposit(s) will be dependent on the nature of localised land disturbances.

7.2.2 Stone Artefact Recording

Stone artefact recording for the current survey involved the recording of a maximum of 13 attributes for individual stone artefacts, with the number of attributes recorded per specimen differing by type. Attributes employed in the current assessment are defined in **Table 15** below. Type definitions can be found in Hiscock (1986) and Holdaway and Stern (2004).

Table 15 Stone artefact attributes

Attribute	Definition	Recorded for
Type	Primary artefact type: flake, flake shatter (*sensu* Andrefsky (2005), flaked piece, core, retouched flake, heat shatter, hammerstone, edge-ground hatchet head and grindstone	All artefacts
Raw material	Lithic raw material on which the artefact was made (e.g., silcrete, silicified tuff, chert, quartz, FGS)	All artefacts
Maximum linear dimension (MLD)	Maximum linear dimension of artefact in millimetres.	All artefacts
Cortex	Presence/absence of cortex	All artefacts
Flake type	Flake sub-type: complete flake, proximal flake and split flake.	All flakes
Tool type	Formal implement type, as defined by Holdaway and Stern (2004).	All retouched flakes and edge-ground implements
Flake length (mm)	Distance between the point of percussion and the furthest distal point of the flake (i.e., length to the most distal point) (after Holdaway and Stern 2004: 138).	All complete flakes
Flake width (mm)	Longest line that can be drawn at right angles to the length dimension (i.e., maximum width) (after Holdaway and Stern 2004: 139).	All complete flakes
Flake thickness (mm)	Maximum distance from dorsal to ventral face (i.e., maximum thickness) (after Holdaway and Stern 2004: 140).	All complete flakes
Platform surface	Nature of the platform surface on complete and proximal flakes: single scar, multiple scar, faceted, cortical, punctiform and crushed/collapsed.	All complete and proximal flakes
Dorsal cortex	Amount of cortex on dorsal surface of flake: none, 1-50%, 51-99% and 100%.	All complete flakes
Core type	Core type: unidirectional, multidirectional, bidirectional, bifacial, bipolar and tranchet.	All complete cores
Core blank	Stone package on which the core was made: cobble/pebble, flake, heat shatter fragment and indeterminate.	All complete cores
Cortex (core)	Amount of cortex remaining on core at discard: none, 1-50%, 51-99% and 100%.	All complete cores
Longest flake scar	Length of longest complete flake scar preserved on core.	All complete cores
Number of striking platforms	Number of striking platforms preserved on core at discard	All complete cores
Number of removals	Number of complete and partial flake scars (>15 mm) preserved on core.	All complete cores
Core length (mm)	Maximum linear dimension of core.	All complete cores
Core width (mm)	Width at mid-point of maximum dimension	All complete cores
Core thickness (mm)	Thickness at mid-point of maximum dimension	All complete cores
Tool state	Complete or broken	All tools
Tool length (mm)	Maximum linear dimension of tool.	All complete tools
Tool width (mm)	Width at mid-point of maximum dimension	All complete tools
Tool thickness (mm)	Thickness at mid-point of maximum dimension	All complete tools

7.3 Results

7.3.1 Survey Coverage and Effective Coverage

As indicated in **Section 7.2** and shown on **Figure 22**, a total of 51 pedestrian transects were completed over the course of the survey. Recorded transect data indicate that a total survey coverage of approximately 141.7 ha was achieved. Excluding those portions of transects falling outside of the Project area provides a revised *total survey coverage* of 137.5 ha, representing around 7**%** of the Project area. A breakdown of survey coverage by landform is provided in **Table 16**.

Effective coverage is an estimate of the area in which archaeological materials are 'detectable'. Calculation of the *total effective coverage* obtained for the current survey indicates that approximately 20.7 ha of land within the Project area was effectively surveyed for Aboriginal archaeological materials. This equates to around 1.1% of the total Project area and 14.6% of the total area surveyed (141.7 ha).

Tabulated estimates of the effective coverage achieved for each of the 51 pedestrian transects completed during survey are provided in **Table H1** in **Appendix H**. Unsurprisingly, levels of effective coverage for transects undertaken in areas of regenerating native bushland to the west, south and northwest of the existing Hydro smelter were, in general, significantly higher than those of transects in the eastern and north-central portions of the site, a product of typically good GSV conditions along the former and typically poor GSV conditions along the latter. As was expected prior to the entering the field, levels of GSV along the cleared vehicle track and fire trails that criss-cross the areas of regenerating native bushland to the west, south and northwest of the existing Hydro smelter were typically very high (**Plate 3** & **Plate 4**). However, exceptions did occur (**Plate 5**). In the eastern and north-central portions of the site, levels of GSV along transects were typically very poor owing to managed native and exotic grass cover (**Plate 6** & **Plate 7**). Nonetheless, areas of higher visibility were also encountered in the form of exposures associated with fluvial erosion (sheet, gully and wave), stock movement and the construction of features such as contour banks, dams and vehicle tracks (**Plate 8**, **Plate 9** & **Plate 10**). Along the margins of Wentworth Swamp, areas of very good to excellent GSV were restricted to cattle tread and fluvial erosion exposures (see **Plate 8** & **Plate 9**).

Consideration of levels of effective survey coverage by landform (**Table 16**) shows that effective coverage was highest within the simple slope landform unit (13.3 ha), with the remaining landform units characterised by significantly lower values. Landform-based cultural lithic counts are consistent with these data in so far as the simple slope unit containing the largest number of surface artefacts. However, given comparable effective coverage totals, the difference in artefact counts between the elevated flat and spur crest units is noteworthy. No cultural lithics were identified within the creek terrace, crest, disturbed, residual rise and swamp landform units.

Table 16 Survey coverage by landform

Landform unit	Area (ha)	%
Creek terrace	1.2	0.9
Crest/Ridge	5.1	3.7
Depression	9.6	7.1
Disturbed	2	1.5
Elevated flat	14.6	10.7
Flood-prone flat	8	5.9
Residual rise	1	0.7
Simple slope	80	59
Spur crest	9.2	6.7
Swamp	5.2	3.8
Total	**135.7**	**100**

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AECOM

SURVEY TRANSECTS

Aboriginal Cultural Heritage Assessment
Hydro Aluminium Smelter Site & Associated Buffer Land
Kurri Kurri, New South Wales

FIGURE 22

Plate 3 **View along part of Transect #16. Note excellent GSV on track.**

Plate 4 **View along part of Transect #14. Note excellent GSV on track.**

Plate 5 **View along part of Transect #6. Note very poor GSV on track, now closed to traffic.**

Plate 6 **View across part of Transect #48. Note very poor GSV conditions owing to native/exotic grass cover.**

Plate 7 **View across part of Transect #47, Swamp Creek floodplain. Note very poor GSV conditions.**

Plate 8 **View across large, artefact-bearing cattle tread exposure on margin of Wentworth Swamp, Transect #43.**

Plate 9 **Artefact-bearing erosion exposure bordering dammed section of Black Waterholes Creek, Transect #24.**

Plate 10 **View across artefact-bearing exposure associated with adjacent contour bank, Transect #50.**

Table 17 Effective coverage by landform with surface artefact counts

Landform unit	Effective coverage (ha)	% of total effective coverage	Number of surface artefacts[16]	% of total artefacts
Creek terrace	0.1	0.4	0	-
Crest	0.6	2.9	0	-
Drainage depression	1.3	6.5	18	3.8
Disturbed	0.3	1.5	0	-
Elevated flat	2	9.5	19	4
Flood-prone flat	1	4.9	11	2.3
Residual rise	0.1	0.4	0	-
Simple slope	13.3	64.2	326	68.6
Spur crest	1.6	7.6	101	21.3
Swamp	0.4	2.1	0	-
Total	**20.7**	**100**	**475**	**100**

7.3.2 Cultural Lithics and Identified Sites

A total of 482 individual cultural lithic items were identified during the current survey, 475 or 98.5% of which are located within the Project area. Employing a 50 m distance convention for site definition, consideration of the location of these items against the mapped and/or described boundaries of valid AHIMS registered sites provides a total of 65 new Aboriginal archaeological sites and 20 pre-existing sites within the Project area (85 sites in total). Newly and previously recorded sites (n = 4) located outside of the Project area are not addressed in this report.

Newly identified surface sites within the Project area include 31 artefact scatters and 34 isolated artefacts while pre-existing sites consist of 11 artefact scatters and nine isolated artefacts. Newly recorded sites account for 85.7% (n= 407) of the identified surface assemblage within the Project area (n = 475) while pre-existing sites account for the remaining 14.3% (n= 68). Summary data on newly and previously identified open artefact sites within the Project area are provided in **Table 18** below. Site locations are shown on **Figure 23**.

AHIMS site cards for all previously identified open artefact sites within the Project area, which contain detailed site descriptions, are attached as **Appendix I**.

7.3.2.1 Open Artefact Sites

As indicated above, a total of 85 open artefact sites (i.e., artefact scatters and isolated finds) have been identified within the Project area, 65 (23.5%) of which are new sites and will be registered on AHIMS.

Of the 20 previously recorded open artefact sites within the Project area, nine were located during the current survey. Notable reductions in the number of artefacts identified within previously recorded artefact scatters KK04 (45-3-3387) and Northern Swamp Tributaries 4 (NST4) (37-6-1650) can be attributed to the off-track movement, in July 2009, of artefacts under AHIP#1103798 (AMBS, 2009a: 105). As indicated in **Table 18**, additional artefacts were located at two previously recorded sites: Northern Swamp Tributaries 2 (NST2) (37-6-1652) and KR02 (37-6-2005). The latter is registered on AHIMS as an isolated artefact. However, it can now be confirmed as an artefact scatter.

Artefact scatters (n = 42) and isolated artefacts (n = 43) are essentially equally represented within the Project area, accounting for 49.4% and 50.5% of the total respectively. Maximum artefact counts for scatter sites range from two to 103, with a mean count of 13.7 (Stdev = 21.6). The majority (n = 27, 64.3%) of scatters contain less than ten artefacts. Scatters containing more than 50 artefacts, conversely, are rare, with only three examples

[16] Note that this total relates only to those artefacts identified within the Project area

present (Hydro-AS02-14; NST4 and KK04). Mean artefact densities, calculated for those sites with known areas (n = 38) using maximum artefact count values, range from 0.001 to 0.039 artefacts per m², with an *overall* mean density of 0.009 artefacts per m².

Excluding those sites with unknown areas (n = 4), open artefact sites within the Project area occupy a total surface area of approximately 133,765 m², representing around 0.7% of the total Project area. Scatter areas range from one to 38,441 m² (mean = 1,651 m²; Stdev = 5,210.4 m²). All isolated finds have been assigned a nominal site area of 1m².

Previously and newly identified open artefact sites within the Project area occur exclusively in contexts consistent with their exposure from subsurface contexts (e.g., fluvial erosion exposures) and, as such, are best conceived of as opportunistic surface manifestations of former subsurface deposits. In common with other parts of the Hunter Valley, a more-or-less continuous subsurface distribution of artefacts across the non-swampy and non-grossly disturbed parts of the Project area is inferred from the results of the current survey and previous archaeological investigations on a local and regional scale, albeit one with highly variable densities linked to key environmental factors such as landform, distance to water, water permanency and slope. Recorded artefacts, importantly, likely represent only a fraction of the total stone artefact resource present within the Project area, with most artefacts occurring in subsurface contexts.

Further discussion on the composition of the combined cultural lithic assemblage (n = 482) recorded during survey is provided in **Section 7.3.3** below.

Table 18 Previously and newly recorded open artefact sites within the Project area: summary information

Site name	Type	AHIMS ID	Centroid Coordinates (MGA Zone 56)		Site area (m²)	No. Cultural lithics	Density (mean, m²)	Environmental Context			
			Easting	Northing				Landform unit(s)	Surface geology	Distance to Water (m)	Slope class(es)
Hydro-AS01-14	Artefact scatter	TBA	357780	6374463	5,085	16	0.003	3; 5; 8	1	20	1; 2; 3; 4
Hydro-AS02-14	Artefact scatter	TBA	359766	6374324	11,015	89	0.008	8	1; 2	<5	1; 2; 3
Hydro-AS03-14	Artefact scatter	TBA	360138	6373383	520	15	0.029	8	2	<5	2; 3; 4
Hydro-AS04-14	Artefact scatter	TBA	360085	6373261	857	11	0.013	8	2	<5	2; 3; 4
Hydro-AS05-14	Artefact scatter	TBA	360256	6373012	315	3	0.010	8	1	<5	1; 2; 3; 4
Hydro-AS06-14	Artefact scatter	TBA	359994	6373142	164	2	0.012	8	2	<5	2; 3; 4
Hydro-AS07-14	Artefact scatter	TBA	359003	6372353	772	30	0.039	8; 10	2	<5	2; 3; 4
Hydro-AS08-14	Artefact scatter	TBA	358265	6372585	1,953	5	0.003	8; 10	2	<5	1; 2; 3; 4
Hydro-AS09-14	Artefact scatter	TBA	358412	6372339	483	2	0.004	5; 8	2	125	1; 2; 3
Hydro-AS10-14	Artefact scatter	TBA	358096	6372326	985	4	0.004	8; 10	2	<5	1; 2; 3;4
Hydro-AS11-14	Artefact scatter	TBA	357628	6372468	458	3	0.007	8	1	30	1; 2; 3
Hydro-AS12-14	Artefact scatter	TBA	357175	6372186	4,094	42	0.010	3; 9	1	20	1; 2; 3
Hydro-AS13-14	Artefact scatter	TBA	357378	6372130	209	7	0.034	8; 9	1	30	1; 2; 3; 5
Hydro-AS14-14	Artefact scatter	TBA	357432	6372247	2,045	13	0.006	8; 9	1	100	1; 2; 3
Hydro-AS15-14	Artefact scatter	TBA	357565	6372127	194	5	0.026	8	1	50	3; 4
Hydro-AS16-14	Artefact scatter	TBA	357531	6372061	338	3	0.009	8	1	45	2; 3
Hydro-AS17-14	Artefact scatter	TBA	357897	6372119	2,405	14	0.006	8	2	50	1; 2; 3
Hydro-AS18-14	Artefact scatter	TBA	358062	6372025	327	6	0.018	8; 9	2	65	2; 3
Hydro-AS19-14	Artefact scatter	TBA	357827	6371996	277	4	0.014	8	2	95	3; 4
Hydro-AS20-14	Artefact scatter	TBA	358459	6371828	847	5	0.006	5	1	250	1; 2; 3
Hydro-AS21-14	Artefact scatter	TBA	357637	6371864	308	2	0.006	5; 8	1	55	3; 4
Hydro-AS22-14	Artefact scatter	TBA	357458	6371685	1,553	13	0.008	8	1	70	1; 2; 3; 4

Site name	Type	AHIMS ID	Centroid Coordinates (MGA Zone 56)		Site area (m²)	No. Cultural lithics	Density (mean, m²)	Environmental Context			
			Easting	Northing				Landform unit(s)	Surface geology	Distance to Water (m)	Slope class(es)
Hydro-AS23-14	Artefact scatter	TBA	358476	6371563	320	4	0.012	5; 8	1	210	1; 2; 3
Hydro-AS24-14	Artefact scatter	TBA	355859	6372140	184	2	0.011	8; 9	1	120	2; 3
Hydro-AS25-14	Artefact scatter	TBA	356555	6371753	2,736	24	0.009	3; 9	1	20	1; 2; 3
Hydro-AS26-14	Artefact scatter	TBA	357247	6371141	2,997	14	0.005	3; 4; 6; 8	1	20	1; 2; 3
Hydro-AS27-14	Artefact scatter	TBA	357148	6370939	871	6	0.007	6	1	85	1; 2
Hydro-AS28-14	Artefact scatter	TBA	357219	6370703	632	2	0.003	4; 8	1	50	1; 2; 3
Hydro-AS29-14	Artefact scatter	TBA	358225	6371002	434	7	0.016	8	1	435	1; 2; 3
Hydro-AS30-14	Artefact scatter	TBA	358420	6371046	1,171	6	0.005	5	1	320	1; 2; 3
Hydro-AS31-14	Artefact scatter	TBA	359541	6371256	498	4	0.008	8	2	30	3; 4
Hydro-IA01-14	Isolated artefact	TBA	357936	6374155	1	1	-	3; 8	1	25	3
Hydro-IA02-14	Isolated artefact	TBA	360899	6373192	1	1	-	3; 8	1	15	3
Hydro-IA03-14	Isolated artefact	TBA	361291	6372936	1	1	-	8	3	55	3
Hydro-IA04-14	Isolated artefact	TBA	356803	6373197	1	1	-	2	1	70	2
Hydro-IA05-14	Isolated artefact	TBA	356844	6373447	1	1	-	8	1	89	3
Hydro-IA06-14	Isolated artefact	TBA	357337	6373419	1	1	-	3; 8	4	30	3
Hydro-IA07-14	Isolated artefact	TBA	357251	6372904	1	1	-	8	1	40	2
Hydro-IA08-14	Isolated artefact	TBA	358051	6372838	1	1	-	8	1	35	3
Hydro-IA09-14	Isolated artefact	TBA	357675	6372531	1	1	-	8	1	80	2
Hydro-IA10-14	Isolated artefact	TBA	357419	6374517	1	1	-	8; 9	1	100	3
Hydro-IA11-14	Isolated artefact	TBA	357234	6372407	1	1	-	8	1	145	3
Hydro-IA12-14	Isolated artefact	TBA	358221	6372373	1	1	-	3; 8	2	<5	3
Hydro-IA13-14	Isolated artefact	TBA	358142	6372209	1	1	-	8	2	95	3

Site name	Type	AHIMS ID	Centroid Coordinates (MGA Zone 56)		Site area (m²)	No. Cultural lithics	Density (mean, m²)	Environmental Context			
			Easting	Northing				Landform unit(s)	Surface geology	Distance to Water (m)	Slope class(es)
Hydro-IA14-14	Isolated artefact	TBA	357200	6372062	1	1	-	8; 9	1	80	3
Hydro-IA15-14	Isolated artefact	TBA	357196	6372010	1	1	-	8	1	100	3
Hydro-IA16-14	Isolated artefact	TBA	357191	6371956	1	1	-	8	1	145	3
Hydro-IA17-14	Isolated artefact	TBA	357758	6371972	1	1	-	5; 8	1; 2	90	2
Hydro-IA18-14	Isolated artefact	TBA	358052	6371829	1	1	-	8	2	88	3
Hydro-IA19-14	Isolated artefact	TBA	355868	6372201	1	1	-	8	1	60	3
Hydro-IA20-14	Isolated artefact	TBA	356482	6372152	1	1	-	3; 8	1	15	3
Hydro-IA21-14	Isolated artefact	TBA	356399	6371678	1	1	-	8	1	88	3
Hydro-IA22-14	Isolated artefact	TBA	356467	6371681	1	1	-	8	1	56	3
Hydro-IA23-14	Isolated artefact	TBA	357177	6371721	1	1	-	8	1	345	1
Hydro-IA24-14	Isolated artefact	TBA	358174	6371607	1	1	-	5; 8	1	45	2
Hydro-IA25-14	Isolated artefact	TBA	358185	6371413	1	1	-	5	1	80	1
Hydro-IA26-14	Isolated artefact	TBA	356661	6371276	1	1	-	8	1	395	3
Hydro-IA27-14	Isolated artefact	TBA	357010	6371196	1	1	-	4; 8	1	260	3
Hydro-IA28-14	Isolated artefact	TBA	356755	6370978	1	1	-	8	1	475	3
Hydro-IA29-14	Isolated artefact	TBA	356946	6370846	1	1	-	6; 8	1	200	2
Hydro-IA30-14	Isolated artefact	TBA	356998	6370750	1	1	-	6	1	100	1
Hydro-IA31-14	Isolated artefact	TBA	357441	6370397	1	1	-	2; 8	1	220	3
Hydro-IA32-14	Isolated artefact	TBA	357661	6370364	1	1	-	8	1	80	3
Hydro-IA33-14	Isolated artefact	TBA	358630	6370333	1	1	-	8	1	45	3
Hydro-IA34-14	Isolated artefact	TBA	358882	6372413	1	1	-	8	2	20	1
KK04	Artefact scatter	45-3-3387	357905	6371719	38,441	13* (previous	0.003	8; 9	1; 2	80	1; 2; 3; 4

Site name	Type	AHIMS ID	Centroid Coordinates (MGA Zone 56)		Site area (m²)	No. Cultural lithics	Density (mean, m²)	Environmental Context			
			Easting	Northing				Landform unit(s)	Surface geology	Distance to Water (m)	Slope class(es)
						total = 103)					
KK05	Artefact scatter	37-6-1954	358542	6371639	6,567	5* (previous total = 17)	0.003	5; 8	1	125	1; 2; 3
KK09	Isolated artefact	37-6-1957	358372	6371638	1	1	-	5	1	345	4
KK10	Artefact scatter	37-6-1958	357408	6371797	6,050	2* (previous total = 6)	0.001	5; 8	1	175	1; 2; 3
KK11	Artefact scatter	37-6-1959	357077	6371847	4,300	3* (not relocated)	0.001	8	1	177	2; 3
KK12	Isolated artefact	37-6-1960	356887	6371887	1	1* (not relocated)	-	3; 8	1	10	1; 2; 3; 4
KK13	Isolated artefact	37-6-1961	356713	6372765	1	1* (not relocated)	-	9	1	220	3
KK14	Isolated artefact	37-6-1962	356732	6372855	1	1	-	8; 9	1	190	3
KK-IF-1	Isolated artefact	37-6-0866	358645	6371329	1	1* (not relocated)	-	3; 8	1	<5	1; 2; 3
KK-IF-2	Isolated artefact	37-6-0865	357745	6369639	1	1* (not relocated)	-	1; 8	4	90	1; 2; 3
KR01	Artefact scatter	37-6-2004	357959	6370106	-	5* (not relocated)	Site area unknown	5; 8	1	75	1; 2; 3
KR02	Artefact scatter	37-6-2005	357514	6370403	476	2* (previous total = 1)	0.004	8	1	225	3; 4
KR03	Artefact scatter	37-6-2006	357491	6370454	-	2* (not relocated)	Site area unknown	2; 8	1	255	1; 2; 3; 4
KR04	Isolated artefact	37-6-2007	357367	6370539	1	1* (not relocated)	-	8	1	295	2; 3
KR05	Isolated artefact	37-6-2008	357171	6370683	1	1* (not relocated)	-	8	1	60	1; 2; 3
KR06	Artefact scatter	37-6-2009	356187	6371481	-	2* (not	Site area	3; 4; 6; 8	1	35	1; 2; 3

Site name	Type	AHIMS ID	Centroid Coordinates (MGA Zone 56)		Site area (m²)	No. Cultural lithics	Density (mean, m²)	Environmental Context			
			Easting	Northing				Landform unit(s)	Surface geology	Distance to Water (m)	Slope class(es)
						relocated)	unknown				
Northern Swamp Tributaries 2 (NST2)	Artefact scatter	37-6-1652	356741	6372410	22,473	20* (previous total = 12)	0.001	3; 8	1	200	1; 2; 3
Northern Swamp Tributaries 4 (NST4)	Artefact scatter	37-6-1650	356823	6372039	10,368	35* (previous total = 52)	0.005	3; 8; 9	1	65	1; 2; 3; 4
Swamp Creek Catchment 4 (SCC4)	Isolated artefact	37-6-1645	357708	6370097	1	1* (not relocated)	-	3; 8	1	75	1; 2; 3; 4
Swamp Creek Catchment 5 (SCC5)	Artefact scatter	37-6-1644	357073	6370752	-	1* (previous total = 2)	Site area unknown	6	1	30	1; 2

[1] **Landform key:** 1 = creek terrace; 2 = crest; 3 = drainage depression; 4 = disturbed; 5 = elevated flat; 6 = flood-prone flat; 7 = residual rise; 8 = simple slope; 9 = spur crest; 10 = swamp

[2] **Surface geology key:** 1 = Rutherford Formation - Dalwood Group; 2 = Quaternary Alluvium; 3 = Branxton Formation - Maitland Group; 4 = Farley Formation - Dalwood Group

[3] **Slope class key:** 1 = level; 2 = very gently inclined; 3 = gently inclined; 4 = moderately inclined