DRAFT

The archaeological investigation for sites of Indigenous cultural significance on the site of the proposed

WARNERVALE DISTRICT TOWN CENTRE

&

SEWERAGE INFRASTRUCTURE

WARNERVALE, CENTRAL COAST, NSW.

MARCH 2004

John Appleton

ARCHAEOLOGICAL SURVEYS & REPORTS PTY LTD

for

LANDCOM

ASR

**This report has been compiled in 'Plain English',
but presented in a format suitable for developing policies
for the management of the cultural resources,
and as a basis for scientific reference
in future research studies.**

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EXECUTIVE SUMMARY

This investigation was performed for LANDCOM, which is undertaking an investigation of land in the Warnervale area for the proposed Warnervale District Town Centre.

Archaeological Surveys & Reports Pty Ltd was commissioned to undertake the "Aboriginal History Assessment" of the site of the proposed Town Centre, and the route of proposed sewer infrastructure. The brief also included a lot to the north of Hakone Road immediately adjacent to the Main Northern Railway.

The scope of the work was to conduct an archaeological investigation of the study area with the assistance of a representative of the Darkinjung Local Aboriginal Land Council, and to identify any Aboriginal sites and relics that might be present. The results of the investigation were to be presented in a report, which was to include an assessment of the significance of any cultural relics or places identified, an appraisal of the options and opportunities arising from the discoveries, and clear recommendations for the management of those cultural resources.

In the absence of any defined artefactual context or places of Indigenous cultural significance within the survey area it is recommended that there are no archaeological or cultural constraints to the proposed development of the proposed Warnervale Town Centre site or of the proposed Sewerage Infrastructure. However, the Darkinjung LALC has recommended that a representative of Darkinjung LALC should be present to monitor any earthworks.

For practical purposes ASR recommends that such monitoring would only be necessary where excavation occurs within 30 metres of the drainage lines in the south-western Landcom block, north of Sparks Road and adjacent to the Main Northern Railway; and the eastern drainage line between Warnervale Road and Minnesota Road. Monitoring is generally of limited value, particularly where any potential archaeological record is likely to comprise of single artefacts or very low-

density scatters, however, while the recommendations are considerably less than those recommended by the Darkinjung representative the proponents and their representatives, contractors, and sub-contractors should be aware of the following provisions.

All developers, contractors and their employees are bound by the provisions of the National Parks and Wildlife Act 1974 as amended, which was in part designed to mitigate impact to the Indigenous archaeological record.

Under the provisions of the National Parks and Wildlife Act 1974, all earthmoving contractors and operators should be instructed that in the event of any bone or stone artefacts, or discrete distributions of shell, being unearthed during earthmoving, work should cease immediately in the area of the find, and the Darkinjung Local Aboriginal Land Council, and officers of the National Parks and Wildlife Service, informed of the discovery. Work should not recommence in the area of the find, until those officials have inspected the material and permission has been given to proceed. Those failing to report a discovery and those responsible for the damage or destruction occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the National Parks and Wildlife Act 1974, as amended.

In the event that a relic or item is discovered during earthworks details of the discovery should be communicated to: The Archaeologist, Metropolitan Zone, and to The Chairperson, Darkinjung Local Aboriginal Land Council (addresses at the front of this report).

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1. INTRODUCTION

1.1 Background to the investigation

This investigation was performed for LANDCOM, which is undertaking an investigation of land in the Warnervale area for the proposed Warnervale District Town Centre.

The NSW Government, Gosford and Wyong Councils and the community have collaborated to prepare a regional strategy to guide the development of the Central Coast region – 'Shaping the Central Coast'. The strategy identifies Warnervale/Wadalba as one of the four main urban release areas for the Greater Metropolitan Region and the major Greenfield site on the Central Coast. Warnervale itself is identified as a district centre with a "compact cities emphasis", along the railway line, providing the focus for existing and new residential development and regional employment activities (Landcom 2004a, 3).

Wyong Shire Council and Landcom are working together to complete the detailed masterplanning of the Warnervale District Town Centre. LFA (Pacific) has been engaged as the Masterplan Design Consultant responsible for developing the detailed Masterplan for the Town Centre (Landcom 2004a, 4).

Archaeological Surveys & Reports Pty Ltd (ASR) was commissioned to undertake the "Aboriginal History Assessment" of the site of the proposed Town Centre, and the route of proposed sewer infrastructure (Landcom 2004b).

The brief also included a lot to the north of Hakone Road immediately adjacent to the Main Northern Railway.

The scope of the work was to conduct an archaeological investigation of the study area with the assistance of a representative of the Darkinjung Local Aboriginal Land Council, and to identify any Aboriginal sites and relics that might be present. The results of the investigation were to be presented in a report, which was to include an assessment of the significance of any cultural relics or places identified, an appraisal of the options and opportunities arising from the discoveries, and clear recommendations for the management of those cultural resources.

1.2 The survey area

The 'survey area' comprises of two areas, the proposed Town Centre of 114 ha, and the route of the proposed sewerage infrastructure.

The roughly rectangular Town Centre area is bounded by Hakone Road to the north, by Hiawatha Road to the east, by Sparks Road to the south, and the western boundary was defined by the rear boundary to properties to the east of Bruce Crescent.

The Town Centre area comprises lots and parcels of land variously owned by Landcom, Wyong Shire Council, Minister Administering the Environmental Planning, Trustees of the Catholic Church, Rayfire Pty Ltd, Toukley R.S.L. Sub-branch, the balance being in private ownership.

Figure 1 is a topographical map of the general region showing the survey area, and Figure 2 is an aerial photograph of the study area (reverse of Topographic maps). Figure 3 is a plan showing the ownership of land parcels within the Town Centre site (Landcom 2004, 6). Figure 4 is a plan of the route of the proposed sewerage infrastructure.

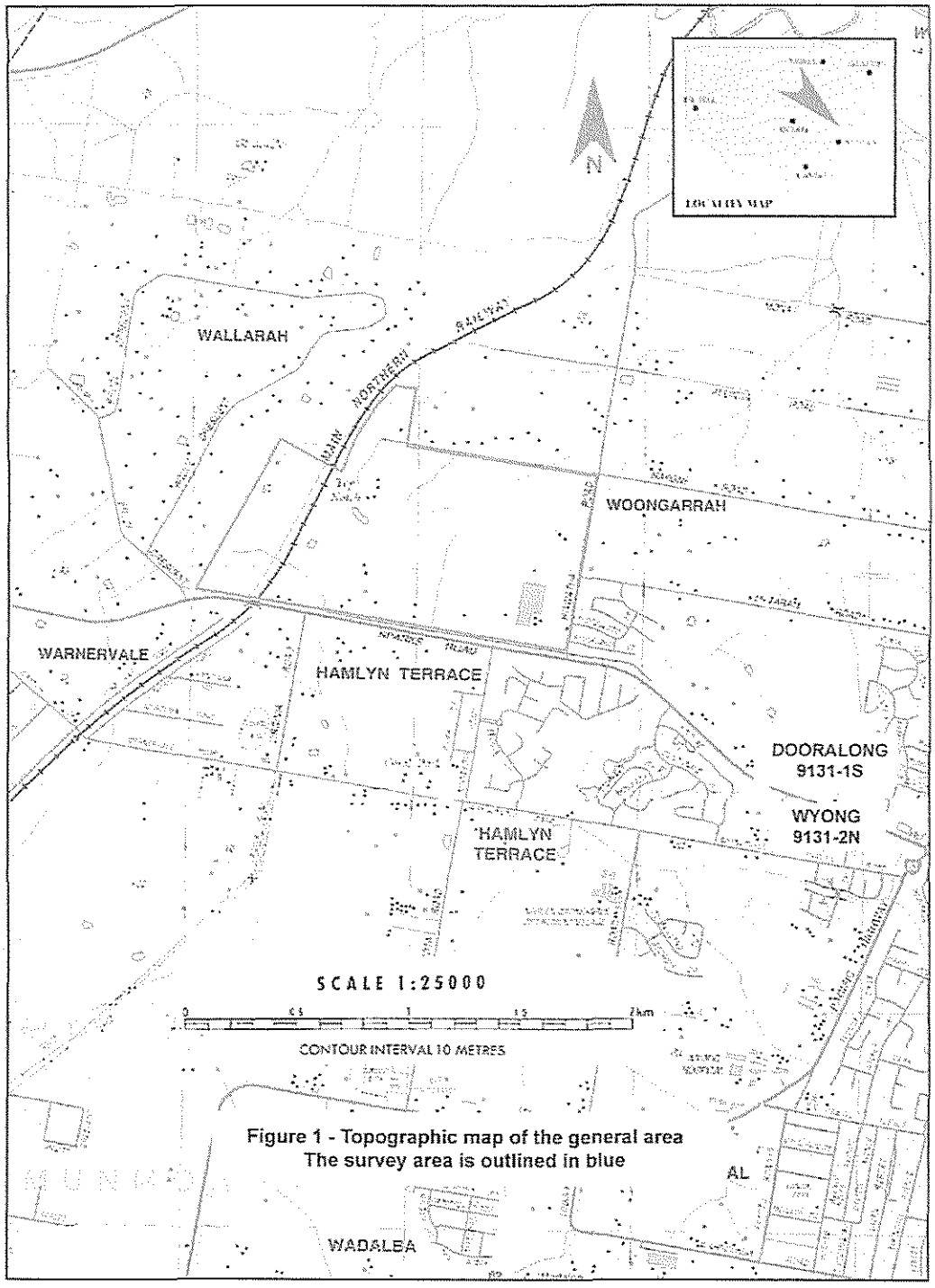

Figure 1 - Topographic map of the general area
The survey area is outlined in blue

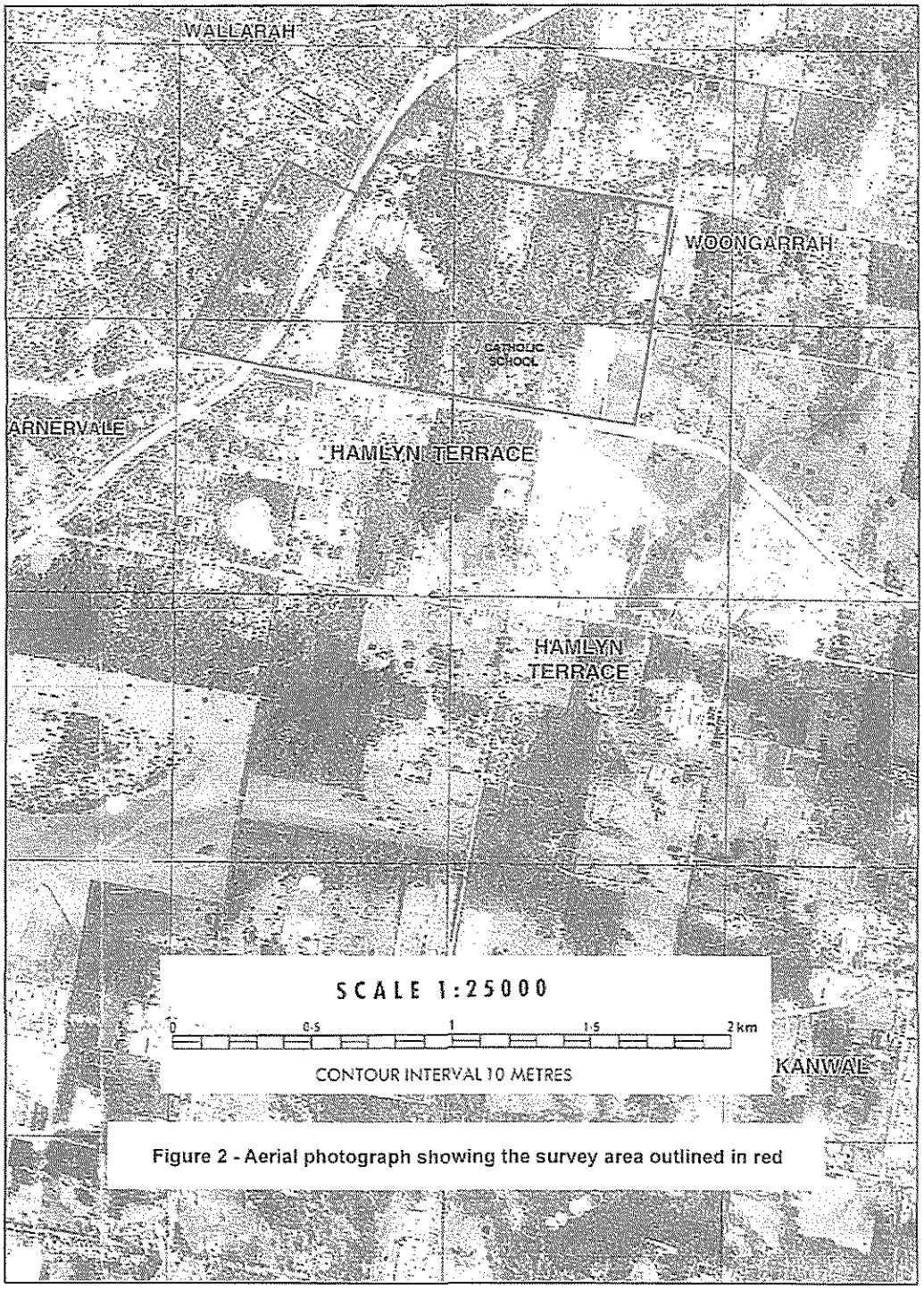

Figure 2 - Aerial photograph showing the survey area outlined in red

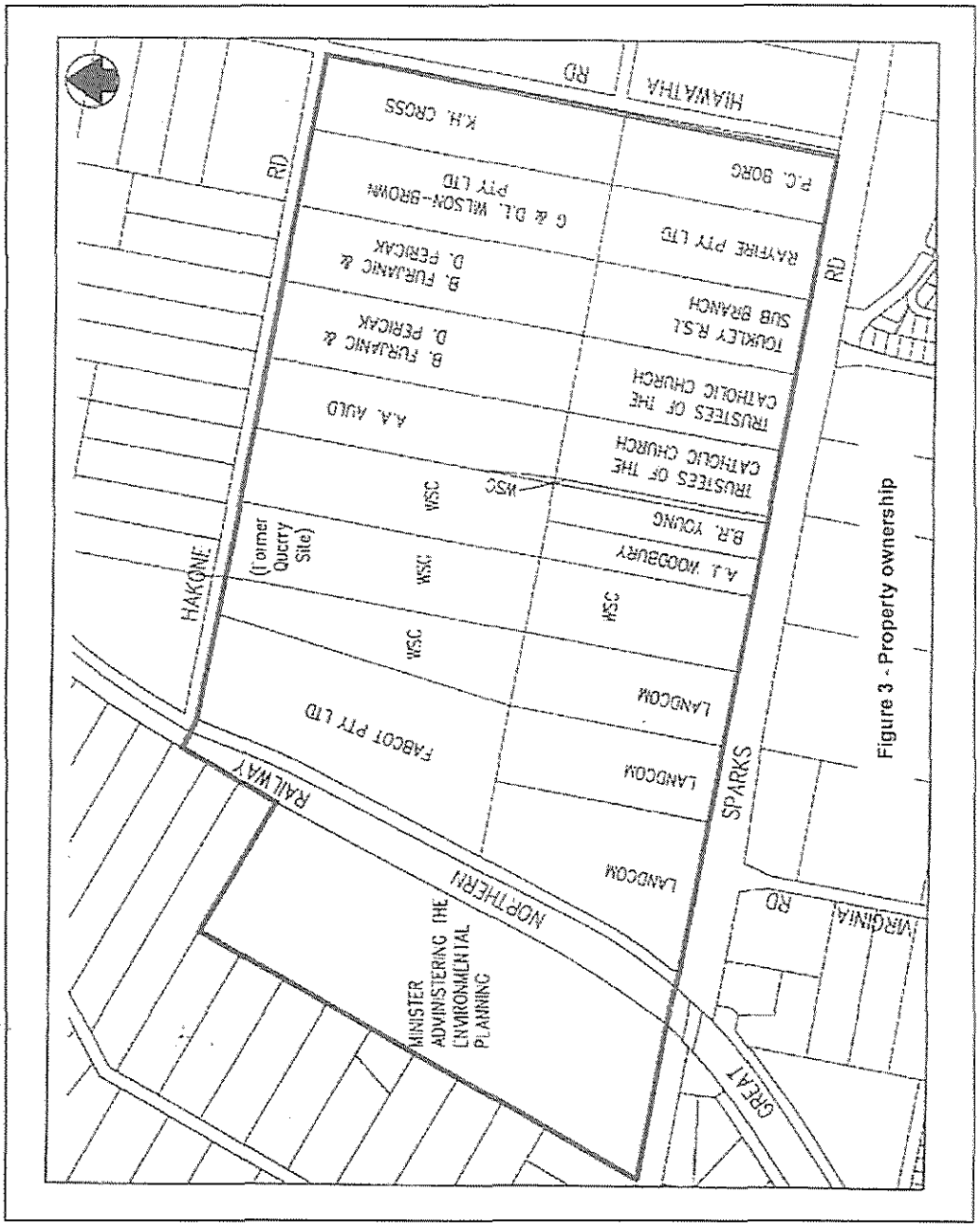

Figure 3 - Property ownership

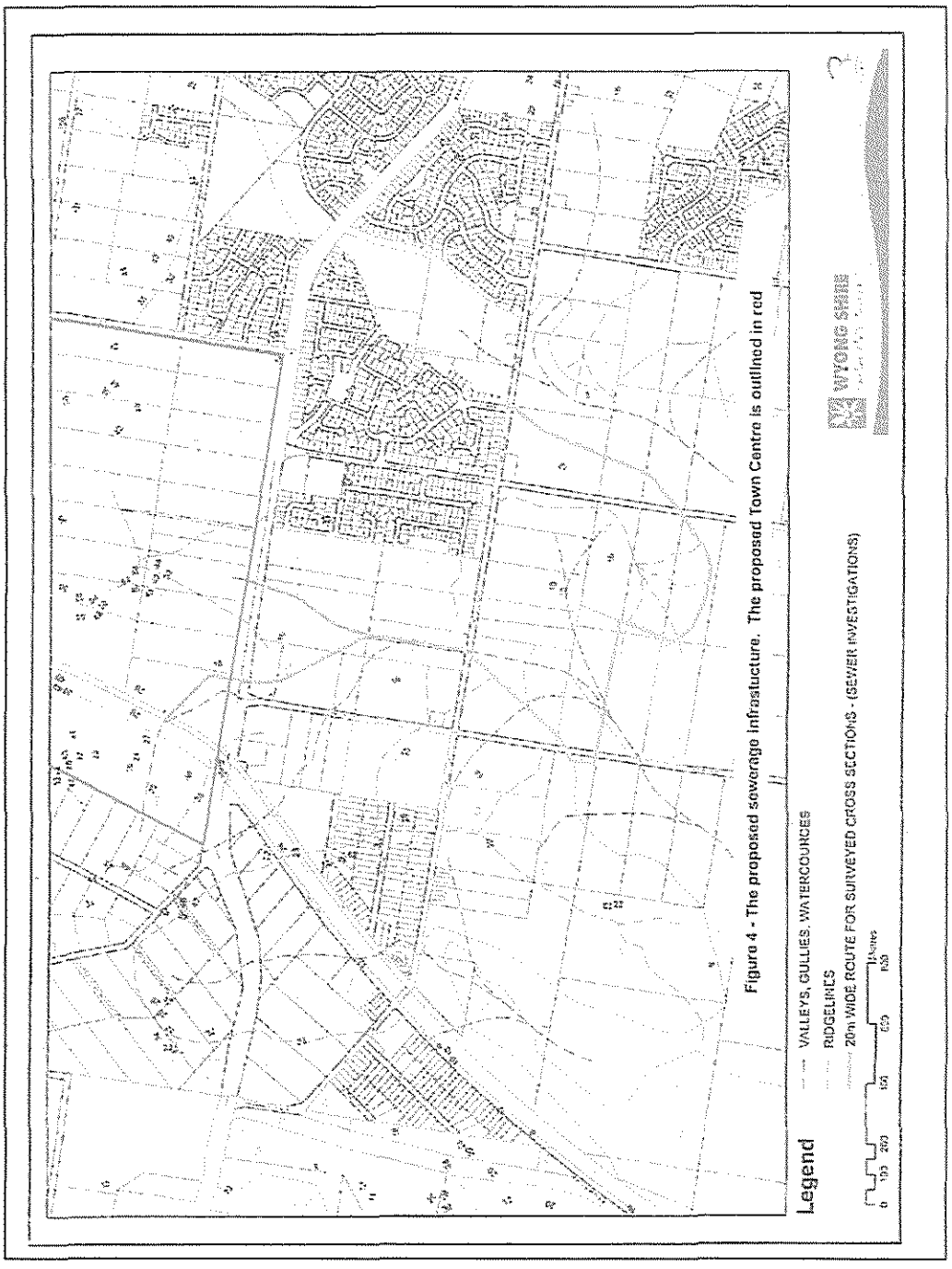

Figure 4 - The proposed sewerage infrastucture. The proposed Town Centre is outlined in red

1.3 Potential impact of the proposed development.

The potential impact to the study area from development is yet to be determined but for the purposes of the archaeological investigation it is assumed that any development has the potential to destroy any archaeological context that might be present.

As a consequence of this survey it is extremely unlikely that the same area will ever be surveyed again, thus from an archaeological perspective, this was the only opportunity to observe and record any sites that might be present, and to propose a strategy for the management of any known or potential archaeological and/or cultural material in the future development of the area.

2. ABORIGINAL CONSULTATION

Prior to the investigation ASR contacted Darkinjung Local Aboriginal Land Council (LALC), to arrange for a Sites Officer to assist in the fieldwork. As a consequence Jodi Cameron assisted Appleton (ASR) in the investigation, which was performed on 18th and 19th March 2004.

Both prior to and during the survey Jodi Cameron and Appleton discussed the potential for particular site types to be present, and the particular environments in which they might occur. The survey strategy was reviewed regularly, and the results discussed at the completion of each 'section'. At the conclusion of the survey the results were discussed in general, and Jodi agreed to provide ASR with a report conveying the land council's recommendations. A copy of the report is included in the appendices.

3 THE ENVIRONMENTAL CONTEXT

Any discussion of the likely presence of Aboriginal cultural remains or of the basis why such remains might be discovered must be within the context of the environment and the resources that would have been available to any Aboriginal occupants of the area.

The following descriptions in sub-sections 3.1 to 3.5 apply to the Town Centre area only. The Sewerage Infrastructure route is described in sub-section 3.6.

3.1 The general geology and topography

The survey area occurs on the eastern rim of the Sydney-Bowen Basin, a major structural basin, which extends from Batemans Bay in the south, to Collinsville, Queensland in the north. The New South Wales portion of the basin is divided into northern and southern sections by a transverse structural high to the north of Narrabri. The southern section of the Sydney-Bowen Basin has been divided into two lower category structural basins, the Sydney Basin and the Gunnedah Basin (Menzies 1974). The study area occurs in the Sydney Basin.

The Sydney Basin is composed of Hawkesbury Sandstone and Wianamatta and Narrabeen Groups, comprising sandstone, shale and claystone (DMR 'Sydney' Metallogenic Map).

The survey area straddles the upper slopes and crest of a low ridge that generally trends on a north-east/south-west alignment, bracketed to the north and east by tributary drainage depressions that flow into Wallarah Creek to the north-east. The southern sections dip towards the south, draining into low-lying areas to the west of Minnesota Road.

The soils generally in the survey area comprise of fine to medium grained weathered sandstone, underlain by massive metasedimentary strata, with clays in drainage depressions, and with darker organic, swamp muds and soils in the low-lying areas. See Figure 11, which shows a soil/bedrock profile in the railway cutting.

Elevations in the survey area vary from just over 50 m AHD in the area of the defunct quarry on the WSC land off Hakone Road, down to just above 20 m AHD in the drainage depression in the south-western corner off Sparks Road.

3.2 Vegetation

The vegetation throughout the survey area varies considerably depending upon elevation, aspect, drainage, surface soils, land-use and stage of regrowth. As a general observation the ridges are dominated by smooth-barked angophoras and scribbly gum, the middle slopes are dominated by bloodwoods, and a variety of eucalypts – some typically of dry sclerophyll woodland, others of wet sclerophyll woodland and littoral forest – depending on their aspect, and the lower slopes and

drainage lines are dominated by tea-tree and casuarina. Similarly the understorey varies significantly with more open understorey on the upper well-drained surfaces but with denser understorey more typical of littoral vegetation on the eastern and north-eastern slopes and drainage lines.

The variety is further complicated by the fact that the vast majority of the survey area has been selectively or wholly impacted upon by clearing, some of which has been maintained by development, mower and/or stock-grazing, while other parts having been allowed to regenerate and are in different stages of regrowth. As a consequence while the species that are present are probably representative of the variety prior to settlement of the area, the proportions in which they are now present have been significantly altered.

In terms of the potential resources to the Aboriginal occupants of the area prior to 'Non-indigenous' settlement there was such diverse vegetation that it would have met all Aboriginal needs. There were fruit, berries, and nectar, and their attendant fauna such as birds, snakes, insects, possums, kangaroos, wallabies, echidnas, koalas, goannas, emus and turtles for their food needs; plants for medicines, salves, and healing; a variety of bark and wood for the manufacture of spears, shields, coolamons, woomeras, boomerangs, digging-sticks, walls and roofing of gunyahs etc.; and tea-tree bark for bandages, gunyahs, bedding etc.

3.3 Water resources

One of the major impacts from clearing was the loosening of surface soils and the increase in run-off and slope-wash and subsequent silting-up of drainage lines. It was clear during the survey that nearly every block had at least one dam to hold surface run-off either for irrigation or for stock-watering – a legacy of hobby-farming. As a consequence some drainage lines above the dams are still relatively open and carry run-off, but below the dams the drainage lines are merely dry vegetation-filled depressions. However, prior to clearing the drainage depressions were probably relatively clear of vegetation and silt and there would have been waterholes upstream of exposed bedrock sills and outcrops.

Aboriginal people depended upon water more than any other resource and were therefore extremely skilled at locating water even during extended dry spells. And while there would have

been times when there was not even groundwater for much of the time they would have known where and how to find sufficient water for their needs. The Central Coast generally receives good rainfall even when inland areas are in drought and so it is unlikely that water was ever so scarce as to be a constraint to Aboriginal use of the area.

3.4 Stone resources

As referred to previously the soils consisted of weathered sandstone and there was no stone in the study area that would have been suitable for knapping into tools or implements. While it is possible there may have been outcrops of conglomerates exposed in the banks of drainage lines and gullies none were observed during the survey – note again Figure 11 which shows the bedrock consisting of layers of pebble-free sandstone separated by layers of shale, with no apparent conglomerates.

In the absence of a suitable knapping material occurring naturally in the study area any artefacts that might be present would have been sourced elsewhere.

3.5 Previous impacts.

As discussed above the survey area has been significantly altered by a variety of activities – refer to Figure 4. A much as 30% has been cleared and 'kept open' for stock grazing (Landcom block in south-west corner, Auld, Borg, and Toukley RSL, and part of Fabcot P/L), 25% remains wooded but has been significantly altered by quarrying, the dumping of rubbish, and vehicle tracks (WSC land), 20% has been partially cleared for residences (Landcom, Woodbury, Young, Cross, part Fabcot P/L), 10% has been partially cleared but is presently being allowed to regenerate (Wilson-Brown P/L, Furjanic & Pericak), and the other 15% has been significantly altered for commercial development (Fabcot P/L, The Catholic Church, Rayfire P/L) – note that the Catholic school has been constructed since the aerial photograph on which the Topographic map is based was taken in 1998.

3.6 Sewerage Infrastructure

The route of the proposed Sewerage Pipeline route and Infrastructure commences in the southern section of the Town Centre site, following the natural drainage line southwards to Warnervale Road, south of which it turns to the south-west to cross Virginia Road, and to the site of a proposed pumping station. From the pumping station the route goes eastwards, looping southwards to connect up with a drainage line that descends from Warnervale Road in Hamlyn Terrace, crossing Minnesota Road and following the gully upstream to Warnervale Road. For ease of reference to the relevant properties the route is shown on detail of a cadastral map in Figure 5 on the following page (WSC 2004c).

3.6.1 The general geology and topography

See 3.1

3.6.2 Vegetation

For most of its length the route crosses through cleared land, that is, land that has been cleared either for residential development, or for stock-grazing. As a consequence there are only two areas with any remnant vegetation. The first occurs in the drainage line in the WSC block immediately to the north of Warnervale Road. While this area may have once been cleared it has been allowed to regenerate into a dense tea-tree woodland swamp.

The second area is the woodland to the east of Virginia Road, where the route leaves the pumping station and heads for Minnesota Road. The woodland was virtually impenetrable, containing dense understorey and occupying a bog. From the outside the woodland appeared to consist of wet sclerophyll and tea-tree and casuarina - see Figure 37.

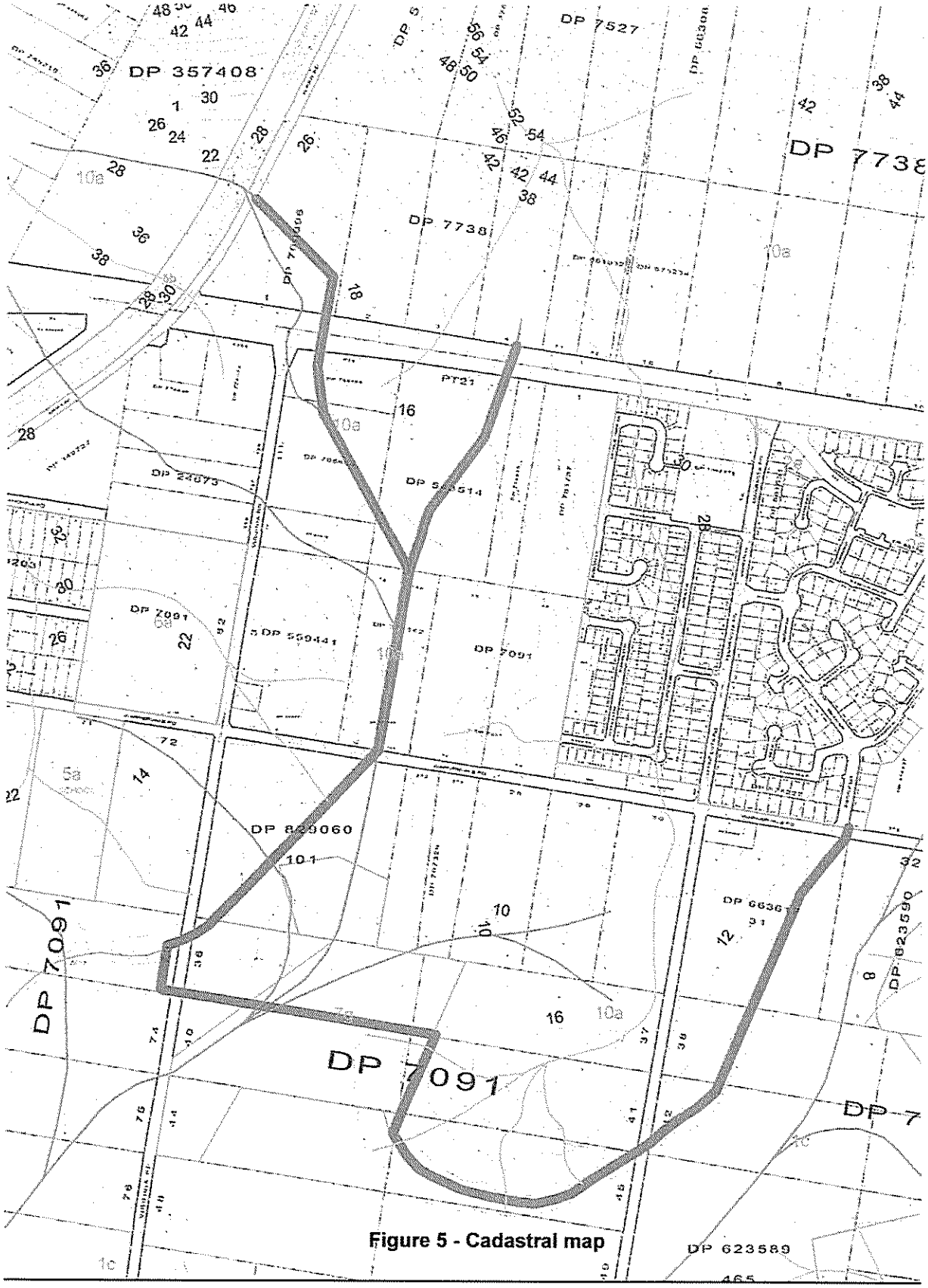

Figure 5 - Cadastral map

3.6.3 Water resources

As with the Town Centre the drainage line along the proposed sewerage pipeline route has been significantly altered by clearing, damming, stock-grazing and the aggradation of silt. It therefore is unlikely to resemble the pre-cleared drainage line, which may have contained water-holes and swamps, either of which would have been a potential source of potable water.

3.6.3 Stone resources

See the description in subsection 3.4.

3.6.4 Previous impacts

For most of its length the sewerage pipeline route crosses through cleared pasture, however it also crosses through a tea-tree swamp and a section of boggy woodland off Virginia Road. In the process the pipeline will also cross beneath Sparks Road, Warnervale Road, Virginia Road (twice), and Minnesota Road. The only section of the route that will cross through relatively undisturbed deposits is the short section of the route of some 30 metres or so, where it crosses through the front of Lot 42, DP 7091 on Minnesota Road.

4 THE ARCHAEOLOGICAL RECORD

The results of a search of the Aboriginal Sites Register (Aboriginal Heritage Information Management System – AHIMS) for all sites within a 11 km wide (west to east) by 13 km wide area centred on the Warnervale/Hamlyn Terrace area, showed that 12 sites had been recorded in the area. Of these ten were of isolated artefacts or open scatters, one was a scarred tree, and one an ochre quarry. However, none of the sites occurred within the area of map coverage in Figure 1.

Recent investigations in the area have not added to the record. No sites were recorded in investigations on properties off Louisiana Road, Hamlyn Terrace (Appleton 2003), or on Industrial Land at Sparks Road (Appleton 2004a) or on WSC land at San Remo (Appleton 2004b).

As a general statement the near absence of sites within a coastal environment such as this is more likely to reflect the fact that few surveys have been undertaken in the area, rather than a genuine absence of sites. However, in this instance the absence may be that there are few areas that have not been significantly altered.

The Wyong area was slow to develop and as recently as the mid 1980s subdivisions were mostly for hobby farms and small-scale commercial projects. As the provisions of the Environmental Planning and Assessment Act were not enacted until 1979 there had been no requirement for archaeological surveys to be undertaken, but in the late 80s the Central Coast began its' metamorphism and hobby farms were replaced with residential developments. As a consequence a number of surveys have taken place between the 1990s and the present, but only a few sites have been recorded.

The absence of sites is perhaps therefore indicative of the degree to which clearing and pasture-improvements practices in the 70s and 80s destroyed the archaeological contexts. And although the archaeological record may in fact still exist, if in a very altered state, it is presently concealed beneath residential sub-divisions where they have been developed, and by agricultural grasses where the sub-divisions are yet to encroach.

5 MODELS FOR SITE LOCATION

5.1 Site types and their location

In order to design an investigative strategy it is firstly necessary to develop a predictive model for site location. This is not to determine where the investigation should be conducted, but to establish a theoretical model for the distribution of archaeological material against which the effectiveness and subsequent analysis of the survey results can be tested, compared and reasoned. The basis upon which the predictive model is derived must however be one of consideration of which archaeological material might realistically be expected to not only be present, but also detectable.

The first objective of any archaeological investigation must be to observe and record sufficient of the archaeological record that is present to be able to propose that it is representative of the record as a whole. The investigative strategy is therefore directed and designed to detect that which is

representative of the record in the particular study area, and naturally, as different study areas will comprise variations in environment, vegetation, topography, etc., so the investigative strategy must be designed to best suit the circumstances. The objective must be to detect material evidence, and so it is necessary to consider the extent to which artefactual material may be present, and the degree to which it is visible or might be discovered.

There are several factors, which are likely to affect, firstly, where Aboriginal people are most likely to have been, secondly, where they have left evidence of their activities, and thirdly, the degree to which that evidence is observable in the present record.

People visited places mainly to obtain resources, and in general places that were richest in resources were more likely to have been visited by people than those places with fewer resources. Important resources were permanent water, ephemeral water, food resources, stone raw material sources, shelter (from sun, wind, and rain), and perhaps suitable surfaces for rock art, and proximity to mythological natural features. Those resources may have been a factor in the suitability of a location for particular ceremonial activities but cultural boundaries also influenced the choice of ceremonial grounds. Alternatively, sites frequently occurred along preferred access routes and particularly where that route coincided with a watercourse.

However, the attractions of such an environment frequently resulted in the archaeological record becoming discontinuous or significantly disturbed, as stock and vehicles impacted upon it in the post-European contact phase.

Frequency of visits and use of particular locations was also determined by the 'accessibility' or freedom from environmental constraints in the area. For example, whether there were alternative, preferred or easier ways to travel around or over natural barriers, be they geological, geographical, cultural, or imposed by fauna or flora, or whether they were only seasonally accessible, such as mounds on flood terraces, or the availability of water during periods of drought, or whether or not floods, fire or snow hindered access.

Few past Aboriginal activities are represented by surviving material evidence. This in part is because many activities did not leave material evidence (eg. tools were reused), but it is also because very little cultural material survived. An exception to this was shellfish, which was very durable.

The survival of material that is durable was also affected by recent European land use. Cultivation has destroyed many archaeological sites. However, cultivation can also help expose sites that might otherwise be covered. This brings us to the other important point about site distribution, which is that to a great extent site distribution recorded by archaeologists reflects the distribution of places where the ground surface is sufficiently eroded to expose artefactual material.

By far the majority of recorded sites have been stone artefact scatters or isolated stone artefacts, and in the vast majority of sites they were found in one or more of the following contexts:

i) On or adjacent to deposits containing quartz, quartzite, jasper, silcrete, chert, chalcedony, metamorphosed greywacke, and other indurated or siliceous sedimentary rocks, or redeposited fine-grained volcanics, or

ii) On river banks or adjacent to river banks where the watercourse contains river pebbles of quartz, quartzite, jasper, silcrete, chert, fine-grained volcanics, basalts, etc., and particularly at the junctions of watercourses, or

iii) On ridges and spurs overlooking watercourses or on high vantage points affording uninterrupted views of swamps, water holes, saddles, passes, and any other likely access path into the observer's area, or

iv) In the vicinity of outcrops of suitable raw material such as basalt, silcrete, chert, or other highly silicified sedimentary rock.

Other site types do occur and perhaps because of their lower and less predictable profile, are present in far greater numbers than we are aware of. People die but there are few recorded burials. One reason may be that in many instances the soils are too acid for the preservation of bone, but a far more likely reason is simply that burial frequently entailed subsurface internment, and a surface survey will only discover a burial where there has been erosion of significant disturbance to the surface deposits. As a consequence many burials have only been discovered when exposed by erosion of a sand body or river terrace.

Other site types such as carved trees, scarred trees, stone arrangements, Bora rings, etc., may once have been present, but are unlikely to have survived in easily accessible country from the attention of non-indigenous people. Thus, much of what might have existed is now lost or destroyed, and the archaeological record has become biased by the post-contact utilisation of resources, and by the selective exploitation and preservation of particular environments.

Other factors which affect the degree to which sites are recorded during an investigation include the time of year at which the fieldwork is performed (the seasonality of some vegetation growth) and the conditions under which the survey is performed – (wet, dry, cold, windy, poor light, etc.).

A brief description of site types such as isolated artefacts, open scatters, camp sites, knapping floors, quarries, middens, mounds, hearths, carved trees, scarred trees, stone arrangements, Bora rings, burials, engravings, paintings, grinding grooves, occupation deposits (and PADs), and ceremonial and mythological sites is given in the appendix.

5.2 A predictive model for the study area

Based on all of the above the following model for site distribution was proposed for the study area, in which there are no shelters or overhangs, no exposed rock surfaces suitable either for grinding axes or for engraving, no sources of stone suitable for knapping tools and implements, but which contains a drainage system that might have retained water for some weeks after rain.

- Isolated artefacts may be present and visible in erosion features
- Low-density artefact scatters may be present and visible in erosion features, but it is unlikely that any debitage will be visible
- There is a potential for trees more than 150 years old to exhibit scarred surfaces
- There is a potential for any trees more than 150 years old to exhibit carved surfaces

- There will be no stone quarries
- In the absence of any shelters there will be no art sites
- In the absence of any exposed sandstone there will be no engravings, or grinding grooves within the Project Area
- There will be no shell middens
- There will be no intact occupation deposits
- There will be no visible evidence of burials
- There will be no surviving Bora rings
- There will be no surviving stone arrangements
- There are no known cultural associations with the area

6 THE SURVEY

6.1 The survey strategy

Prior to the investigation it was decided that as the survey area was not large it would be possible to undertake a comprehensive survey of the entire survey area. In effect, the grass ground cover was so dense in many places that it was only possible to perform a sample survey. As a consequence the survey strategy entailed walking tracks and roads, and targeting soil exposures and erosion features, drainage lines, and any tree that appeared to be old growth.

6.2 Details of the survey

The survey was performed over two days on 18th and 19th March 2004, by Appleton (ASR), assisted by Jodi Cameron, representing the Darkinjung LALC. The survey was made on foot, in variable conditions, from cloudy – which became a thunderstorm – to clearing, sunny conditions on the first day, and clear, sunny conditions on the second day.

All of the areas shown shaded in red in Figure 7 were surveyed on foot.

6.3 Site recording

All relevant observations as to the topography, vegetation cover, and conditions, were recorded in a field-log, and photographs taken with an Olympus Camedia C-3030 Zoom Digital Camera – until it seized – after which a Canon T70 SLR was used, to record the character of the survey area, and to witness survey conditions.

6.4 Effectiveness of the survey technique

Groundcover and poor archaeological visibility (dense agricultural grasses, leaf litter, dense lantana and blackberry, thickly vegetated drainage depressions and dams, tea-tree swamp etc.,) presented significant constraints to performing an effective survey. However, residential activity

areas, tracks, stock-wear, slopewash, and areas of bare ground beneath tree drip--lines provided excellent transects of good archaeological visibility through all types of land features and environments, providing excellent sampling opportunities.

6.5 Effective coverage

The table in Figure 6 is divided into units, delimited by observed topographical features, environments, and/or land use, briefly described in terms of 'horizontal' or map area, soil, and archaeological visibility, and the percentage of the area actually surveyed.

Figure 7 shows the effective survey coverage based on the assumption that most artefactual material if exposed and visible can be observed for up to 5 metres to either side of the path of the observer. Clearly this would vary significantly between a path walked through dense vegetation, and a path across a claypan, and is given as a guide only.

The photographs on the following pages were taken in varying conditions. On the first day the area to the west of the railway line was surveyed in sunshine, but a heavy thunderstorm occurred during the survey of the Fabcot property. However it soon passed and the remainder of the properties on Hakone Road with the exception of the WSC property were surveyed in partly cloudy, but generally sunny conditions. The remainder of the survey area was surveyed on the second day under a clear sky, which explains the variable quality of the photographic record.

The captions to the photographs refer to the properties identified in Figure 4.

Area (Land use)	Description (predominant on listed properties)	Survey area 114 ha	Rock/soil	Vegetation	Average surface visibility	Exposures	Approx area surveyed on foot	Average arch. visibility of exposures	Archaeology
1	Pasture (Landcom, Auld, Borg, Toukley RSL)	Approx. 342,000 sqm	Shallow A Horizon on massive sedimentary	Cleared with isolated angophoras	< 3%	Stock wear, tracks, minor slopewash	50%	95%	Nil
2	Woodland (WSC)	Approx. 285,000 sqm	Shallow A Horizon on massive sedimentary	Varied: dry and wet sclerophyll with littiral on northern and eastern slopes	< 3%	Drip-lines, tracks and bare ground	20%	< 25%	Nil
3	Partially cleared residential (Landcom, Woodbury, Young, Cross, Fabcot)	Approx. 228,000 sqm	Shallow A Horizon on massive sedimentary	Remnant dry and wet sclerophyll with littiral on northern and eastern slopes	10%	Tracks, yards, activity areas, stock wear etc.	60%	80%	Nil
4	Cleared but regenerated (Wilson-Brown, Furjanic& Pericak)	Approx 114,000 sqm	Shallow A Horizon on massive sedimentary	Predominantly dry sclerophyllwith tea-tree, lantana, bracken etc.	< 3%	Driplines with minor slopewash	40%	20%	Nil
5	Developed (Fabcot, Catholic school, Rayfire P/L)	Approx. 171,000 sqm	Shallow A Horizon on massive sedimentary	Cleared	N/A	Nil	Nil	N/A	Nil
6	Pipeline: Sparks Road to Warnervale Road	1,500 x 40m	Shallow A Horizon soils on clayey sedimentary	Cleared but for tea-tree regrowth north of Warnervale Road	< 3%	Residential activity	30%	< 30%	Nil
7	Pipeline: Warnervale Road to Virginia Road	600x40m	Shallow A Horizon soils on clayey sedimentary	Partially cleared but vigorues regrowth, particularly south of Warnervale Rd	0	Nil	10% (Virginia Road)	80%	Nil
8	Pipeline: Virginia Road to Minnesota Road	900x40m	Shallow A Horizon soils on clayey sedimentary	Western section dense woodland in bog, eastern section cleared pasture	0	Nil	Nil	Nil	Nil
9	Pipeline: Minnesota Road to Warnervale Road	800x40m	Shallow A Horizon soils on clayey sedimentary	Southern section partially cleared residential, northern half cleared to west, scrub to east	0	Nil	60%	Nil	Nil

Figure 6 - Table of Effective Survey Coverage

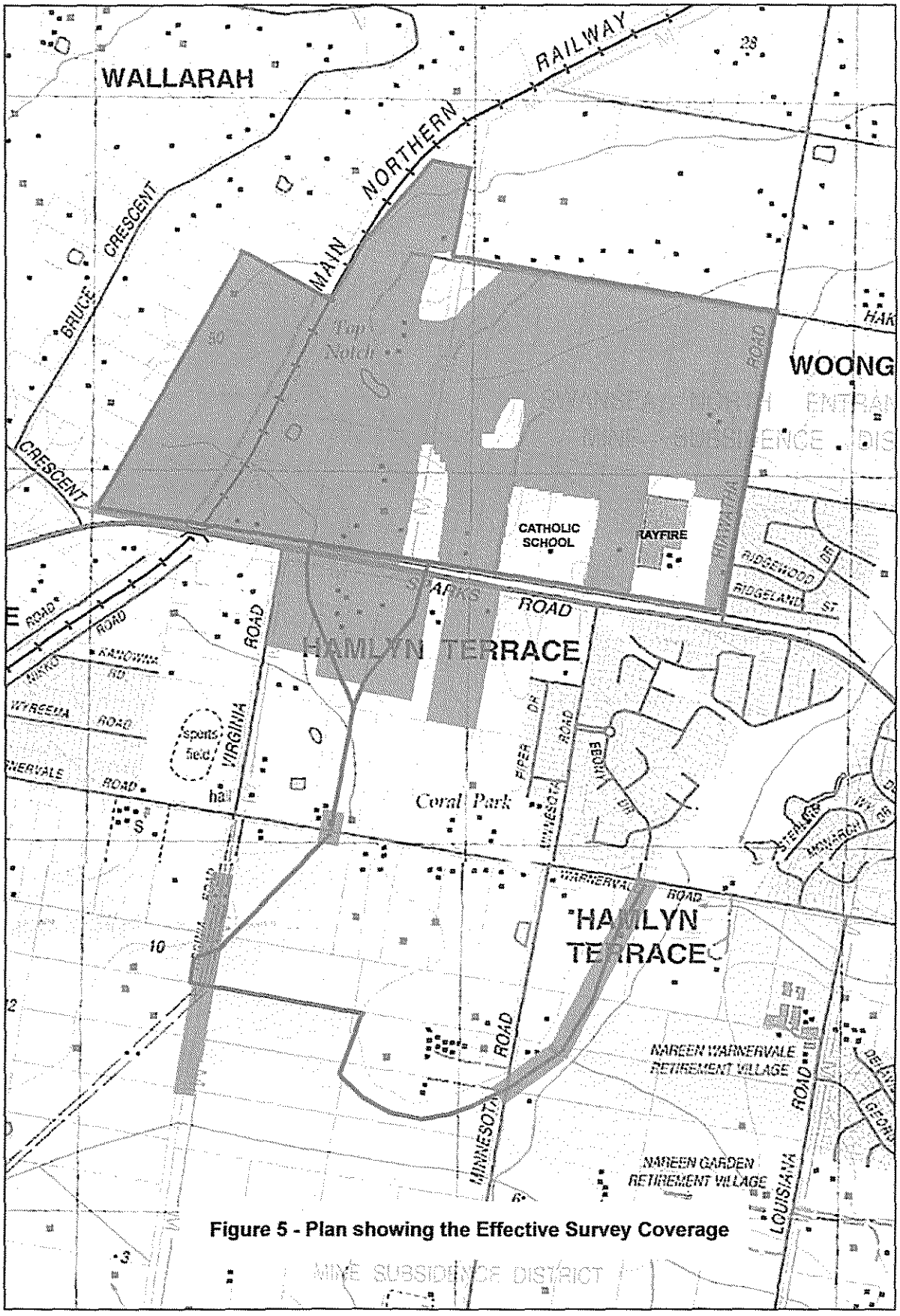

Figure 5 - Plan showing the Effective Survey Coverage

Figure 8 – Southern end of the block to the west of the railway line.

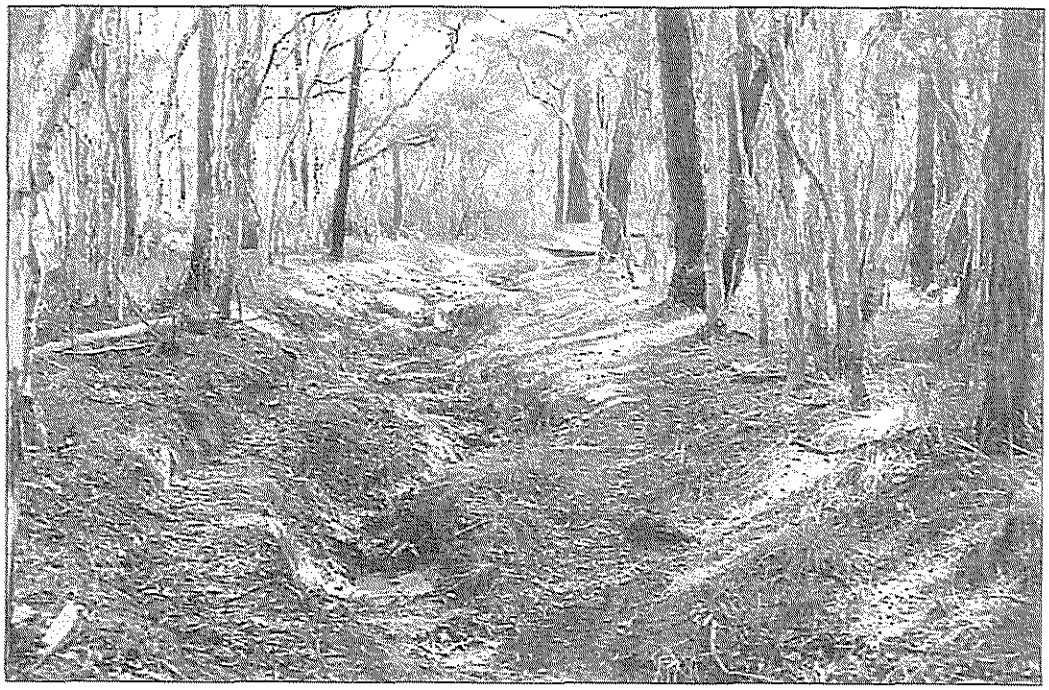

Figure 9 – Track exposures mid-slope in the northern half of the western block.

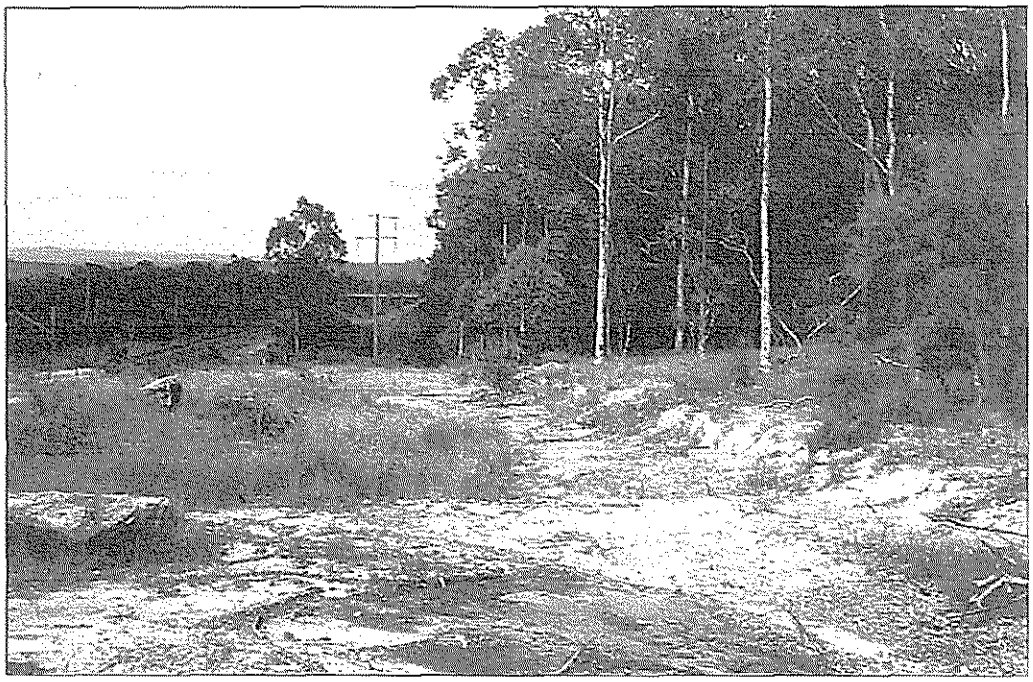

Figure 10 – Looking southwards along the eastern edge of the western block, with the railway on the left.

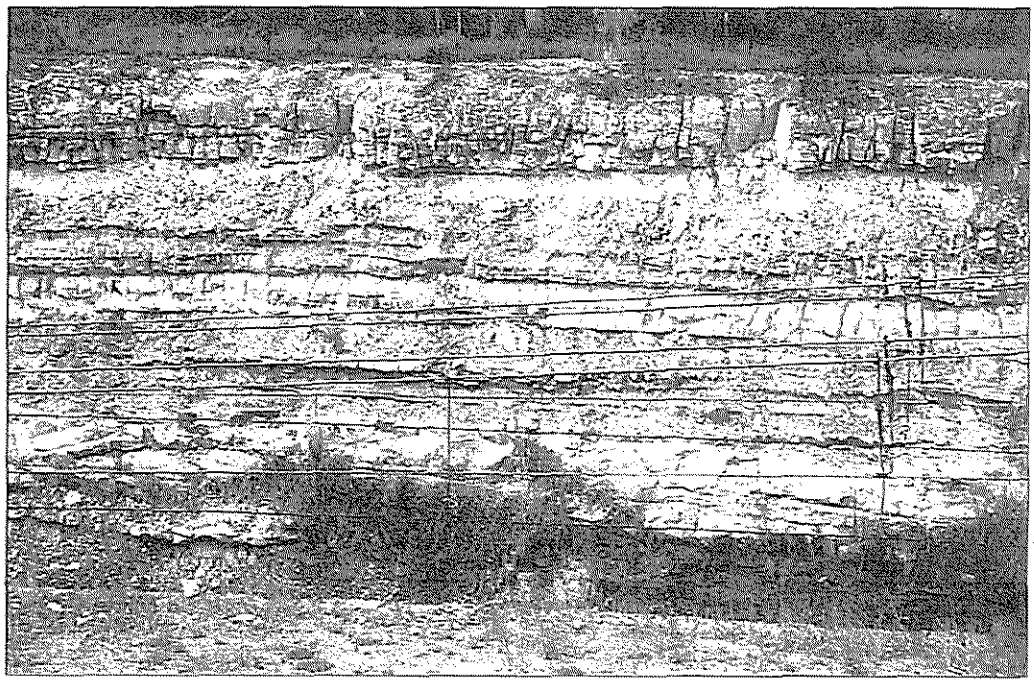

Figure 11 – The stratified bedrock exposed in the railway cutting. Note the shallowness of the soil horizon.

Figure 12 – The block to the north of Hakone Road. The railway passes behind the tree-line.

Figure 13 – The northern approach to the Fabcot property from Hakone Road.

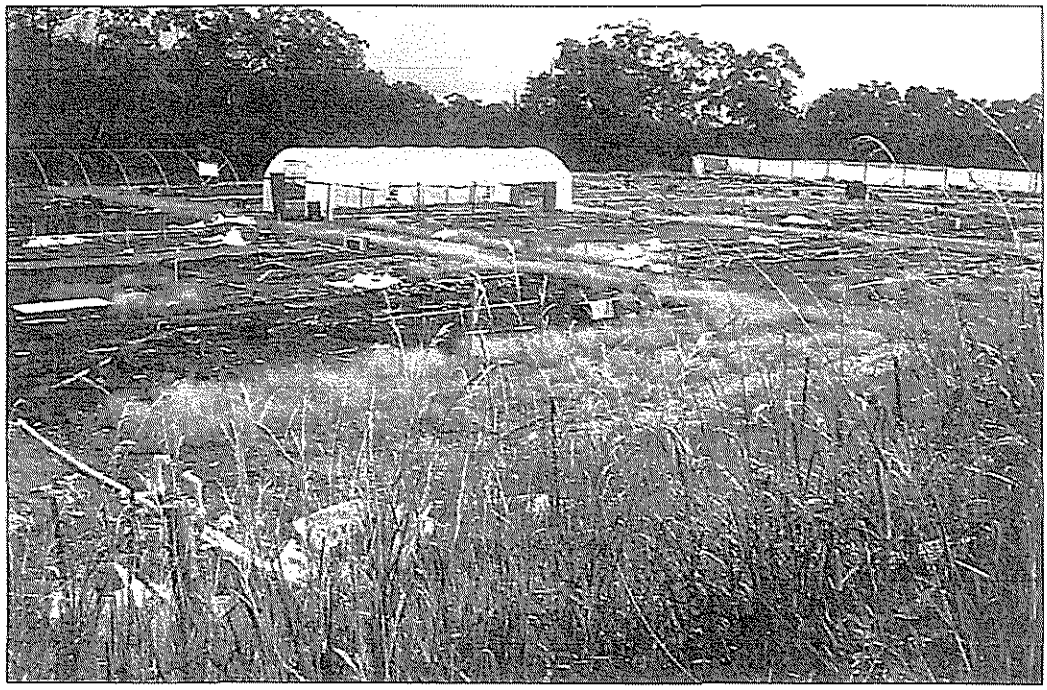

Figure 14 – Part of the defunct nursery on the Fabcot property.

Figure 15 – Looking southwards from the Fabcot property towards Sparks Road.

Figure 16 – The drainage line (on the left) in the Landcom property, to the south of the Fabcot block.

Figure 17 – Remnant woodland in the central Landcom property, to the south of the Fabcot block.

Figure 18 – Looking northwards from the ridge in the central WSC block.

Figure 19 – Looking eastwards along the quarried ridge in the central WSC block.

Figure 20 – Looking southwards along the northern section of the Auld property.

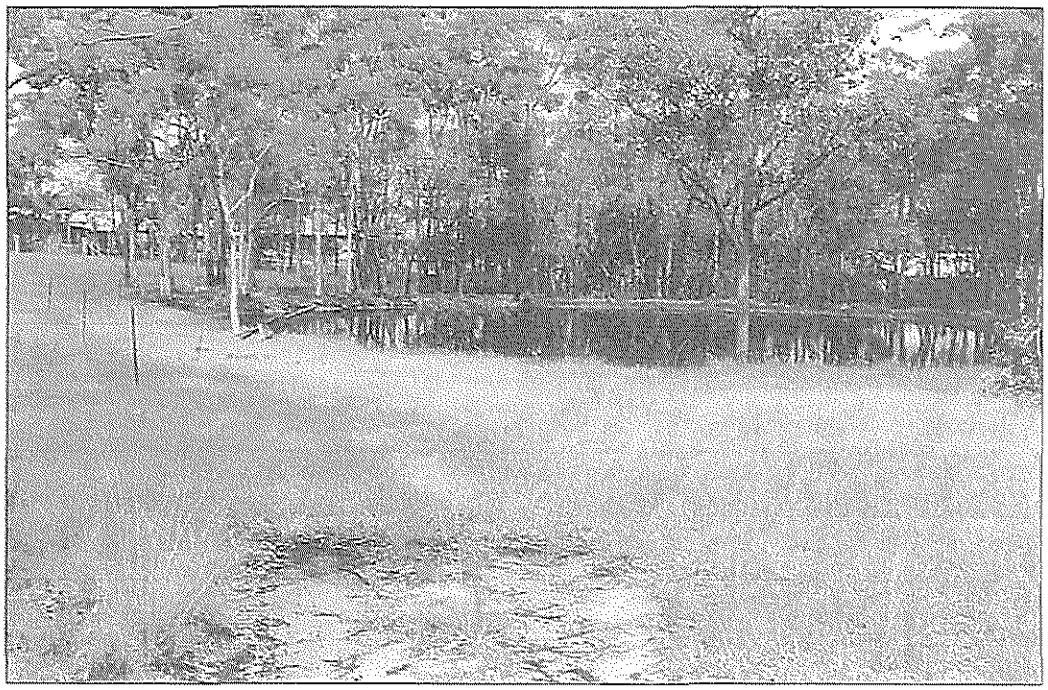

Figure 21 – The southern end of the Auld property and rear of the Catholic school.

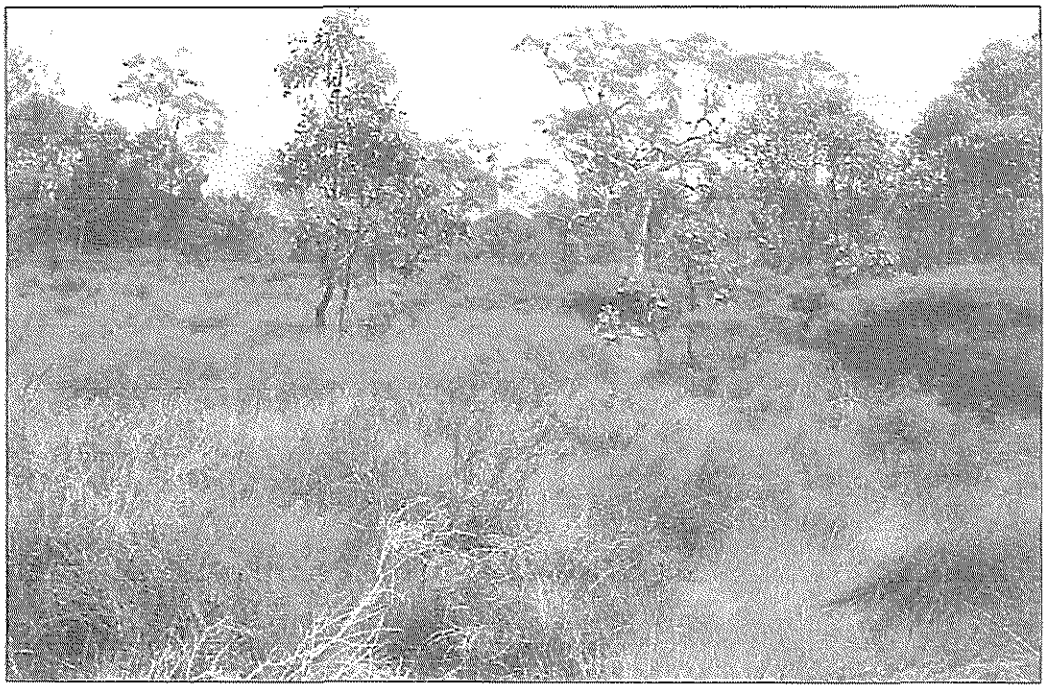

Figure 22 – Vegetation typical of the regrowth on the Furjanic/Pericak property.

Figure 23 – Overgrown dam at the northern end of the Furjanic/Pericak property.

Figure 24 – Looking eastwards along the ridge on the Wilson-Brown property.

Figure 25 – Dam at the northern end of the Wilson-Brown property.

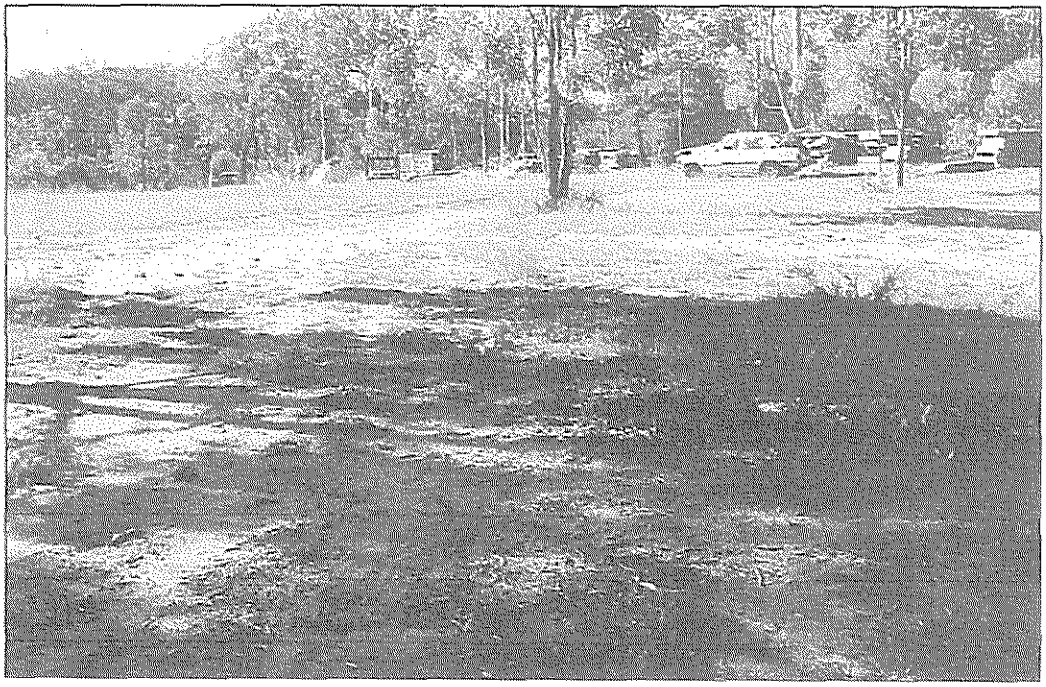

Figure 26 – Looking north-westwards across the northern slopes of the Cross property.

Figure 27 – Looking southwards towards the ridge on the Cross property.

Figure 28 – Looking southwards in the southern section of the Cross property.

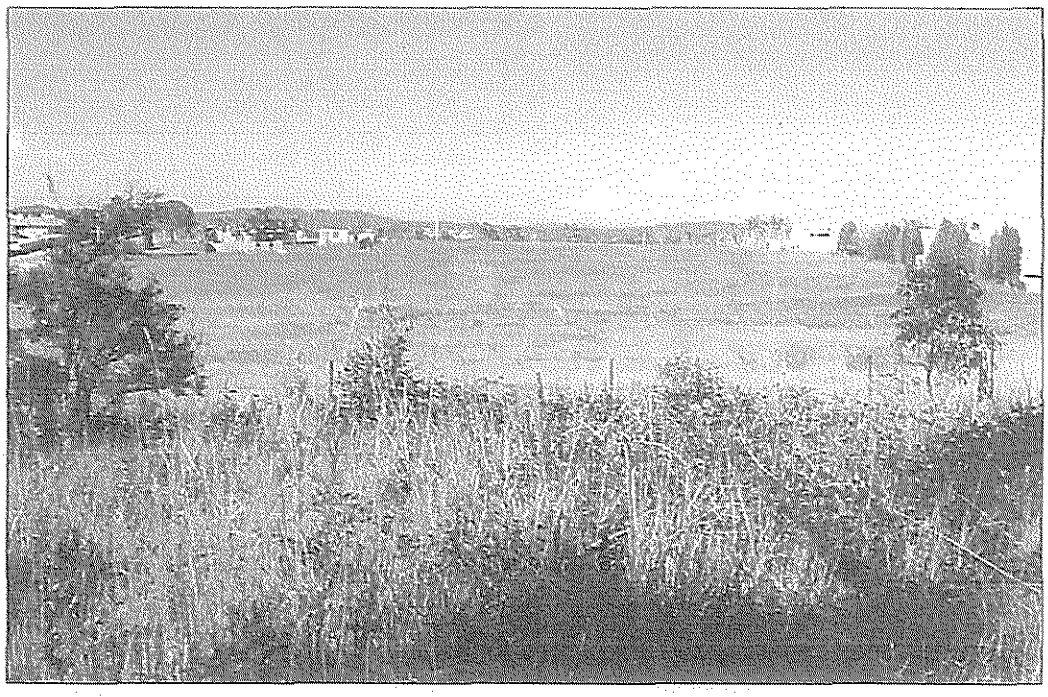

Figure 29 – Looking southwards across the Borg property from the northern boundary.

Figure 30 – Looking northwards up the Toukley RSL property from Sparks Road.

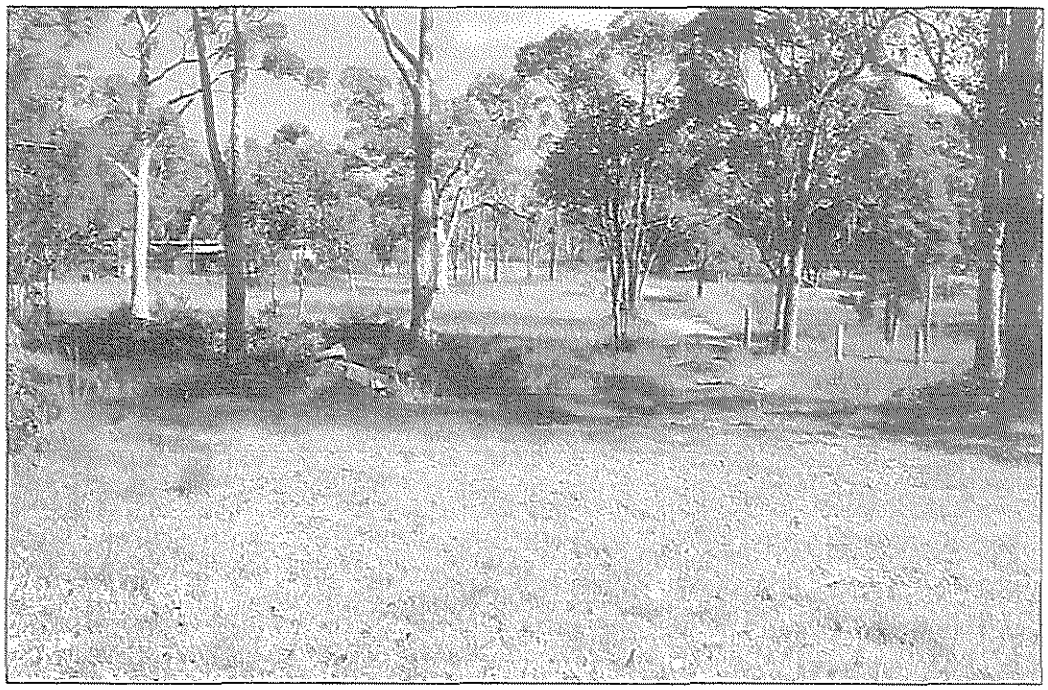

Figure 31 – Looking southwards across the front of the Woodbury and Young properties

Figure 34 – Pipeline route: The drainage line, on the left, flows into the tea-tree woodland on the right.

Figure 35 – Pipeline route: The drainage line to the north of Warnervale Road.

Figure 36 – Pipeline route: The drainage line to the south of Warnervale Road.

Figure 37 – Pipeline route: Point of entry into the woodland to the east of Virginia Road.

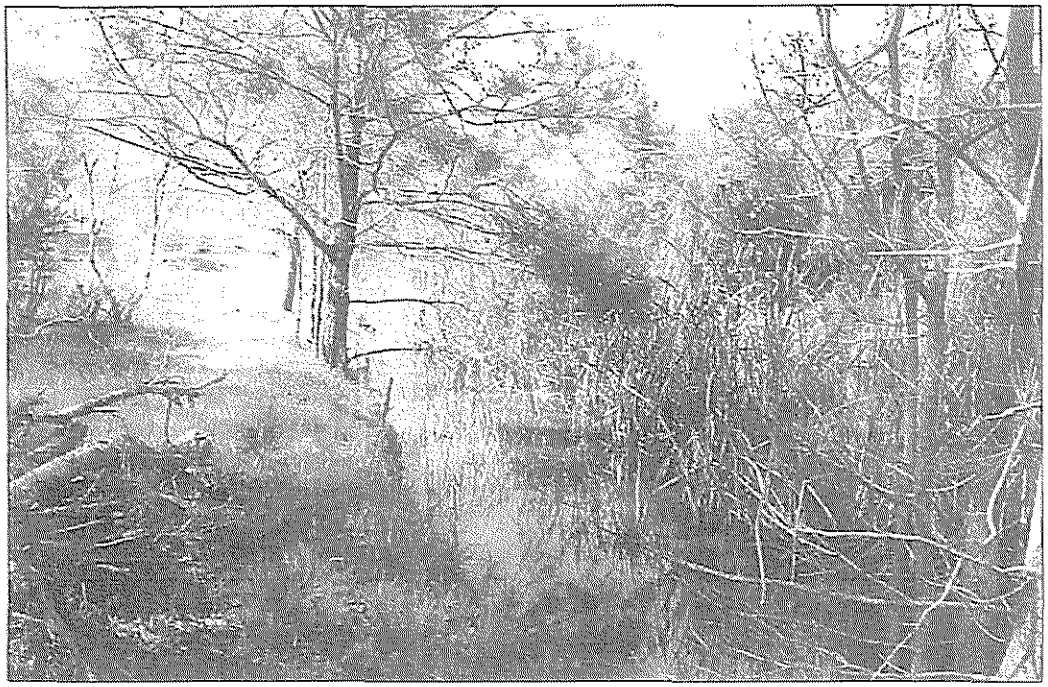

Figure 38 – Pipeline route: The drainage line on Lot 38, DP 7091, east of Minnesota Road.

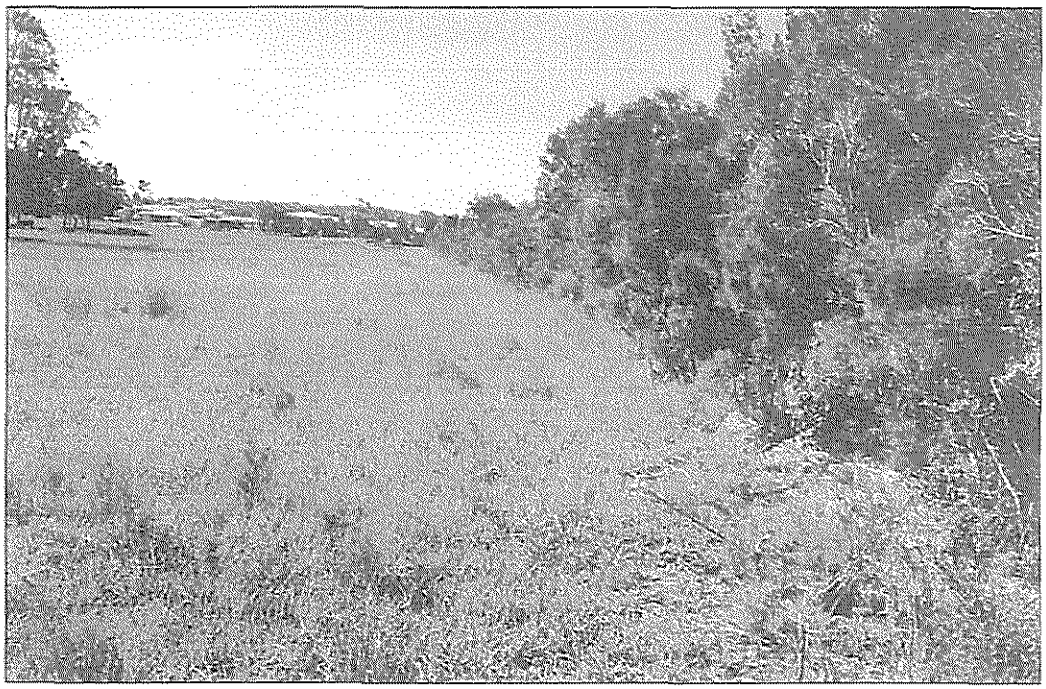

Figure 39 – Pipeline route: The scrub on the right marks the drainage line on Lot 31, DP 663617.

7 THE RESULTS

No artefacts or sites of Indigenous origin were identified in the survey area.

8 DISCUSSION

Sections of the study area have been significantly altered, and in those areas that had not been the archaeological visibility was very poor. Prior to clearing the entire survey area would have been a semi-closed to open dry sclerophyll woodland, with typically, large angophoras along the ridgelines and upper slopes dominating open grassland. Downslope scribbly gums and bloodwoods would have dominated a tea-tree and banksia understorey, while tea-tree, paperbarks and isolated casuarinas would have prevailed on the lower slopes and along drainage lines.

People travelling through this country would have utilised the open ridges, descending the slopes only to obtain water or to hunt and collect food. Generally the environment would not have been suitable for long-term campsites, although overnight camps might have been set-up in any open grassland along the ridges.

It is therefore unlikely that the study area would have seen more than occasional use, and given the absence of a suitable stone material, it is unlikely that the users left large or dense artefact scatters. With material being scarce the only discarded material was likely to consist of trimming flakes of less than 5 mm length, or isolated discarded cores or damaged flakes. Neither of which would be observable in such a disturbed landscape.

In summary, given that there was an absence of stone suitable for the manufacture of tools within the survey area it was not surprising that no stone artefacts were observed. Any artefacts that might have been discarded during hunting and collecting were likely to be in very low densities, as the stone would have been sourced elsewhere and not readily replaceable. If any artefacts were present they would have been likely to consist of small trimming or maintenance flakes of less that 5 mm long. Very few old growth trees remain and so there was little likelihood of finding any scarred or carved trees, and as discussed in the section on the predictive model the absence of outcropping rock and clearly defined drainage lines precluded the likelihood of finding other site types.

Although the survey area occurred in a region in which there is a potential for sites to occur, there was only a very low potential for the survey area to contain observable archaeological material. If however archaeological material were present, it is likely to consist of small isolated artefacts or discrete low density scatters, neither of which would be observed other than by chance.

9 SIGNIFICANCE ASSESSMENT

The NPWS policy to safeguard all sites, Aboriginal places, and archaeological material of significance wherever possible requires that some means of assessing the significance of the sites is necessary. This is not only for the purpose of determining whether the proposed development can proceed as proposed, but also to provide Cultural Resource Managers with the information for future management of the area.

9.1 Cultural significance

The Aboriginal or cultural significance of Aboriginal relics and sites can only be assessed by the Aboriginal community, and in particular, the Elders. It is the responsibility of the archaeologist to ensure that the Elders, or elected representatives of the Aboriginal community are advised of the survey results, and are consulted as to their knowledge and opinion of the significance of the area, and to transcribe and present those expressions in report form.

In this instance Jodi Cameron, reported the results of the investigation and her recommendations to the land council by way of a written report. With the approval of the Chairperson, Jodi has provided me with a copy of the report, which has been included in the appendices.

The recommendations of the Darkinjung LALC are that there are no cultural constraints to the proposed development of the study area, but that a representative of Darkinjung LALC should be present to monitor any earthworks.

9.2 Research potential

In the absence of any artefactual material in a depositional context, or of known specific Aboriginal association with the survey area the research potential is assessed to be very low.

10 RECOMMENDATIONS

In the absence of any defined artefactual context or places of Indigenous cultural significance within the survey area it is recommended that there are no archaeological or cultural constraints to the proposed development of the proposed Warnervale Town Centre site or of the proposed Sewerage Infrastructure. However, the Darkinjung LALC has recommended that a representative of Darkinjung LALC should be present to monitor any earthworks.

For practical purposes ASR recommends that such monitoring would only be necessary where excavation occurs within 30 metres of the drainage lines in the south-western Landcom block, north of Sparks Road and adjacent to the Main Northern Railway; and the eastern drainage line between Warnervale Road and Minnesota Road. Monitoring is generally of limited value, particularly where any potential archaeological record is likely to comprise of single artefacts or very low-density scatters, however, while the recommendations are considerably less than those recommended by the Darkinjung representative the proponents and their representatives, contractors, and sub-contractors should be aware of the following provisions.

All developers, contractors and their employees are bound by the provisions of the National Parks and Wildlife Act 1974 as amended, which was in part designed to mitigate impact to the Indigenous archaeological record.

Under the provisions of the National Parks and Wildlife Act 1974, all earthmoving contractors and operators should be instructed that in the event of any bone or stone artefacts, or discrete distributions of shell, being unearthed during earthmoving, work should cease immediately in the area of the find, and the Darkinjung Local Aboriginal Land Council, and officers of the National Parks and Wildlife Service, informed of the discovery. Work should not recommence in the area of the find, until those officials have inspected the material and permission has been given to proceed. Those failing to report a discovery and those responsible for the damage or destruction

occasioned by unauthorised removal or alteration to a site or to archaeological material may be prosecuted under the National Parks and Wildlife Act 1974, as amended.

In the event that a relic or item is discovered during earthworks details of the discovery should be communicated to: The Archaeologist, Metropolitan Zone, and to The Chairperson, Darkinjung Local Aboriginal Land Council (addresses at the front of this report).

GENERAL GLOSSARY: The definitions that follow are for terms used in this and other reports written by the author, and do not necessarily apply to their use in different contexts.

ADZE : A modified flake with at least one steeply-retouched working edge. While all adzes are generally considered to be wood-working tools it is probable that some also served as cores and others as scrapers. Adzes with a uniform butt were frequently hafted to make a chisel-like tool, but the intended use of the adze determined the size of the adze and whether it was hafted (Flenniken and White, 1985).

AHD: Australian Height Datum

ARCHAEOLOGICAL DEPOSIT :
Sediments which contain evidence of past Aboriginal use of the place, such as artefacts, hearths, burials etc.

ARTEFACT : Any object that has attributes as a consequence of human activity (Dunnell, 1971). In this report 'artefacts' has been used generally to describe pieces of stone that have been modified to produce flakes, flaked pieces, cores, hammerstones, or axes.

BACKED BLADE :
A stone tool manufactured from a flake on which one margin has been modified by the removal of small flakes to blunt the edge or margin opposite the cutting edge.

BORA GROUND :
A ceremonial site comprising of one or two connected circles composed of compacted or mounded earth, or defined by an arrangement of stones, of 2 to 30m diameter, generally used in male initiation rites.

CAMPSITE : A place at which the density of artefacts and the variety of material indicates that people 'frequently' used the place as a stopping or resting place. Such places are also likely to contain or be close to water resources, food resources, or stone material resources. In this report a campsite is used to describe artefact scatters that are associated with hearths or fireplaces, as distinct from scatters that are not associated with hearths or fireplaces, which are described as Open Scatters.

CHALCEDONY :
A form of silica (partially translucent), which occurs as linings in cavities in rocks. When banded it is known as AGATE (Department of Mines, 1973). Chalcedony is uniformly coloured and agate has curved bands or zones of varying colour (Cook & Kirk, 1991).

CHERT : Another name for sedimentary chalcedony. It occurs most frequently in limestones, or in marine sedimentary rock, or as pebbles in sedimentary rock. In its depositional context it is often concentrated in bedding planes. Chert found in deep-water limestones is formed from radiolaria and diatoms (siliceous planktonic micro-organisms) (Cook & Kirk, 1991).
Chert is a form of amorphous or extremely fine-grained silica, partially hydrous, found in concertions and beds. It is classified as a chemical sedimentary rock although it may be precipitated both organically and inorganically (Department of Mineral Resources, n.d.).

CONGLOMERATE :
Naturally cemented gravel. Conglomerate is a coarse-grained clastic sedimentary rock composed of generally rounded fragments of other rock types larger than 2 mm in diameter, set in a fine-grained matrix of sand, silt, or any of the common natural cementing materials (Department of Mineral Resources, n.d.).

CORE : A piece of stone from which flakes have been removed, that cannot otherwise be described as a retouched or modified artefact.

CORTEX : The naturally altered surface of stone – eg. the water-worn surface of river pebbles.

DEBITAGE : The small waste material observed in knapping floors. Generally, waste material is described as all those fragments having a maximum dimension of less than 10mm

FLAKE : A fragment of stone exhibiting features indicating that it has been deliberately removed from a core piece. These features are evident as:
i) Platform: Plane or point at which a blow was delivered to remove the flake.

ii) Bulb of Percussion: Convex surface that occurs on the face or ventral surface of a flake, radiating from the point of impact, produced as a consequence of the force pattern.
iii) Eraillure: see below.

Other terms:

i) Dorsal: The back or outer face of a flake as it would have been prior to removal from a core. Frequently either ridged or exhibiting negative flake scars when removed in secondary flaking, with a natural weathered cortex when removed in primary flaking.
ii) Ventral: The 'chest' or inner face of a flake as it would have been prior to removal from the core. The surface upon which the Bulb of Percussion occurs.
iii) Platform Preparation: The removal of flakes from a surface to produce a level platform. May be evidenced by retouch scars to the platform.
iv) Retouch: The removal of small flakes from an edge or margin of an artefact to modify its shape or resharpen its edge.
v) Proximal: The end of a flake closest to the striking platform.
vi) Distal: The end of a flake furthest from the striking platform.
vii) Margin: The edge of an artefact.
viii) Eraillure: A small circular to elliptical negative flake scar occurring on the surface of the bulb of percussion on flakes of very fine-grained or highly silicified material. It occurs 'naturally' as a consequence of internal forces generated at the time of flake removal.
ix) Split Cone: Occurs when the flake splits down its axis frequently removing part of the striking platform. Generally believed to be produced by faulty knapping technique, but is also probably a consequence of flawed material.
x) Transverse Snap: Occurs when a flake snaps across its axis. Generally believed to be caused by post-depositional impacts such as human or stock treadage, or vehicular traffic.

FLAKED PIECE :

A fragment of stone exhibiting flake scars indicating that it is an artefact, but not displaying diagnostic features, such as a Bulb of Percussion, Striking Platform, or an Eraillure.

GREYWACKE :

A type of sandstone, grey or greenish-grey in colour, tough and well indurated and typically poorly sorted (Clark & Cook, 1986).
A generally poorly sorted, dark sandstone containing feldspar and sand-sized rock fragments of metamorphic or volcanic rocks (Department of Mineral Resources, n.d.).
Usually a dark and coarse-grained rock compared to mudstones and siltstones that are much finer-grained and better sorted.

HOLOCENE PERIOD :

The period from 10,000 years ago to the present.

IGNEOUS ROCK :

Rock formed by the cooling and solidification of magma on or below the earth's surface (Geography Dictionary, 1985).

In situ : In its original place – as deposited.

ISOLATED ARTEFACT :

A solitary stone artefact, at least 50m from its nearest neighbour. This is based on NPWS policy that two artefacts within 50m of each other constitute a site.

KNAPPING FLOOR:

A discrete scatter of artefacts in which at least two artefacts are recognisably of the same material, and derive from the same piece of stone. Also described as a stone tool manufacturing site or floor.

LOCATION : The place at which an artefact is found, or a place identified as having either archaeological or Aboriginal significance.

MEASUREMENT :

I) Flake:
  i) Length: Measured along the percussion axis at right angles to the platform.
  ii) Width: The greatest width measured at right angles to the percussion axis.
  iii) Thickness: The greatest thickness measured at right angles to the percussion axis.

II) Flaked piece:
  i) Length: The longest dimension
  ii) Width: The greatest width measured perpendicular to the length.
  iii) Thickness: The greatest thickness measured perpendicular to the length.

III) Core:
  i) Length: The longest dimension.
  ii) Width: The greatest width measured perpendicular to the length.
  iii) Thickness: The greatest thickness measured perpendicular to the length.

MIDDEN : A refuse heap or stratum of food remains, such as mollusc shells, and other occupational debris (Dortch, 1984 – see also Meehan, 1982).

MUDSTONE : A fine-grained detrital rock, usually quite massive and well consolidated. May be black through grey to off-white, browns, reds and dark blues/greens. Frequently found in association with sandstones (Cook & Kirk, 1991).
Identification is often aided by colour variations in layering. A source for stone material tool manufacturing material found as river pebbles in creek beds, and artefacts often display a water-worn cortex.

NEGATIVE FLAKE SCAR :
A concave surface resulting from the removal of a flake, occurring on the surface of the rock from which a flake has been removed.

PLEISTOCENE PERIOD :
The period from about 10,000 years ago to 2 million years ago.

POTENTIAL ARCHAEOLOGICAL DEPOSIT (PAD) :
Synonymous with Potentially Archaeologically Sensitive : Having the potential to contain archaeological material although none is visible.

QUARTZITE :
Quartzites are formed by the regional or contact metamorphism of quartz arenites, siltstones, and flints (cherts). They are composed essentially of quartz, and usually have a fine-grained granoblastic (grains are roughly the same size) texture. Generally massive, but may sometimes show sedimentary structures (Cook & Kirk, 1991).

ROTATION :
The removal of flakes from a core by blows directed at different angles, to different platforms. May be evident on the dorsal surface of a flake as negative flake scars, which do not follow the same direction as the percussion axis of the flake. This may be confused with scars produced during core preparation.

SCAT : The solid waste material produced by an animal – dung, droppings, manure (Triggs, 1985).

SCATTER : Two or more artefacts occurring within 50 metres. Scatter may also be used in the context of 'background scatter', meaning the general distribution of artefacts across the landscape that cannot be recognised as discrete concentrations.

SILCRETE : A near surface or surface siliceous induration (Desen & Peterson, 1992).
A conglomerate consisting of surficial sand and gravel cemented into a hard mass by silica.
A siliceous duricrust (Bates & Jackson, 1980).
Crusts may form as a result of low, infrequent rainfall, on reasonably flat surfaces. These are known as duricrusts – those cemented by silica are known as silcretes (Clark & Cook, 1986), sometimes referred to locally as 'billy' (Gentilli, 1968), or 'grey billy'.
Silcrete on the northern tablelands of NSW forms at the surface contact between sediments of the Sandon Beds and the Armidale Beds with overlying basalt, where groundwater (more rich in silica than surficial water) interacts with surficial water and precipitates new quartz as the matrix to the sediments (N.D.J. Cook, Dept. of Geophysics, UNE, pers. Comm.).
In softer formations of quartz sands, groundwater has apparently been responsible for the formation of concretionary layers of silcrete. Under altered climatic conditions, the less competent beds erode away leaving concretions. Since they are often the size of old-fashioned woolsacks and are greyish and white, they are popularly known as gray billy (slang for billy goat) (Fairbridge, 1968).

SITE : A discrete area or concentration of artefactual material, place of past Aboriginal activity, or place of significance to Aboriginal people.

SOIL SCIENCE TERMS (taken from Banks, 1995, and others as referenced).

BEDROCK : Outcrop of *in situ* rock material below the soil profile.

BENCH : A strip of relatively level earth or rock breaking the continuity of a slope.

BLOWOUT : A closed depression formed in the land surface by wind eroding sands and depositing them on adjacent land.

CLAYPAN : A depression caused by the aeolian deflation of sediments, or by the presence of a prior lake.

DUNE : A ridge built up by wind action composed of sands, silts, or sand-sized aggregates of clay.

FLOODPLAIN : A large flat area, adjacent to a watercourse, characterised by frequent active erosion and aggradation by channelled and overbank stream flow.

GIBBER : A level surface covered by a thick deposit of gravel or broken siliceous pebbles, occurring in the more arid parts of the continent, thought to have been formed from the break-up of a siliceous (silcrete) surface crust, and termed gibber plains (Whittow, 1984) – see also silcrete.

GILGAI : Surface microrelief associated with soils containing shrink-swell clays. Gilgai consists of mounds and depressions, or irregularly distributed small mounds and subcircular depressions varying in size and spacing. Vertical interval usually <0.3m; horizontal interval usually 3-10m, and surface almost level. Sometimes called 'crab-hole' soils.

GULLY : An open incised channel in the landscape generally greater than 30cm deep and characterised by moderately to very gently inclined floors and steep walls.

HUMMOCK : A small raised feature above the general ground surface.

LANDFORM ELEMENTS :
Crest : Landform element standing above all points in the adjacent terrain.
Flat : Neither a crest or a depression <3% slope.
Upper slope : Adjacent to and below a crest or flat but not a depression.
Midslope : Not adjacent to a crest, a flat or a depression.
Lower slope :Adjacent to and above a flat or a depression but not a crest.

LITHOSOLS : Shallow soils showing minimal profile development and dominated by the presence of weathering rock and rock fragments.

RILL : A small channel cut by concentrated runoff through which water flows during and immediately after rain.

RUNOFF : That portion of precipitation not immediately absorbed into or detained upon the soil and which thus becomes surface flow.

SCARP/CLIFF : A steep slope terminating a plateau or any level upland surface.

SCRUB : vegetation structure consisting of shrubs 2-8m tall.

SHEET EROSION : The removal of the upper layers of soil by raindrop splash and/or runoff.

SOIL PROFILE :
"A HORIZON" : The top layer of mineral soil. This may consist of two parts:
A_1 HORIZON: Surface soil and generally referred to as the topsoil.
A_2 HORIZON: similar in texture, but paler in colour, poorer in structure, and less fertile.

" B HORIZON" : The layer below the A Horizon. This consists of 2 parts:
B_1 HORIZON: A transitional horizon dominated by properties characteristic of the underlying B_2 horizon.
B_2 HORIZON: typically contains concentrations of silicate clay and/or iron, and/or aluminium and/or translocated organic material.

"C HORIZON" : The parent rock. Recognised by its lack of pedological development, and by the presence of remnants of geologic organization.

"R HORIZON" : Hard rock that is continuous (Charman & Murphy, 1993; 350-1).

SPUR : A ridge which projects downwards from the crest of a mountain as a water-parting (Whittow, 1984).

SUBSOIL : Sub-surface material comprising the B and C Horizons of soil with distinct profiles; often having brighter colours and higher clay contrasts.

SURFACE CONDITION :
Gravelly : Over 60% of the surface consists of gravel (2-69mm).
Hardsetting : Soil is compact and hard.
Loose : Soil that is not cohesive.
Friable : Easily crumbled or cultivated.
Self-mulching : A loose surface mulch of very small peds forms when the soil dries out.

SWALE : A linear level-floored open depression excavated by wind or formed by the build-up of two adjacent ridges.

SWAMP : Watertable at or above the ground surface for most of the year.

TERRACE : A flat or gently inclined surface bounded by a steeper ascending slope on its inner margin and a steeper descending slope on its outer margin (Whittow, 1984).

TOPSOIL : A part of the soil profile, typically the A_1 horizon, containing material that is usually darker, more fertile and better structured than the underlying layers.

UNDERSTOREY : A layer of vegetation below the main canopy layer.

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APPENDICES

Appendix i: Site Types

Site types associated with Indigenous activities and culture

The definitions that follow are for terms used in this report, and do not necessarily apply to their use in different contexts.

Art sites are defined as places where any medium has been applied to a rock surface either as symbols, characters, drawings, paintings, or any other rendition, recognisable as not being a natural discolouration or feature. They also include markings to a rock surface, either by engraving, abrading, or pecking, and which cannot be identified as being a natural feature.

Bora rings are circles of 2-30 metres diameter of compressed earth (from repeated treading or dancing), or stone arrangements, at which men performed initiation ceremonies, and are the most frequently recorded ceremonial sites. Sometimes they occur as two rings joined by a central track in a barbel configuration. They usually occur on level or low-lying country, which is usually the first topographical unit to be cultivated, or utilised for highways and roads, but they may also occur as circular stone arrangements on elevated rock platforms and hilltops. If they are or were present then they are usually either already known and have been recorded, or they have long since been destroyed.

Carved trees are readily recognised by even the untrained observer. The carving is incised either into the outer bark, or more commonly, into the living wood after removal of a section of the bark. The designs frequently consist of 'diamond cross-cuts', but may also consist of stylised animal motifs. Previously unrecorded carved trees are still discovered in relatively remote or inaccessible areas. Carved trees frequently occur near burial sites and/or Bora rings, but in some regions they may have been tribal boundary markers.

Fish traps may occur either in rivers or on seashores. They are recognisable as unnaturally formed stone arrangements that were constructed to trap fish (or eels or turtles) carried into the enclosure in deep water, and which are left stranded within the enclosure as the water level drops. The fish were then caught by nets, hand, or by spear.

Grinding grooves are usually observed on the surfaces of large sedimentary boulders or exposed shelves and outcrops of sedimentary rock along creek banks and beds, or near water. They have been produced by Aborigines using the rock surface to shape and sharpen the edges of stone to produce ground-edged axes, or to sharpen wooden spears (the latter tend to be narrow and deep). Water was used to lubricate the surface of the rock. The grooves frequently occur as linear abraded depressions in the rock, and may each be between 10 and 50 centimetres long, up to 15 centimetres wide, and 2 to 5 centimetres deep. Some sedimentary rock surfaces may exhibit shallow ground depressions of roughly round or elliptical shape, and these are more likely to be associated with seed grinding, root crushing, or other food preparation.

Middens may be identified variously as beach, lagoon, lacustrine, or estuarine, and are most likely to be observed at or above the water line where erosion, topsoil removal, or mining has exposed the shell. The size of the midden can vary enormously, with the smallest comprising a 'one off', "dinner-time camp" (Meehan, 1982), with as few as two or three shells, or a shallow lens of only a few centimetres. The largest middens may extend for many kilometres and may comprise of a number of lenses and layers of shell and ash up to several metres deep. These large middens may be evidence of continuous exploitation of the resource over many thousands of years. Middens of fresh water mussel shell may be found in eroding creek banks or in eroding terraces, particularly near both existing and defunct water holes.

Isolated shell or fragments may occur on any surface and in any situation. A single shell may have been discarded by a bird, but the presence of use-wear would indicate Aboriginal use of the shell as

a tool, which was discarded after use. Such occurrence is likely to be where there is no immediate source of stone material suitable for tool manufacture.

Natural Mythological sites are places of significance to Aborigines, either because they are described in mythological stories or songlines, or because they were used in religious ceremonies. They may occur anywhere and while some are more predictable than others – as for example, permanent water holes, waterfalls, rock promontories, etc., others may have no particularly remarkable features. Seldom is there any recognisable artefactual evidence or anything to distinguish it from similar features in the vicinity. These sites must of necessity be identified by Aboriginal people with an association with the place.

Open sites, campsites, knapping floors, scatters, and isolated artefacts, are most likely to occur on eroded and exposed creek banks, particularly where slope wash or stock trails has removed the humic layer, or on eroded ridges and spurs, particularly near the junctions in watercourses.
Open sites are most likely to be present in greatest numbers near a source of either raw stone material, or potential food resources, or in a natural corridor between two differentially preferred environmental zones, or at the contact between two environmental zones containing different resources.
Artefacts in open scatters are likely to be manufactured from the dominant raw material available; i.e. Greywacke on greywacke-sourced soils, quartz on granite-sourced soils, silcrete and chert on relict sedimentary soils.
Artefact assemblages in open scatters are likely to consist predominantly of discard material, i.e., cores, flakes, flaked pieces, and debitage.
Artefacts exhibiting retouch scars and backing are most likely to occur in sites where secondary activity took place peripheral to the central camp site, although this is a generality and can only be observed where there is sufficient surface visibility to identify peripheral sites. Fragments of flakes with retouch or backing may occur on knapping floors indicating breakage occurring during manufacture, or maintenance areas in which damaged tools have been replaced and discarded.
Isolated artefacts are likely to be most frequently observed where the groundcover obscures all but the larger artefacts, such as cores, and large flakes, or where there is little contrast between the texture of artefactual material and the surface upon which it lies. Artefacts of materials contrasting with the matrix may be visible regardless of size; eg. quartz artefacts may be far more visible than much larger basalt artefacts against a background of dark humic terrace soils.

PADs or Potential Archaeological Deposits are deposits, usually in shelters (but they may also be identified where there are intact deposits in open areas), which although not containing any visible archaeological material, are considered likely to contain archaeological material below the surface. These 'sites' are not recorded as sites on the Aboriginal Site Register, but are identified as places that require subsurface testing to establish whether a site exists or not.

Rock shelters with art or occupation deposits, are most likely to occur where the character of the parent rock is sufficiently massive or consolidated for it to retain a structure that weathers differentially to form shelters and overhangs.

Scarred trees are perhaps the most difficult site type to determine as having been caused by deliberate removal of the bark by humans and not as a consequence of natural events; such as abrasion from falling trees or branches, natural branch attrition, fire damage, or contact from vehicles or stock. They may occur in places wherever there are tree species that produce bark suitable for tool and implement manufacture. While some scars are clearly the consequence of deliberate bark removal by Aborigines (either evidenced by stone axe marks, or identified by Knowledge Holders), some scars were made by settlers, and stockmen, and surveyors who frequently blazed trails and property boundaries by scarring the trees, and by timber men who removed a strip of bark to test the suitability of a tree for logging.

Other site types such as hearths, burials, etc., are less easily predicted, although burials are frequently associated with carved trees, and Bora rings, and hearths with campsites, shelters, and shell middens.

Appendix ii: Detail of the AHIMS Site Register

Your Ref:
Our Ref: AHIMS #9551

Archaeological Surveys and Reports
16 Curtis Steret
Armidale NSW 2350

Friday, 2 April 2004

Attention: John Appleton

Dear Sir or Madam:

Re: **AHIMS Search for the following area at** Wyong Shire and Landcom
Zone 56 Eastings: *354000-365000* Northings: *6315000-6328000*

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW National Parks and Wildlife Service (NPWS) at the above location.

A search of the NPWS Aboriginal Heritage Information Management System (AHIMS) has shown that 12 Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to NPWS;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and NPWS assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the NPWS Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;
- It is known to the Aboriginal community; or
- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, NPWS would recommend that an Aboriginal Heritage Assessment be

NSW
NATIONAL
PARKS AND
WILDLIFE
SERVICE

ABN 30 841 387 271

Head Office
43 Bridge Street
P.O. Box 1967
Hurstville NSW
2220 Australia
Tel: (02) 9585 6444
Fax: (02) 9585 6555
www.npws.nsw.gov.au

undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

Kellyanne Sheargold
Aboriginal Information Officer
Information Systems Unit
Cultural Heritage Division
Phone: (02) 9585 6345
Fax: (02) 9585 6094

Appendix iii: Darkinjung LALC report

ABORIGINAL HERITAGE SURVEY REPORT FOR WARNERVALE TOWN AREA

INTRODUCTION

Darkinjung Local Aboriginal Land Council was contacted by John Appleton of Archaeology Reports and Surveys PTY LTD,to accompany him on a heritage site inspection of land owned by Landcom for the new Warnervale City area. Also inspected were 11 blocks of land needed to be used for the sewering of this area. This is in accordance with the Environmental Planning Assessment Act (EPA) 1979 and the Wyong Shire Councils requirements on land prior to any development.

AIM

The aim of the survey is to determine if any Aboriginal Sites of significance are located within the boundaries and immediate surrounds of the survey blocks. Sites of significance include:

Cave/Shelter Sites (which usually include artwork)
Grinding Grooves
Rock Engravings
Scar Trees
Artifact Scatters
Open Campsites
Middens
Burial Sites

SURVEY CONDUCTED BY

The survey was conducted by; John Appleton, Arhaeologist and Jodi Cameron Site Officer for DLALC.
The survey was carried out on foot by way of visual inspection. The area to be surveyed was of a large nature and straddled either side of the railway tracks and across Sparks Road.

SURVEY LOCATION

The main body of land that was surveyed was bouded by Sparks road, the railway line, Hiawathia road, and Hakone road.This low ridge is situated about 10km from Wyong and is best accessed by taking the Sydney to Newcastle freeway and exiting at the Warnervale, Toukley exit. Follow Sparks road for 5km and the main survey area is on the left. The other blocks were accessed through Virginia road, Warnervale road, and Minnasota road.

AREA DESCRIPTION

This area is in between the Watagan mountains in the West and the Tuggerah Lakes and Pacific Ocean in the East. It is part of the wet lands and creeks that drain into the lakes system. The area has low ridges, with pockets of eucalypt and tea tree forests. The area has been extensively used since the late 1800s for logging, farming and more recently for residential developements.
Some of the fauna noted in the survey area was; paper barks, tea trees, smoothbark apple, melleluca shrubs, grasses, common fringe lilly, dwarf daisy, bull rushs, vines, lomandria, spotted gum.

ABORIGINAL OCCUPATION

Proir to white settlement the area would have been well used by the local Aboriginal people. The coastal and esturine areas were well exploited areas for food gathering and early settlers and missionaries have noted this. Threkeld noted "Natives fishing " on Budgewoi lake (Backhouse 1843[1967]:381)this only a couple of kilometers from the survey area.Other sites as middens and bora rings have been recorded within a 5-10 km radius of the survey area.

SITE FINDINGS

Most of the area has been previously cleared at some stage either by logging or clearing for farm and grazing land. All blocks on the ridge were in various stages of regeneration of clearing or were still maintained as paddocks. No sites were found in this area. Where undergrowth was too thick to access bare areas, old growth trees and rock outcrops were looked at for artefacts and potential sites.
Of the 11 or so blocks looked at on the south side of Sparks road were the sewer pipes will go no sites were found. As the area is of a wetland nature and mainly tea tree forest it is unlikely that any evidence of Aboringinal occupation would be found due the wet nature of the area and the absence of any rock formations for grinding grooves at the creek level.

RECOMMENDATIONS

I would recommend that the Darkinjung Local Aboriginal Land Council have no objection to the DA of the Warnervale City area and Sewer pipe service being approved.

I would advise and recommend that at ground clearing and excavation stages of developement that a site officer be present so as to identify any bone or stone artefact should they be dug up. That if any artefact or bone be found that all work cease and the local land council and NPWS and archaelogist be contacted for further investigation.

This report has been preapred by Jodi Cameron Site Officer for Darkinjung Local Aboriginal Land Council. *Should you have any queries regarding this report please do not hesitate to call me on* ***4351 2930.***

Regards,

Jodi Cameron