Also associated with the showground reserve is the burial discovered in 1866, which comprised Aboriginal remains, a spear, carved shield and other implements discovered by a Queanbeyan resident. The remains of a second burial of an Aboriginal person in a sitting position were also identified in 1935 when workmen dug a trench 80m south of the showground (Queanbeyan Age in Williams and Feary 1989).

Records indicate that a wide range of resources were exploited. Possums were available all year round within the wooded ranges of the ACT region: there skins were used for warmth (Bluett 1954). Smooth river cobbles area recorded as being used to grind up roasted Bogong moths during the production of 'moth cakes' (Flood 1996). A localized method of fishing was recorded by Shumack (1967:151) who described Aboriginal people working together to drive fish to the end of a waterhole where they could be speared en masse. Other observed activities include woodworking, food preparation and skin scraping activities with the use f a range of implements including digging sticks, bark vessels, hafted axes and a variety of flaked artefacts (Flood 1996:25-27). Wooden implements such as clubs, boomerangs and shields are recorded, as well as hammocks, nets, ropes, string bags, bone awls as well as the construction of bark huts (Flood 1980:25-26).

Food resources observed ethnographically include possum, kangaroos, wallabies, emus, reptiles, flying squirrel, fish, mussels, Bogong moths, yams, berries and wide range of seeds and plants (Bennett 1834:173; Bluett 1954:5).

Estimates of Aboriginal population sizes when the Queanbeyan area was first settled by Europeans are difficult to establish, due to a general lack of comment by the early explorers regarding native sightings. Lea-Scarlett attributes this to the native population purposefully avoiding the European settlers (1968:21). Observations made by Alan Cunningham, an early explorer of the region who was struck by the absence of signs of native occupation tend to support Lea-Scarlett's argument.

Wright estimated a population of approximately 400-500 Aborigines practicing a traditional lifestyle in the area in 1850. However, inevitably, the traditional patterns of land use and resource exploitation would have been impeded by the arrival of European settlers in the early1800s, restricting access to various resources and introducing diseases such as smallpox and influenza (Flood 1980). So great was the European impact on traditional Aboriginal society that within a few years, most aspects of traditional life had disintegrated and only a small group, including a number of children of mixed descent, remained by 1862 (Lea-Scarlett 1968).

A newspaper article from 1872 recorded only five or six 'full-blooded' Aboriginal people remaining in the area (Goulburn Herald 9 November 1872 in BIOSIS 2007:19). In January

1897, Nellie Hamilton, the last full-blooded Aboriginal person in the district, died in Queanbeyan.

4.5 Predictive Occupation Model

Predictive modeling, in an archaeological context, is a fairly straightforward concept and has been utilised by archaeologists in Australia for a number of years as a tool for undertaking research into Aboriginal heritage sites. In summary, predictive modeling involves the collation of information generated from previous archaeological research in a given region, and using this information to establish patterns of Aboriginal site distributions within the landscape of that particular region. On the basis of perceived patterns of site distribution, archaeologists can then make predictive statements regarding the potential for various Aboriginal site types to occur within certain landscape settings, and can make preliminary assessments regarding the potential archaeological sensitivity of landscape types within a given region.

4.5.1 Predictive Models: Strengths and Weaknesses

It should be acknowledged that most, if not all predictive models have a number of potential inherit weaknesses, which may serve to limit their value. These include, but may not be limited to the following.

1) The accuracy of a predictive model is directly influenced by the quality and quantity of available site data and information for a given region. The more data available and the greater the quality of that data, the more likely it is that an accurate predictive model can be developed.
2) Predictive modeling works very well for certain types, most particularly isolated artefacts and artefact scatters, and to a lesser extent scarred trees. For other site types it is far more difficult to accurately establish distribution patterns and therefore make predictive modeling statements. Unfortunately, these site types are generally the rarer site types (in terms of frequency of occurrence) and are therefore generally the most significant sites.
3) Predictive modeling (unless it is very sophisticated and detailed) will generally not take into account micro-landscape features within a given area. These micro features may include (but is certainly not limited to) slight elevations in the landscape (such as small terraces) or small soaks or drainage depressions that may have held water. These micro features have been previously demonstrated to occasionally be focal points for Aboriginal activity.
4) Predictive modeling to a large extent is often predicated on the presence of watercourses. However, in some instances the alignment of these watercourses has changed considerably over time. As a consequence the present alignment of a given watercourse may be substantially different to its alignment in the past. The consequence of this for predictive modeling (if these ancient water courses are not taken into account) is that predicted patterns of site distributions may be greatly skewed.

4.5.2 A Predictive Model of Site Type Distribution for the Study Area

The survey results of a series of previous investigations within the study area and in the surrounding landscapes as well as the predictive models previously posed by archaeologists in the area (e.g. Flood 1980, Boot and Heffernan 1898, Boot and Bulbeck 1990) indicate that Aboriginal open site occupation and patterning is fundamentally guided by topography, water and cold air drainage, with continual site visitation (and thus development of larger sites) dependent upon each of these three factors being met. The most commonly recorded sites in the ACT and NSW are isolated finds and open artefact scatters, with archaeological deposits, scarred trees, stone quarries and axe grinding grooves also occurring. Rarer sites include rock art sites, stone arrangements, burials, ceremonial sites and carved trees.

Artefact Scatters and Isolated artefacts

Stone artefacts are the most commonly identified markers of Aboriginal culture in the archaeological record and may occur either on the surface of the ground and/or within subsurface deposits. Stone artefacts most commonly comprise unretouched flakes and flaked pieces, which generally represent the byproducts of tool manufacture. Retouched flakes and typological tool forms as well as cores generally occur less commonly. This is due not only to variations in mobility and resource exploitation patterns, but also to the fact that a single core or the manufacture of a single 'tool' may result in the prior production of dozens of unretouched flakes and flaked pieces.

Isolated artefacts are defined as single stone artefacts. Where isolated finds are closer than 50 linear metres to each other they should generally be recorded as an artefact scatter. Artefact scatters are usually identified as a scatter of stone artefacts lying on the ground surface. For the purposes of this project, artefact scatters are defined as at least 2 artefacts within 50 linear metres of each other. Artefacts spread beyond this can be best defined as isolated finds.

It is recognised that this definition, while useful in most instances, should not be strictly prescriptive. On some large landscape features for example, sites may be defined more broadly. In other instances, only a single artefact may be visible, but there is a strong indication that others may be present in the nearby sediments. In such cases it is best to define the site as an Isolated Find/Potential Archaeological Deposit (PAD).

Artefact scatters can vary in size from two artefacts to several thousand, and may be representative of a range of activities, from sporadic foraging through to intensive camping activity. In rare instances, campsites which were used over a long period of time may contain stratified deposits, where several layers of occupation are buried one on top of another.

Previous archaeological research in the region has identified the following pattern of distribution and densities for stone artefacts:

- The majority of artefact scatters are located in close proximity to a watercourse, on relatively level and well-drained ground.
- Larger open artefact scatters (representing more intensive activity, such as regular camp areas), tend to be located on level, elevated landscape features, close to (within 200m) of major water courses
- The most common areas are the elevated basal slopes of hills, the level spines of spurs (around the termination point of the spur), or on elevated sand bodies;
- Site and artefact densities are also comparatively high on the spines of major ridgelines. These ridge lines are thought to have been utilised as favoured travelling routes through the landscape, and these sites are generally assumed to be representative of this activity;
- Site and artefact densities also tend to be comparatively lower in areas away from water courses;
- Site and artefact densities are comparatively lower moderate to steeply sloping terrain.

Given the range of topographical units traversed by the proposed route of the Ellerton Dr extension, artefact densities are predicted to fluctuate along the route. Artefact densities are predicted to be low towards the northern portion of the route in response to the steep to moderately sloping terrain and distance from permanent water sources. However, artefact densities are predicted to increase with proximity to the Jumping Creek area and the Queanbeyan River given the more undulating topography and the availability of permanent water and raw material sources.

- Open campsites are anticipated near streams, on level and elevated ground and on low gradient basal slopes.
- Large open campsites are most common within 100-150m of major drainage lines, often with a preference for confluences of major streams.
- Small, low-density open artefact scatters and isolated finds may occur away from major creek lines.

Scarred Trees

Scarred or carved trees are the product of the deliberate removal of bark by Aboriginal people for either domestic or ceremonial purposes. These site types can therefore occur anywhere were trees are of a sufficient age. In an Aboriginal context, however, they are most likely to occur in areas suitable for habitation – such as flat, elevated landform units near water.

The identification of Aboriginal scarring can prove difficult given the ability for bark to be removed naturally through fire and branch as well as the removal of bark by Europeans

throughout the entire historic period. As such, rigorous identification criteria must be utilized to exclude any natural or European causes of scarring. The following criteria are advocated by Irish (2004) to assess the validity of an Aboriginal scarred tree:

- Aboriginal scars generally do not extend to the ground,
- Scars are generally regular in outline, with parallel or concave edges and demonstrating symmetry. Regrowth should also be regular,
- Ends of scars should have a definite shape: pointed, rounded or square
- The presence of axe marks evidences human production, however European and Aboriginal workmanship is differentiated by the use of a steel vs. a stone axe. Steel axes produce sharper and more clearly defined cuts.
- The tree must be of an appropriate age to have been modified by Aboriginal people (i.e. around 150 years is considered appropriate)
- The tree must be native to the region (i.e. excludes historic plantings).

Given the extensive clearing and predominance of regrowth noted throughout the study area, it is unlikely that scarred trees will have survived and be present in the study area.

Stone Quarry and Procurement Sites

Stone quarries or procurement sites occur as exposures of stone material which have been exploited by Aboriginal people as sources of raw material for the manufacture and maintenance of stone tools. Quarry sites are more readily identifiable in the landscape as areas where extraction and preliminary flaking activities have been undertaken on site. Procurement sites tend to be more subtle and may not always leave material evidence of having been exploited. River cobbles are one such example, where small, portable cobbles may be procured and reduced away from the source, leaving no trace of their exploitation on site.

The presence of quarry sites is therefore directly dependent upon the surface exposure of suitable stone. Given the nature of the geology of the study area, quarries are unlikely to be recorded in the study area. However, it is inevitable that procurement sites occur throughout the area in the forms of cobble beds in or near the Queanbeyan River and associated tributaries.

Grinding Grooves

Grinding grooves are the product of the manufacture and maintenance of edge ground tools. Most commonly these tools are manufactured from stone, however bone and shell were also ground in some cases. These sites may occur as a single groove or as multiple grooves revisited and utilized over an extended period of time.

Grinding grooves are always located on fine grained, homogenous, sandstone exposures and as such, their presence is dependent upon the occurrence of a suitable rock surface

and accompanying water source. They may occur on either horizontal or vertical surfaces and in both open site and rockshelter contexts.
The absence of sandstone exposures in the study area makes this site type unlikely in the current investigation.

Burials
Several Aboriginal burials are known to exist within the wider region (including the Queanbeyan Showground). The visibility of burials is generally dependent upon their being exposed or disturbed via natural erosion or human activity and as such, they are rarely identified on field surveys.

Soil depth is essential for burials to occur: given the skeletal soils observed over much of the area, burials are unlikely in the current study area.

Rock Shelters
Rock shelters will occur from any form of rock overhang, with evidence of occupation provided by a range of archaeological features such as surface artefacts, shell, bone and charcoal deposits, paintings and stencils or the presence of a sub-surface deposit.

The absence of any large vertical stone exposures in the study area makes this an unlikely site type during the current investigations.

5.0 European Historical Background

5.1 Historical Context

5.1.1 Exploration and Pioneers

The current study area lies to the east and south of Queanbeyan city, in the Parish of Queanbeyan and the County of Murray. European explorers first visited the Queanbeyan area in 1820 during exploratory expeditions led by Charles Throsby. While working on the road to the Goulburn Plains, Throsby heard stories from the Aborigines of a lake and the nearby Murrumbidgee River. After several failed attempts by Throsby and his men to locate the Murrumbidgee, Governor Macquarie sent a team including Joseph Wild, Constable James Vaughan and Charles Smith (Throsby's nephew) to find the river. On the 8th December 1820, during their expedition to find the Murrumbidgee, they discovered the site of the future Queanbeyan (Watson 1938).

By the end of the 1820s repeated visitations by explorers and reports of good grazing in the area caused substantial interest, with the area being opened for permanent occupation following the definition of County Murray in 1829 (Lea-Scarlett 1968).

However a number of settlers had arrived several years earlier. In 1824, Joshua John Moore selected Acton on the Molonglo River, with his employees becoming the first European settlers in the Queanbeyan district. The following year James Ainslie selected 4000 acres and grazed 700 sheep on behalf of Robert Campbell, establishing the Duntroon Estate, which was confirmed by the Surveyor General in November 1825. In 1827 J.J. Moore was permitted to purchase 1000 acres around his existing stock station at Canberry (Acton). Other early landholders within County Murray included George Palmer with land at Jerrabomberra and Ginninderra, and McPherson at Springbank (Lea-Scarlett 1968).

The population of the County grew rapidly, building from 510 people in 1828-1833 to 1728 by 1836 and up to 2111 by 1841 (Dibden 2009). The early population was dominated by convicts, however by 1831 convicts comprised less that 30% of the total population in the district (Lea-Scarlett 1968; Watson 1938). Initial settlement generally included a series of inns such as 'The Harrow' at Gundaroo and the 'Star and Garter' at Boro Creek. In 1838 'The Harp' was opened at Bungendore and 'The Union' was licensed at Michelago. A fortnight later, 'The Elmsall' license was taken out at Queanbeyan, with all three establishments issued licenses by the newly established court at Queanbeyan (Lea-Scarlett 1968).

5.1.2 Development of the Queanbeyan Town

Despite existing for some years prior, the settlement of Queanbeyan was officially recognized on the 3rd October 1838. A post office was established in 1836 and the first Police Magistrate – Captain Alured Tasker Faunce - was appointed in 1837, holding his

first court in 1838 (Lea Scarlett 1968; Dibden 2009). The town experienced rapid population growth during the 1840s rising from 72 in 1841 to 208 in 1846 and up to 372 by 1851. Despite a lack of skilled builders in the area, the original Christ Church and a small schoolhouse were built and opened in 1844. The first Catholic Church was built in 1849 and opened in 1850. A thriving brewery was established in 1845 next to the Doncaster Inn, but folded following the death of its proprietor in the mid 1860s.

Settlement at Queanbeyan developed on both sides of the river, with the first bridge linking the settlements financed and constructed in 1848 by local residents and comprising a footbridge extending between Macquoid and Monaro Streets. However, the bridge was abandoned in 1855, being insufficiently robust and suffering following the weakening of the riverbank. In 1854 a punt was set up as an interim measure while plans were made for a new bridge. Following several years of lobbying by various members of the community and local businesses, government support was provided for the construction of a new bridge in its current location between Trinculo Place and Monaro St. The bridge was opened on the 19th August 1858 (Lea-Scarlett 1968).

During the 1850s the number of hotels in the area increased from three to 6 and up to 8 by 1859 (Lea-Scarlett). In 1859 the Commercial Bank opened, followed by the construction of permanent courthouse in 1860 and the Queanbeyan District Hospital and Oddfellows Hall, which were completed in 1861. By 1861 the town population had reached 526, with six general stores operating along with a number of smaller businesses. A second bank opened and began operating out of Oddfellows Hall in 1852.

In the later half of the century, Queanbeyan experienced significant developments with the extension of the electric telegraph to the town in 1861 and the opening of the railway link in 1886 (Dibden 2009:30). The first newspaper was founded in 1860 and a successful wheat industry had been established by the 1880s.

5.1.3 Mining

The mining potential of the Queanbeyan district was recognized early on, with Captain Faunce and J.J. Wright together opening a silver, lead and copper mine on Faunce's Dodsworth property (which was later known as Primrose Valley Mine and occupies the land now known as Jumping Creek) in 1851. Unfortunately, the mine was closed after only a few years due to insufficient returns (Lea-Scarlett 1968; Dibden 2009).

In 1852, geologist Reverend W.B. Clarke identified 20 localities within the Queanbeyan district/County Murray where gold might be found. However, the success of gold mining was very limited, with the extraction of other deposits found to be more profitable (Dibden 2009). Primrose Valley Mine was sold on to John Gibbs in 1868 who established a company to mine lead and silver following the discovery of a four-foot wide lode. However, the mine closed after insufficient backing (Lea-Scarlett 1968). The mining

period in Queanbeyan was thus short lived and largely unsuccessful, with town thriving more indirectly from the profits of mines elsewhere in the region such as Captains Flat and Foxlow.

5.1.4 Lime Burning

As an essential ingredient in the production of mortar and plaster, lime was an invaluable resource from the beginning of European settlement. Initially, lime was obtained by burning large quantities of seashells, however by the 1820s focus had shifted to the extraction of lime from local limestone (Dibden 2009). In the Queanbeyan area, lime extraction was initiated in the 1830s by Tom Sayersbury who established a lime kiln along the Molonglo Rv (though to be located 3km from Yarralumla (O'Keefe and McGowan 1993)) and operated it for several decades. The lime in the mortar of Queanbeyan's earliest buildings came from Sayersbury, who was the primary lime producer in the region (Dibden 2009).

A second limekiln was established c.1860 by George Rottenbury who worked for Campbell and Duntroon for over 50 years and held a small leasehold on the banks of the Molonglo River near Bowen Dr. It is thought that the kiln was located on this property (Dibden 2009). Also in c1860, a third limekiln was established by the Gibbs family, the new owners of Primrose Valley who were burning lime on the property (O'Keefe and McGowan 1993).

Following Sayersbury's death in 1871, Rottenbury and the Gibbs brothers were the only local limekiln operators recorded in the area. However, following the death of John Gibbs, his brother William struggled to operate the limekiln alone, with the business folding a few years after John's death. At a similar time, Rottenbury also closed up business, providing an opportunity for Moses Moorley to step in and fill the niche (O'Keefe and McGowan 1993).

Morely established a limekiln on Stringybark Hill to the south of Queanbeyan in the late 1870s, in time to exploit a boom period for Queanbeyan and enormous demand for lime. Following the arrival of the railway to the area in 1887 competition was introduced from outside suppliers, such as the limekilns operating at Kingsdale near Goulburn. The combined effects of outside competition, the death of his wife and the economic depression of the 1890s resulted in the end of Morley's business (O'Keefe and McGowan 1993).

O'Keefe and McGowan undertook a detailed study of limekiln remains in the Canberra-Queanbeyan region in 1993. The Morely kiln site was located as part of a heritage assessment of the Readymix Quarry site to the south of Queanbeyan. The 'D' type kiln is located in a spring fed gully to the south of the quarry, built from stone into the bank so as to allow top loading (Dibden 2009). The remains of two stone buildings also occur at the

site and are thought to be associated with the limekiln (O'Keefe and McGowan 1993). Traces of the pre-Morley limekilns were unable to be found.

The remains of a limekiln have been identified by at Jumping Creek (Kuskie 1989). Judging by the level of preservation and building materials present, the kiln has been attributed to Arminio Marchiori, an Italian immigrant who ran a lime burning business in the 1920s (Kuskie 1989; Dibden 2009). Another kiln site in the local area occurs at White Rocks, 2km south of Queanbeyan and is dated to 1920s or 1930s. A third kiln site occurs on the 'Millpost Property' between Queanbeyan and Bungendore and is thought to postdate the Morley kiln (O'Keefe and McGowan 1993; Dibden 2009).

5.1.5 The Jumping Creek Area

The areas around Jumping Creek were originally those of the Dodsworth Property, which subsequently became known as Primrose Valley. It is therefore an area that has been subject to considerable European activities during the early periods of Queanbeyan's history.

Four landholders are recorded as occupying Jumping Creek; Faunce, Willis, Shannon and Amey (Kuskie 1989:69). The Willis Family occupied the land in the late 1800s and sold the property to Samuel Shannon in 1921. Shannon's daughters Lyla and Joan Amey inherited the land upon his death in 1960. There is also evidence to suggest that the Gibbs family owned at least part of the Dodsworth estate during the 1860s to 1870s (O'Keefe and McGowan 1993; Dibden 2009:32), and as such, it is possible that a second residence occurs within the area (in addition to Dodsworth residence which lies to the north).
The historical record therefore shows various mining and lime extraction industries taking place within the Jumping Creek area during its time as Primrose Valley. These may be summarized as follows:

- 1851 – Mining venture in silver-lead-copper undertaken by owner Captain Alured Tasker Faunce.
- 1860s – Lime burning by the Gibbs brothers
- 1920s – Lime burning by Arminio Machiori, who worked as a lime-burner at 'The Valley' (Primrose Valley) and 'The Springs'. The location of this second industry corresponds with the subdivision of a mining lease during the 1930s (O'Keefe and McGowan 1993; Dibden 2009).
- Mining for lead, copper, zinc and gold is recorded to have continued into the early twentieth century, with extraction and processing recorded to have occurred in the meander of Jumping Creek (IT Environmental 1999:5 in Dibden 2009:32).
- Department of Minerals and Energy records also record a lead-copper mine on Portion 32 including a shaft, adit, stope and pits with the extent of surface workings covering c.61m. Another shaft existed on Portion 51 and is thought to have been a gold mine (Dibden 2009:32).

Earliest maps for the area date to 1881 (Paris of Queanbeyan, County of Murray 2nd edition, c.1881-1907 (Department of Lands)) and show that the current route of the Ellerton Dr extension traverses the centre of Faunces's Dodsworth Estate. By 1920, the area is known as the Primrose Valley Estate (Paris of Queanbeyan, County of Murray 5nd edition, c.1920-1931 (Department of Lands)).

5.2 Search of Heritage Registers

An extensive search was conducted on all of the relevant heritage registers for items of local, national and world significance that might exist within the proposed route of the Ellerton Drive Extension. The following databases were included in the search:

- Australian Heritage Database – this database contains information on more than 20,000 natural, historic or indigenous places and includes those places listed on:
    - The World Heritage List
    - The National Heritage List
    - The Commonwealth Heritage List
    - The Register of the National Estate

- State Heritage Inventory – this database holds the NSW Heritage Databases which contain more than 20,000 statutorily –listed heritage items in NSW, including items protected by heritage schedules to local environmental plans (LEPs), regional environmental plans (REPs) or by the State Heritage Register.

- National Trust of Australia (NSW) Register – this register is run by a Community Organisation which promotes the conservation of both natural and built heritage. There currently exist more than 11,000 items on the Trust's Register which are said to be 'classified.' The register does not provide any statutory obligations for protection of a site but is recognized as an authoritative statement on the heritage significance of a place.

No historic sites were identified on any of the registers listed above, within the study area. However two historic sites are listed on the draft Queanbeyan LEP (2011), which has completed its public exhibition period and is currently with the Minister for Planning and Infrastructure for signing and gazetting, is not yet in force. The two sites are the limekilns of Marchiori and White Rocks, marked as A2 and A4 on maps 6 of the LEP. Both of these sites are identified as having local historical significance but occur well outside the current study area.

5.3 Previous Historical Surveys

Sixteen historic sites have been previously recorded in the broader region of the study area, however all fall well outside of the current study area. The locations of each of these sites are mapped in figure 7.

5.3.1 Curtis Land and Environs

Both Saunders (2003) and BIOSIS 2007 undertook heritage surveys in the areas around the northern portion of the Ellerton Dr Extension. Saunder's investigation of Curtis Land to the east failed to identify any historic sites in the area. BIOSIS's (2007) recent investigations of Cook Ave which lies to the west of the proposed alignment of Ellerton Dr extension likewise failed to identify any historical sites.

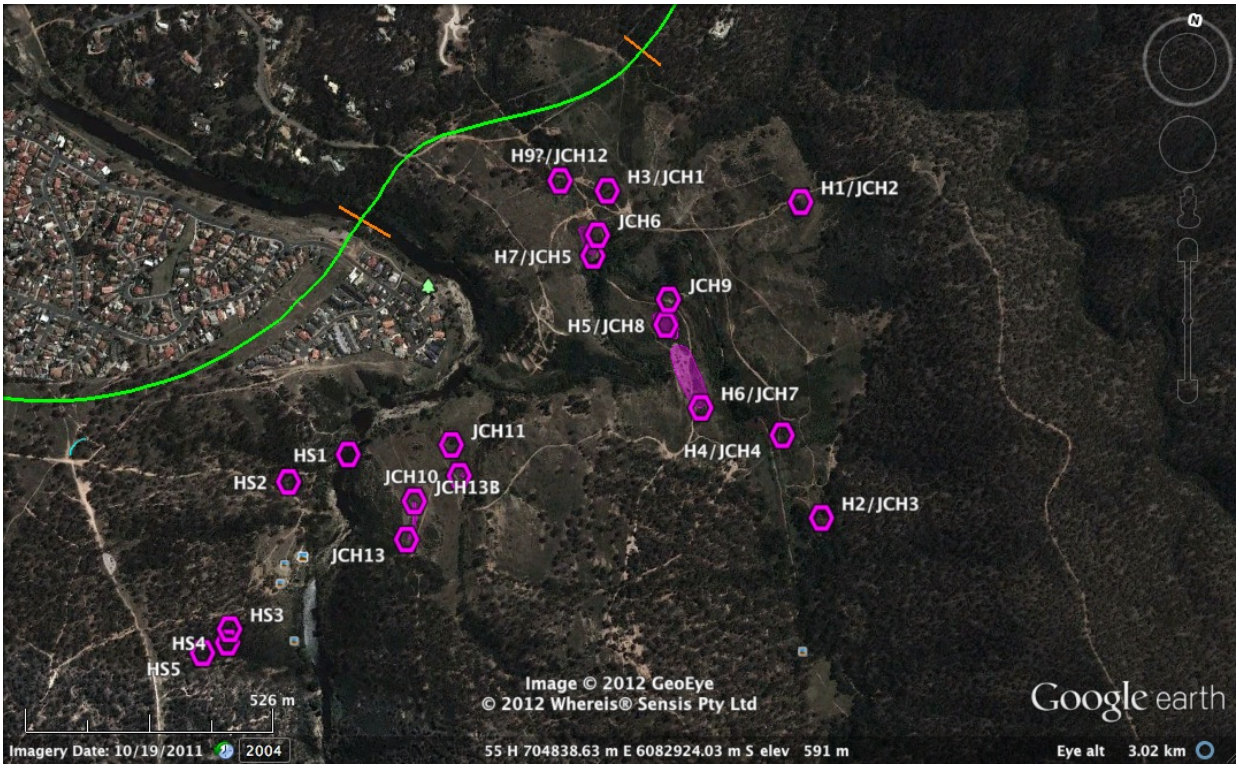

Figure 7. Location of previously recorded historic sites in and around Jumping Creek and Environs and Gale Precinct

Documentary evidence of the area suggests that no buildings occurred in the area, most likely due to its proximity to the escarpment and foothills of Curtis Land and the Cuumbean Nature Reserve to the east. The area is unlikely to have offered much in the way of development or agricultural prospects.

5.3.2 Jumping Creek Area

The Jumping Creek area has been the subject of a number of heritage investigations, however only a handful included observations of historic heritage.

Boot and Heffernan (1989) noted the presence of a number of European sites in the area but did not undertake any site recordings. Kuskie (1989) recorded a total of 9 historic sites during a survey for his honours research. Each of these sites is summarized in table 3.

In 1989 a local environmental study (Kinhill 1989) also identified five examples of mineral extraction including a shaft in the northeast of the area, two shafts in drainage areas along the southwest, an old mine comprising adit and stopping in the far southeastern corner of the area (according to Dibden 2009 this may be Marchiori quarry) and a shallow pit on the ridge within the meander of Jumping Creek (Dibden 2009).

A second environmental study undertaken in 1999 (IT Engineering 1999 in Dibden 2009) identified five mining sites, an ore processing area, a sheep dip, a shallow limestone extraction area and an associated brick lined limekiln (Dibden 2009:35). Several of thesecorresponded with Kuskie's sites, resulting in their re-evaluation and re-assessment, others overlapped with those sites identified previously by Kinhill (1989) (see Table 3). Navin Officer (2004b) undertook a survey in the northern portion of Kuskie's original study area where he originally located site H8, a possible limestone quarry. Navin Officer did not identify any historical sites during their survey and note that the area once identified as H8 by Kuskie (1989) now comprises a dumping area for cars and building materials with no clear evidence of having ever been a quarry site (2004b:32).

O'Keefe and McGowen's 1993 survey covered land further to the south of Queanbeyan and included the site of the Morley limekiln which dates to the 1870s. Based on the construction materials and overall preservation of the site, they conclude that the Jumping Creek limekiln is likely to be that of Marchiori and date to the 1920s. They also suggest that the Marchiori limekiln site may also be the same as that of the earlier Gibbs Brothers limekiln, however Dibden's analysis of the parish maps and documentary records of the time indicates that this is unlikely, and that the two kilns occurred on different properties (2009:36).

In 2009 Dibden revisited the 10 previously recorded historic sites in the Jumping Creek area (Kuskie's sites H1-7 and H9 plus three additional mine sites identified by Kinhill and located by IT Engineering), reassessing and re-interpreting several of them (see table 3). The survey also resulted in the discovery of an additional three potential heritage sites (JCH6, JCH9, JCH11).

The first of these is JCH6, a limekiln thought to be that used by the Gibbs Brothers in the 19th century, making it the oldest known limekiln in the local area (Dibden 2009:57). The second site is a miner's camp (JCH9) located adjacent to the mine and processing area associated with JCH8. The camp is represented by the remains of a building, including an earth platform and remnants of footings. Historic debris is also scattered about the area. The third is JCH11, recorded as a domestic site comprising the remains of several structures and a series of earthworks. The building remains include an L-Shaped platform with stone footings as well as a series of hand pressed pricks and an associated circular stone feature. The proximity of this site to the mining sites of JCH10 and JCH13 are

Table 3. Previously recorded Historic Sites around Jumping Creek and Environs

Site Name and Location	Kuskie (1989)	Kinhill (1989)	IT Engineering (1999)	Navin Officer (2004b)	Dibden (2009)	Current Significance Assessment (Dibden 2009)
H1 705178E 6083390N	Mine Shaft		Mine Shaft		Mine Shaft (JCH2)	Does not meet criteria for heritage listing.
H2 705289E 6082752N	Quarry		Quarry		Limestone Quarry (JCH3)	Local significance
H3 704742E 6083351N	Remains of structures and yards		Sheep Dip		Shearing shed complex (JCH1)	Local significance
H4 705221E 6082866N	Limekiln		Limekiln		Brick Limekiln (JCH4)	Local significance
H5 704921E 6083072N	Remains of structures and stock yards		Ore processing area for open cut mine and associated mine workings.		Ore processing area (JCH8)	Local significance
H6 705028E 6082899N to	Quarry		Open Cut Mine		Mine workings (JCH7)	Local significance

Site Name and Location	Kuskie (1989)	Kinhill (1989)	IT Engineering (1999)	Navin Officer (2004b)	Dibden (2009)	Current Significance Assessment (Dibden 2009)
704944E 6083027N						
H7 704733E 6083200N and 704696E 6083262N	Quarry				Limestone Quarries (JCH5)	Local significance
H8	Possible Limestone Quarry			Not an historical site – now a dumping area for derelict cars, no evidence of past use as a quarry.		Does not meet criteria for heritage listing.
H9 704633E 6083356N	Pile of galvanized iron				Building material dump (JCH12)	Does not meet criteria for heritage listing.
Shaft – northeast ridge		Shaft – northeast ridge				
2 shafts – southwest drainage area 704509E		2 shafts – southwest drainage area	2 mine shafts		Two mine shafts (JCH10) thought to be associated with JCH13 or	Does not meet criteria for heritage listing.

Site Name and Location	Kuskie (1989)	Kinhill (1989)	IT Engineering (1999)	Navin Officer (2004b)	Dibden (2009)	Current Significance Assessment (Dibden 2009)
6082662N and 704522E 6082672N					JCH11	
Old mine, adit and stopping – southwest (Marchirori quarry?)		Old mine, adit and stopping – southwest (Marchirori quarry?)	Exploratory mine			
Shallow pit – meander Jumping Creek		Shallow pit – meander Jumping Creek			Mine diggings (JCH13), likely to relate to mining activities at JCH10 and JCH11 .	Does not meet criteria for heritage listing.
JCH6 704736E 6083248N					Lime Kiln – probably that of the Gibbs Brothers.	Local Significance
JCH9 704918E 6083130N					Miner's camp associated with adjacent mine and processing area (JCH8)	Local Significance

Site Name and Location	Kuskie (1989)	Kinhill (1989)	IT Engineering (1999)	Navin Officer (2004b)	Dibden (2009)	Current Significance Assessment (Dibden 2009)
JCH11 704480E 6082728N					Domestic Site associated with mine sites JCH10 and JCH13	Local Significance

argued to indicate that the JCH11 complex 'is a residential area for hose working the mines' (Dibden 2009:61).

Several of the sites identified were assessed as being of local significance, while 5 sites were found not to meet threshold levels for criteria for heritage listing (details are provided in table 3). Dibden assessed the remainder of the Jumping Creek area as having low potential for subsurface remains due to skeletal soils eroded to bedrock.

5.3.3 Gale Precinct

Navin Officer (1990) undertook an historical heritage assessment of the Gale Precinct area, which lies immediately to the south of the southwestern leg of the proposed Ellerton Dr extension. The historic investigation was undertaken in conjunction with an Aboriginal heritage assessment and resulted in the identification of 5 historic sites, including four limestone quarries and two lime burning kilns. A summary of these sites is provided in table 4.

The historic sites HS1, HS2 and HS5 are identified as being relatively recent in age and of low archaeological value. However, the manufacturing techniques, building materials and design of the kilns at HS3 are argued to be indicative the of late 19th century/early 20th century (Navin Officer 1990). Comparisons with the limekilns identified at Jumping Creek by Kuskie (1989) show the White Rocks (HS3) examples to be more crudely designed, manufactured from cheaper materials and more poorly preserved. Due to the general lack of limekilns on heritage registers and the potential value of these kilns as the oldest intact samples of their kind in the area, Navin Officer (1990:25) suggest that the 'kilns and associated quarries and tracks would form a regionally important and highly significant landscape.'

Table 4. Previously recorded historic sites in the Gale Precinct

Site Name and Location	Description	Significance Assessment
HS1 704250E 6082670N	Small limestone quarry	Relatively modern, low archaeological significance.
HS2 704130E 6082590N	Large limestone quarry 100m up stream from HS1	Relatively modern, low archaeological significance.
HS3 704060E 6082250N	Two lime burning kilns – Listed on the Queanbeyan LEP as White Rocks – oldest known limekilns in the area.	May represent a rare surviving examples of local nineteenth century industrial activity. Thus may form a regionally important and highly significant historic landscape.

HS4 704060E 608222N	North facing quarry scarp positioned within main limestone outcrop, associated with kilns at HS3	May represent a rare surviving examples of local nineteenth century industrial activity. Thus may form a regionally important and highly significant historic landscape.
HS5 704010E 6082190N	North facing quarry scarp within main limestone outcrop, larger than that of HS4.	Relatively modern, low archaeological significance.

Historical Sites in the Current Study Area

There are no known historic sites located within 100m of the centerline for the Ellerton Drive alignment. The closes historical site to the alignment is H9, which lies some 150m to the south of the proposed alignment. It is therefore well outside the current area of investigation.

5.4 Predictive Statements

Given the European history of the Jumping Creek area and its previous use as a focal are for agriculture, mining and quarrying activities, the potential exists for sites associated with these activities to occur along this portion of the Ellerton Dr extension.

The proposed route traverses the historical Primrose Valley Mine and occurs within close proximity to a number of previously identified historic sites including open cut mines, mine shafts, limestone quarries, ore processing areas, sheep dips and a lime kiln. As such, it is predicted that sites relating to both the mining period and residential occupation of the area may still exist within the study area. Most sites are likely to occur on crests or other level ground and in close proximity to reliable water sources.

The potential also exists for exotic historic tree plantings, traces of old fences and old roads/tracks to be identified.

6.0 Results

6.1 Aboriginal Heritage

6.1.1 Summary of Results

During the current survey, the locations of seven previously recorded Aboriginal sites occurring within 100m of the centerline of the proposed development were revisited. Due to increased ground cover since the original locations of these sites, four sites could not be relocated during the current investigations (sites 57-2-66/428, 57-2-74, 57-2-75 and 57-2-615). The remaining 3 sites were relocated and their current status was re-recorded (sites 57-2-635, 57-2-352, 57-2-352).

An additional 6 Aboriginal sites (named ED1-ED6) were identified during the current survey, comprising four low density artefact scatters (sites ED1, ED3, ED5 and ED6) and two isolated finds (sites ED2 and ED4). Two of these sites (ED4 and ED5) are identified as components of a large site complex associated with sites (57-2-066/428, 57-2-74, 57-2-75 and 57-2-635). The locations of all newly identified sites are mapped in figure 8.

All Aboriginal sites identified accord with the predictive model for site location in the area (see section 4.5.2), none of the sites occur in areas with any soil depth and as such, there is no potential for sub-surface deposits at any of the identified sites. All sites have been subject to a range of post-depositional processes, primarily vehicle and recreational bike damage and erosion.

6.1.2 Previously Recorded Sites

A total of 8 previously recorded sites occur within 100m of the proposed Ellerton Dr extension, comprising 7 artefact scatters and an isolated find. Each of these sites is summarized in table 3. Site 110 was destroyed in 1991, while the artefacts visible along the exposed track of site 635 were salvaged and relocated in 2010, leaving a total of 7 sites to be re-assessed/re-identified during the current investigation.

In the years since the original identification of many of these sites, the surrounding landscape has, in some cases been dramatically altered. In other cases, the ground cover has increased significantly, greatly diminishing visibility. Any identified problems are discussed in detail in relation to each site below.

Site Name: 57-2-66/57-2-428

Despite an extensive search throughout the area, this site was unable to be relocated during the current investigation. Visibility in the immediate area of the site is extremely poor, with thick grass cover predominating. Small areas of erosion occur with exposed shale bedrock outcropping, however no artefacts were identified within these small areas of visibility, or anywhere along the vehicle track located immediately to the east.

Figure 8. The location of newly recorded sites from the current investigation.

Site Names: 57-2-74 and 57-2-75

Site 57-2-74 was first identified by Boot and Heffernan as a large artefact scatter of 65 artefacts, extending along a track from Lonergan Drive to the top of a central ridge. Boot and Herffernan (1989) felt that the site may form a complex including JC1, JC9 and JC10 – i.e. 57-2-0066, 0074 and 0075). Kuskie (1989) increased the number of artefacts identified to 107 and indicated that his site JCV 5 may also be part of the complex (no new number assigned to it). Dibden (2009) only located 81 artefacts during her 2009 survey, probably due to the increased ground cover of grass and litter across the area. Visibility was significantly diminished during Dibden's survey (2009).

During the current investigations, artefacts could not be located in the specific areas of either of these sites despite an intensive investigation. Ground cover in the area is now relatively thick, including moss, thick shale bedrock and an regrowth understory of waist high shrubs which form large, impenetrable clumps in several areas.

Site Name: 57-2-635

This site was identified by Navin Officer in 2009 and comprises a scatter of at least 150 artefacts extending along the knoll of the same ridgeline as 57-2-0074, 0075 and 0066/428. The site was visible along an existing and well-used vehicle track with exposed shale bedrock and shallow soils, but was recorded to extend across the ridge crest and away from the vehicle track on either side. In November 2010, the artefacts along the vehicle track only were salvaged and relocated to beneath a tree approximately 15m from the track but within the identified bounds of the scatter (site 57-2-683).

During the current investigation, a number of additional artefacts were identified, extending the bounds of the site further to the north to include a number of artefacts exposed along a track running down the side of the ridge to the north. Several arefacts were also identified in small exposures across the ridge crest. Visibility away from the tracks, however is very low (<1%) with much of the area covered with grass. The Aboriginal community recalls recording this site with Navin Officer and commented that many artefacts are retained beneath the grass cover. Artefact numbers appear to peter off away from the ridge crest. The contents and bounds of the surface scatter identified during the current investigation are as follows:

Grid Reference: 0704381E 6083340N - 0704400E 6083309N – 0704412E 6083342N

Site Type: Open Artefact Scatter
Site Contents: At least 10 artefacts
Surface Visibility: 90% along tracks, <1% grassed areas adjacent to tracks.
Aspect: Open aspect – level crest

Proximity to Water: Site is approximately 180m from the Queanbeyan Rv to the west and within 100m of Jumping Creek to the north.

Disturbance: Highly disturbed, by erosion and vehicle tracks.

Site Description:

Site comprises at least 10 artefacts scattered along the crest/knoll of an northwest/southeast trending ridgeline with some spilling over to the upper to mid northern slopes (decline 5°). Those members of the Aboriginal community who participated in the identification and salvage of the site with Navin Officer (2010) observed that tended to peter out away from the crest of the ridge. Due to the dense ground cover currently across the site, the exact distribution of artefacts is unknown.

Water is located 100m to the north from the Jumping Creek and 180m to the west from the Queanbeyan River. Details of identified artefacts are included in table 5 with photos of the site provided in plates 1-5.

Potential for Sub-surface Deposits:

The site is located upon skeletal soils with abundant shale bedrock and quartz outcrops. The grass cover alone is affecting visibility of artefacts, as there is almost no soil depth across the area. The potential therefore exists for the site to extend much further than is currently visible but not for sub-surface deposits.

Plate 1. Ground cover away from tracks at 57-2-635

Plate 2. Looking east along site to relocation point 57-2-683

Plate 3. Looking north to ridge crest from northern extremity of site

Plate 4 Sample of artefacts identified

Plate 5. Sample of artefacts identified

Table 5. Artefact assemblage identified at Site 57-2-635

Class	Raw Material	Measurements (mm)	State	% Cortex	Measures of Reduction
Flake	Chert, brown	27 x 14 x 5	Complete	0	10 dorsal scars, one dorsal rotation, no overhang removal, feather termination.
Flake	Chert, brown	31 x 18 x 2	Longitudinal Conal Split, Right Lateral	0	2 dorsal scars, no dorsal rotations, no overhang removal, feather termination.
Flake	Chert, grey	11 x 17 x 5mm	Distal Portion	0	2 dorsal scars, no rotations, hinge termination.
Flake	Chert, grey	35 x 15 x 5	Medial Portion	100	Primary flake?

Site Name: 57-2-110

Consent to destroy Site 57-2-110 was given in October 2001. The location of the site is now in a landscaped area between two residences in the suburb of Karabar. During the

current survey the area surrounding the site was revisited, no additional artefacts were identified and the original landscape has been completely destroyed.

Site Names: 57-2-351 and 57-2-352

These sites were first identified by Saunders (2003) and relocated by BIOSIS (2007). Site 57-2-351 was originally described as an isolated volcanic anvil stone – flaked and pitted on one surface. Site 57-2-352 comprised a scatter of 4 artefacts made from quartz and including an anvil fragment made from porphyritic volcanic. During the current study, attempts to relocate these sites showed significant spatial movement since their original recording. This is most likely due to the more recent construction of power lines immediately overhead, as well as a range of additional post-depositional disturbances.

Artefacts from the two sites now appear to be mixed, with the porphyritic volcanic anvil recorded at site 57-2-352 now associated with two additional artefacts (only one of which was quartz) and with both sites having moved down slope (to the west). The two sites are located approximately 40m apart and now form a single blended site. Details of the four artefacts discovered during the current survey are provided below. A map of the old and new locations of these two sites is provided in figure 9.

Grid Reference: 0704629E 6085454N - 0704592E 6085431N
Site Type: Open Artefact Scatter
Site Contents: At least 4 artefacts including a hammerstone and anvil over an area measuring approximately 40m x 40m
Surface Visibility: 90%
Aspect: West, incline 3°
Proximity to Water: Site is approximately 160m from ephemeral tributary of the Queanbeyan River and approximately 1.1km from the River itself, which lies to the west.
Disturbance: Highly disturbed, introduced gravels, erosion, adjacent residential development and overhead power lines

Site Description:

Site comprises at least four artefacts including hammerstone and anvil fragments located in a highly disturbed and eroded area immediately adjacent to the residential development of Greenleigh to the west and the existing portion of Ellerton Dr to the north. Artefacts were recovered over an area of approximately 40m x 40m.

The site occurs on the gentle basal slopes of the adjacent steep ridgelines of Curtis Land to the east, with local inclination of 3° (extending up to >30° to the ridge crest).

Details of identified artefacts are included in table 6 with photos of the site provided in plates 6-10.