

Table 2.1 Principal planning assumptions		
	Original planning	Structure Plan
CAPACITY POPULATION		
<i>Estimated total Capacity for Gungahlin</i>	80-85,000	Up to 100,000
<i>Estimated total population at 2010 for Gungahlin</i>	unspecified	47 300
Average growth rate	unspecified	Variable (see existing demographic profile)
Dwelling occupancy	Less than 3 persons per dwelling but unspecified	2.72 persons per dwelling (1996 Gungahlin figure)
Age profile relative to ACT	Similar profile to rest of ACT but higher median age	Not an output
SUBURBS		
<i>Average walking distance</i>	Not an output	400m
Maximum walking distance	1-1.5 km	800m – under 2km
Maximum neighbourhood size	1800 blocks	Variable
Neighbourhood population size	3500-5500	2800-8000
HOUSING		
Average block sizes	unspecified	Not determined
Average net dwellings per hectare	unspecified	20 dw/ha – urban residential area 13 dw/ha – Residential area
% of dwellings on standard blocks	65%	Density gradient varies at centres
% of dwellings on smaller blocks	15%	Density gradient varies at centres
% of dwellings on multi-unit blocks	20%	Density gradient varies at centres
SCHOOLS		
<i>Pre-schools</i>	1 per neighbourhood	1:5000 persons
Primary schools	1 per neighbourhood	1:750 pupils/PS
High Schools	3-4	1:1000 pupils/HS
Colleges	unspecified	1:14000 hholds (subject to peaks)
TRANSPORT		
<i>Arterial road spacing</i>	1.4 to 1.9 km	Not determined
Residential frontage to arterial roads	Not permitted	Not determined
Residential trip generation rates	unspecified	10 vehicles per dwelling per day
Modal split	Unspecified	Bus route within 400m of 90% of dwellings and bus stop within 500m of 95% of dwellings
OPEN SPACE		
<i>Rate of provision of local parks</i>	<i>NCDC standards</i>	Within 200m of 90% of dwellings
EMPLOYMENT		
<i>Labour force participation rate</i>	46-50%	50%
RETAIL		
<i>No. of centres</i>	Town centre 2 group centres local centre in each suburb	Town centre 3 group centres 5 local centres
COMMUNITY FACILITIES SITES		
	Large sites Unevenly distributed	Larger sites at town centre Smaller sites distributed generally within 400m of 90% of dwellings

3. THE REVIEW AREA

3.1 *History and heritage*

The Gungahlin District displays a rich cultural heritage which reflects its history of Aboriginal and European settlement. The Ngunnawal people occupied part of the Southern Tablelands and adjacent highlands, which included the area that is now Gungahlin. Throughout the Gungahlin district there is evidence of Aboriginal occupation, mostly in the form of camp sites and scatters of stone artefacts. Many of the sites occur adjacent to streams and wetlands where subsequent erosion has exposed stone implements and flakes.

The first recorded Europeans to visit the Gungahlin area were part of a party sent by Governor Macquarie to discover the Murrumbidgee River in 1820. Settlers taking up land grants followed in 1825. George Thomas Palmer established a homestead and local settlement on the Ginninderra Creek known as 'Palmerville', to the south of Gungahlin. Many of his tenant farmers and labourers subsequently took up land in the local district. By the 1850s, European settlement extended along Ginninderra Creek within the present boundaries of Gungahlin.

In the late 1850s a number of smaller landowners acquired portions around the periphery of the Palmer estate. These included Anthony Rolfe of 'Tea Gardens', his son Edmund of 'Gold Creek', John Butler of 'Malton' and John Crinigan of Crinigan's Hut. Butler and Crinigan had been assigned convicts on the Palmer estate. Squatters who subsequently purchased their land also appear to have settled in the area north of the Palmer estate in the vicinity of Mulligans Flat. These included John Gillespie at 'Horse Park' who may have been the first free selector to occupy land in this area.

The settlers cleared the land, built homes, and initially engaged in subsistence farming, with crops such as wheat and oats sown on alluvial flats. There were few amenities, families were large and life was often hard. By the twentieth century, stock grazing had become the principal rural activity in the area.

With the passage of the Seat of Government Act in 1911, the Commonwealth began resuming land in the Gungahlin district and the old NSW land portions were replaced by a smaller number of large pastoral leases. Many of the original families left the district around this time.

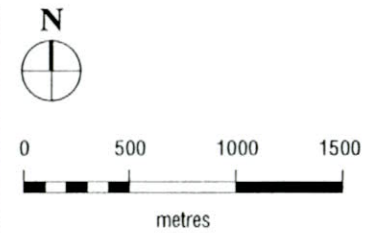
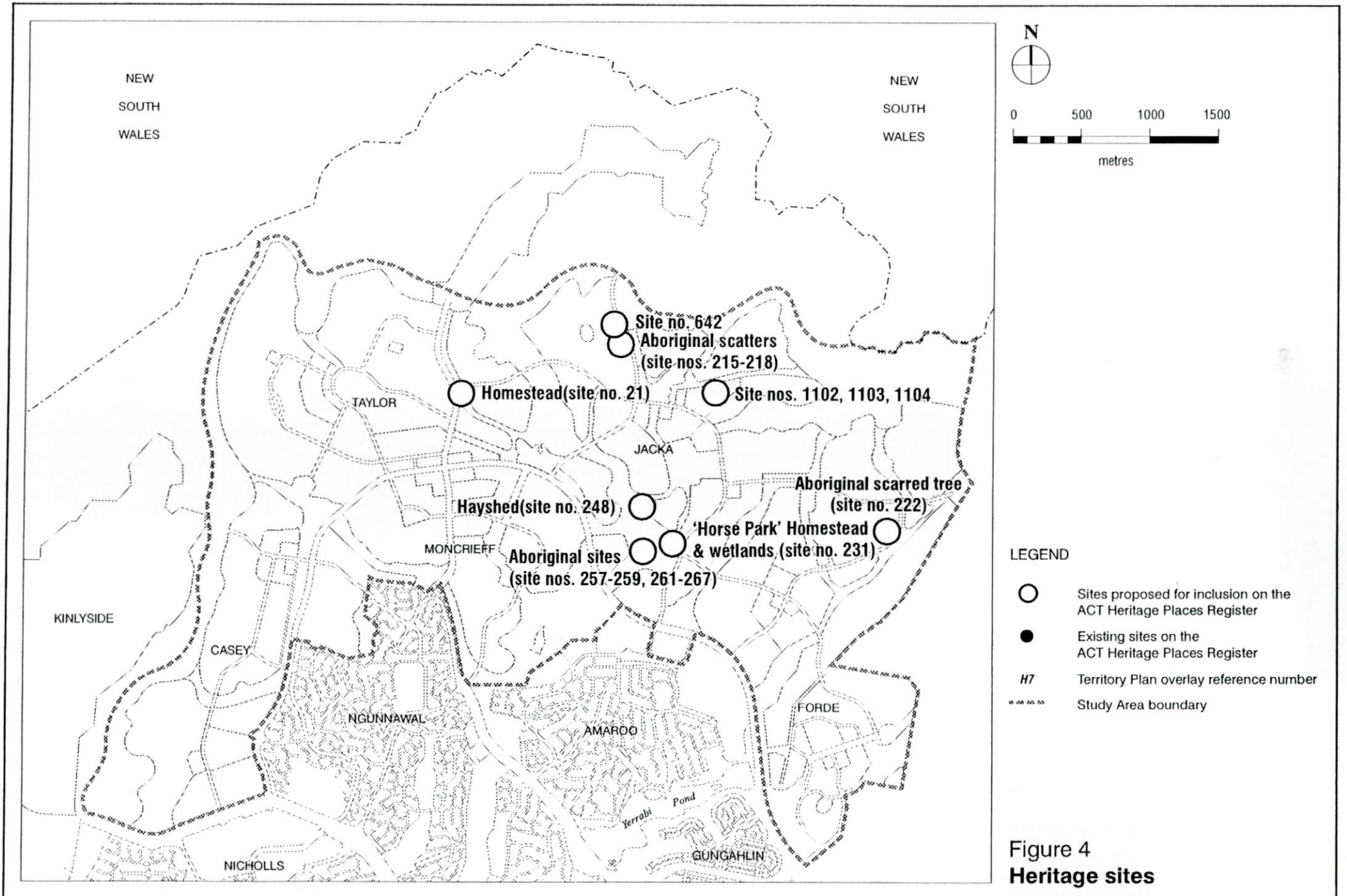
A large number of heritage places have been recorded in the Gungahlin district generally. Only a small proportion of these have so far been nominated or included on either the interim Heritage Places Register (prepared by the ACT Heritage Council) or the Heritage Places Register (Appendix V of the Territory Plan). **Figure 4** identifies listed places. Assessment of many of the places recorded, for nomination or inclusion on these Registers, is in progress.

3.2 *Existing land use*

The North Gungahlin area contains two main separate landscape character areas of existing land use:

- hilly upland areas – which adjoin the ACT/NSW border (forestry plantations and proposed equestrian trail nominated for inclusion in the National Trail); and
- sloping open areas – where rural leases and homesteads exist.

There are a number of existing land uses, as described below and shown on **Figure 5**.



- LEGEND
- Sites proposed for inclusion on the ACT Heritage Places Register
 - Existing sites on the ACT Heritage Places Register
 - H7 Territory Plan overlay reference number
 - - - - - Study Area boundary

Figure 4
Heritage sites

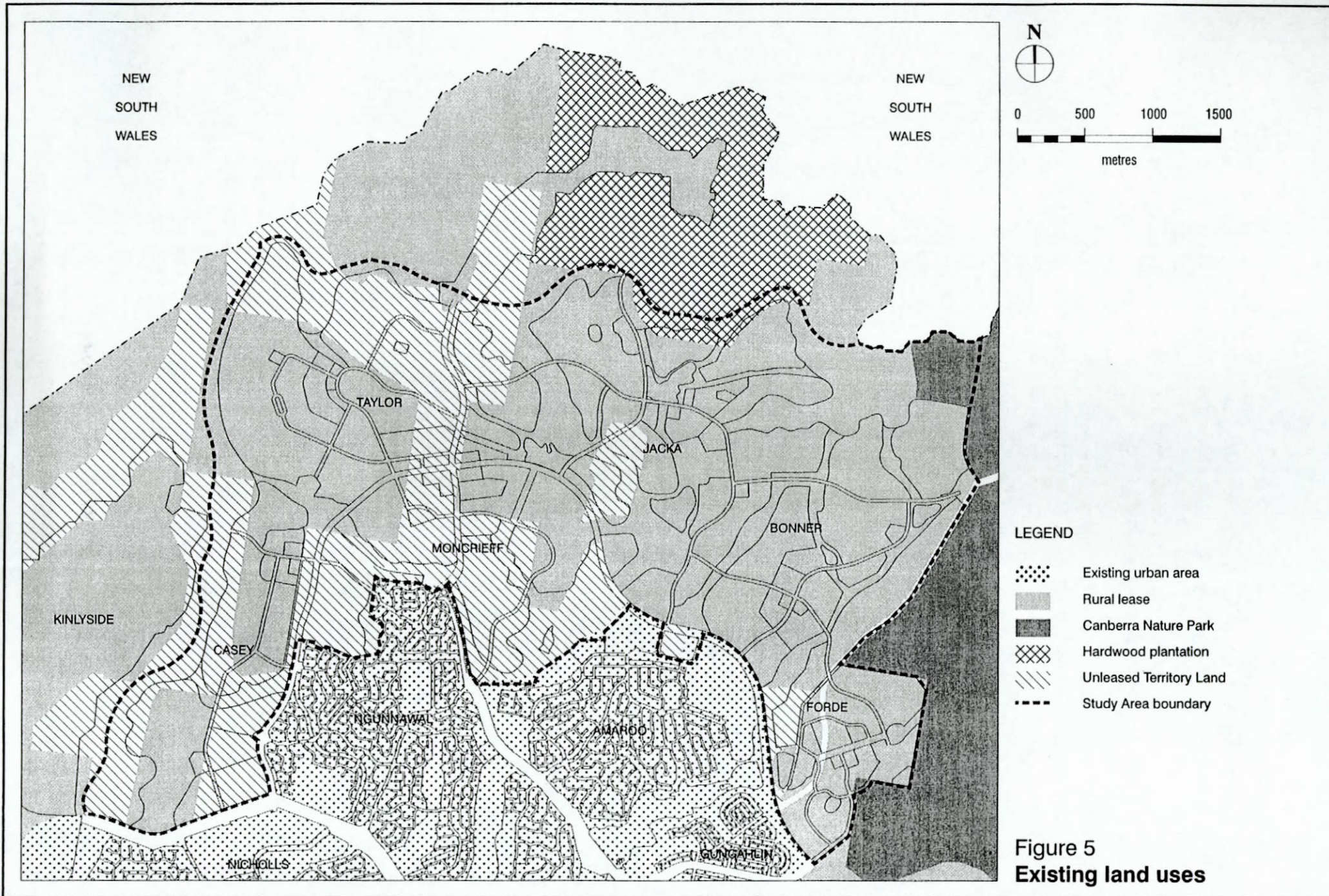


Figure 5
Existing land uses

3.2.1 Forestry

Fuel wood plantations managed by ACT Forests were established in part of the hills area in the late 1980s. These occupy an area of about 3 square kilometres in the north adjacent to the NSW/ACT border and are intended to be managed indefinitely although future logging for firewood is unlikely at this stage. As is the case in other productive forests in the ACT, they can also serve recreation, wildlife habitat and agistment grazing purposes.

Jacka and Taylor contain areas of tree plantation, established as part of a forward tree planting program throughout the ACT by previous governments and agencies, predominantly for landscape purposes.

3.2.2 Rural

Since the 1950s, much of the rural land has been amalgamated into single large leases. Since the 1980s, rural land has been placed on short-term leases and land management practices have changed as a result of the increased uncertainty of tenure. There are four rural leases that will be affected by urban development in North Gungahlin.

3.2.3 Urban

Development of Palmerston began in 1992, Nicholls in 1993, Ngunnawal and Amaroo in 1994. Amaroo adjoins the northwestern edge of Yerrabi Pond, the largest water body in Gungahlin. Development of the town centre began in 1998. There are a range of services in the town centre including a Joint Emergency Services Centre, a service station and a major retail supermarket forming part of the Gungahlin Marketplace. Projects recently completed include the Canberra Raiders Club, Magnet Mart, Community Centre/Library, a fast food site and Burgmann Anglican School - Stages 1 and 2. Early stages of the town centre residential development have also been completed.

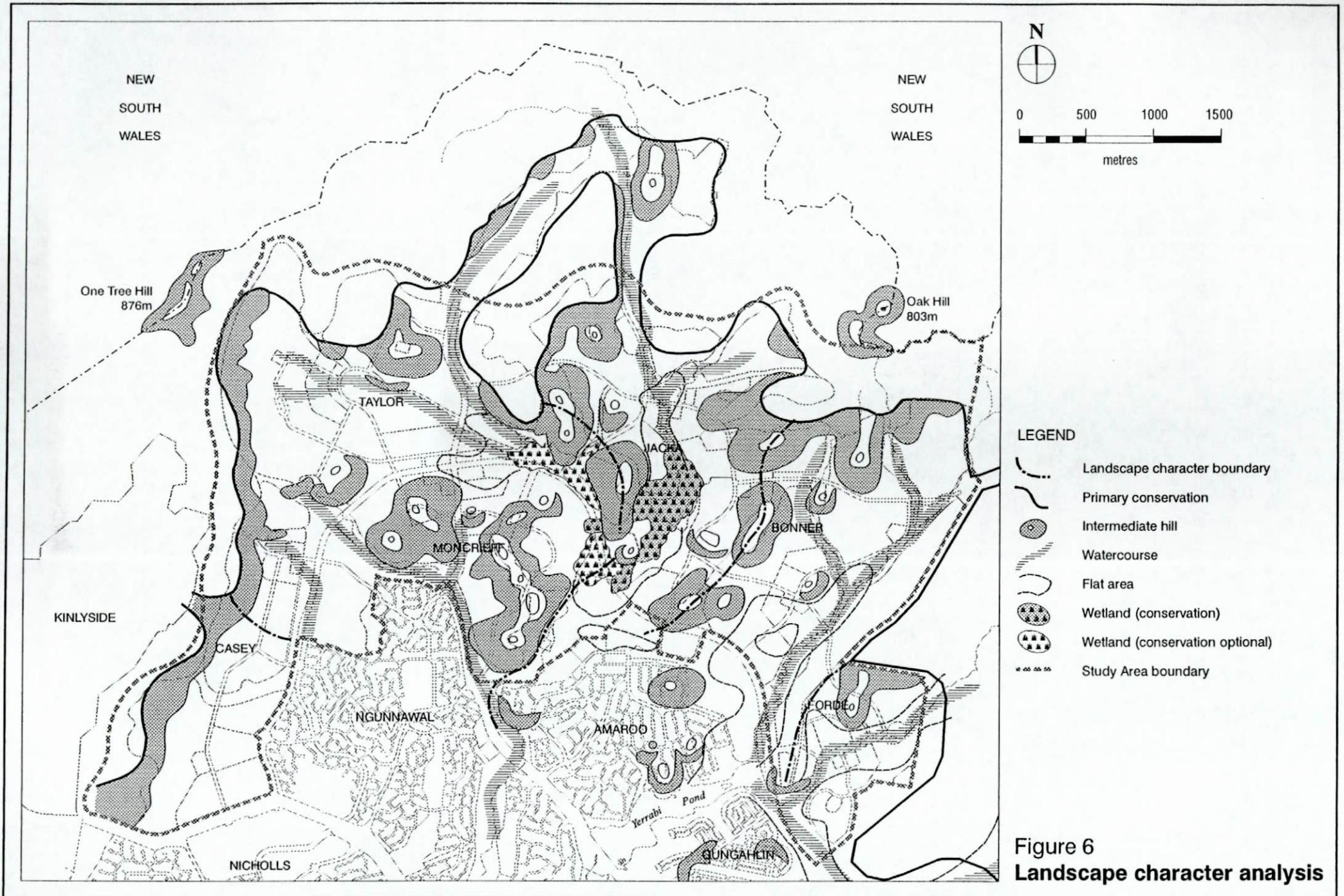
3.2.4 Surroundings

The North Gungahlin area is surrounded by a range of existing and proposed land uses including:

- Mulligans Flat Nature Reserve;
- Hills, Ridges and Buffer land use area to the north, extending to the ACT/NSW border;
- A broadacre land use policy area north of the proposed future suburb of Taylor;
- Gundaroo Road providing access to NSW;
- the proposed future suburb of Kinlyside; and
- existing urban areas of Gungahlin (contained in the Gungahlin Town Centre, and the suburbs of Amaroo, Ngunnawal and Nicholls).

3.3 Topography, geology and soils

The North Gungahlin urban area covers an area of approximately 1,420 hectares and is bounded to the north by a rim of hills which form the northern tip of the ACT. These hills are the dominant feature of the local topography and together with lower ridges (oriented in a general north-east to south-west pattern) define four topographic zones of different character (see **Figure 6**):



- the uplands which are the steeper and higher areas along the ACT border and contain most of the areas that the current Territory Plan identifies as Hills, Ridges and Buffer Areas Land Use Policy areas;
- the north-west valleys which consist of a series of closely spaced ridges of generally moderate slopes, separated by wide flat-floored valleys;
- the tablelands which are elevated and undulating with moderate slopes; and
- the wide plains which are gently sloping, often with indistinct drainage lines.

The land drains south towards the Town Centre with a system of ridges and broad valleys. The North Gungahlin Area ranges in elevation from about 870m near the summit of One Tree Hill to about 610m near the low point of Yerrabi Pond.

Most of the area contains siltstones, mudstones, shales and sandstones of the Canberra formation. Some of the upper areas contain resistant dacite and dacitic tuffs of the Hawkins volcanics. The predominant soils in the area are duplex soils. They occur at depths up to 1.5 metres and are subject to waterlogging in some low-lying areas and gully erosion along parts of the drainage lines. While all of the soils are susceptible to disturbance, those of particular concern are shallow lithosols associated with the ridges and steep side slopes, and deep solodic soils, which are poorly drained and occur in the headwaters of valleys.

3.4 Landscape

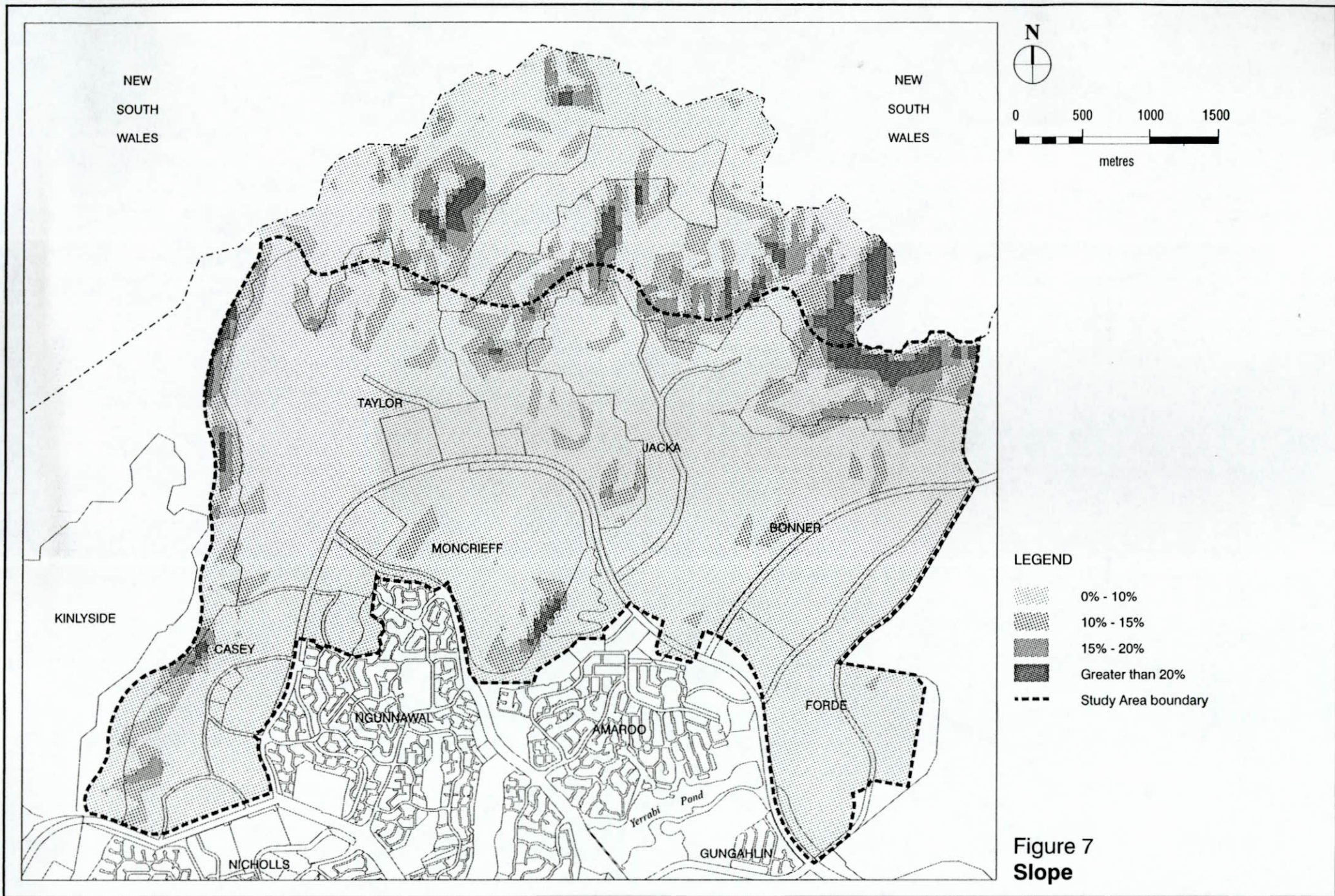
North Gungahlin is potentially one of the highest parts of urban Canberra and the upper slopes provide excellent views of the Brindabellas. Views are also available from the mid-slope escarpments and from numerous prominent knolls above 650m (AHD) within the area. Views to landmarks within the Parliamentary Triangle such as the Captain Cook Memorial Jet, Black Mountain Tower and Parliament House are common above 650m (**Figures 7 and 8**).

The North Gungahlin area forms a significant natural amphitheatre 5km wide at its lowest reaches. The rim of hills and ridges provides well-defined edges to the landscape setting. The prominent ridges and peaks of One Tree Hill (870m) to the west of Oak Hill (800m) to the north have a visual presence at a metropolitan scale similar to Black Mountain (812m) and Mount Ainslie (843m).

3.4.1 Landscape character

In determining suitable land use and development areas in North Gungahlin, an assessment and evaluation of landscape character areas was undertaken. These areas help delineate residential areas. The suburbs which emerge correspond to cohesive landscape units (see **Figure 9**). This is particularly true of the three outer suburbs:

- Taylor which is defined by the high slopes of One Tree Hill to its west, gentler slopes to the north, a lower ridge system to the east and the hills of Moncrieff to the south east.
- Jacka which is strongly defined by hill reserves on two sides giving it a high degree of containment and which is delineated from the separate character area, Bonner, by a backdrop of the relatively subtle north-south ridge system.
- Bonner which is strongly defined by high country to the north, and Mulligans Flat to the north and east.



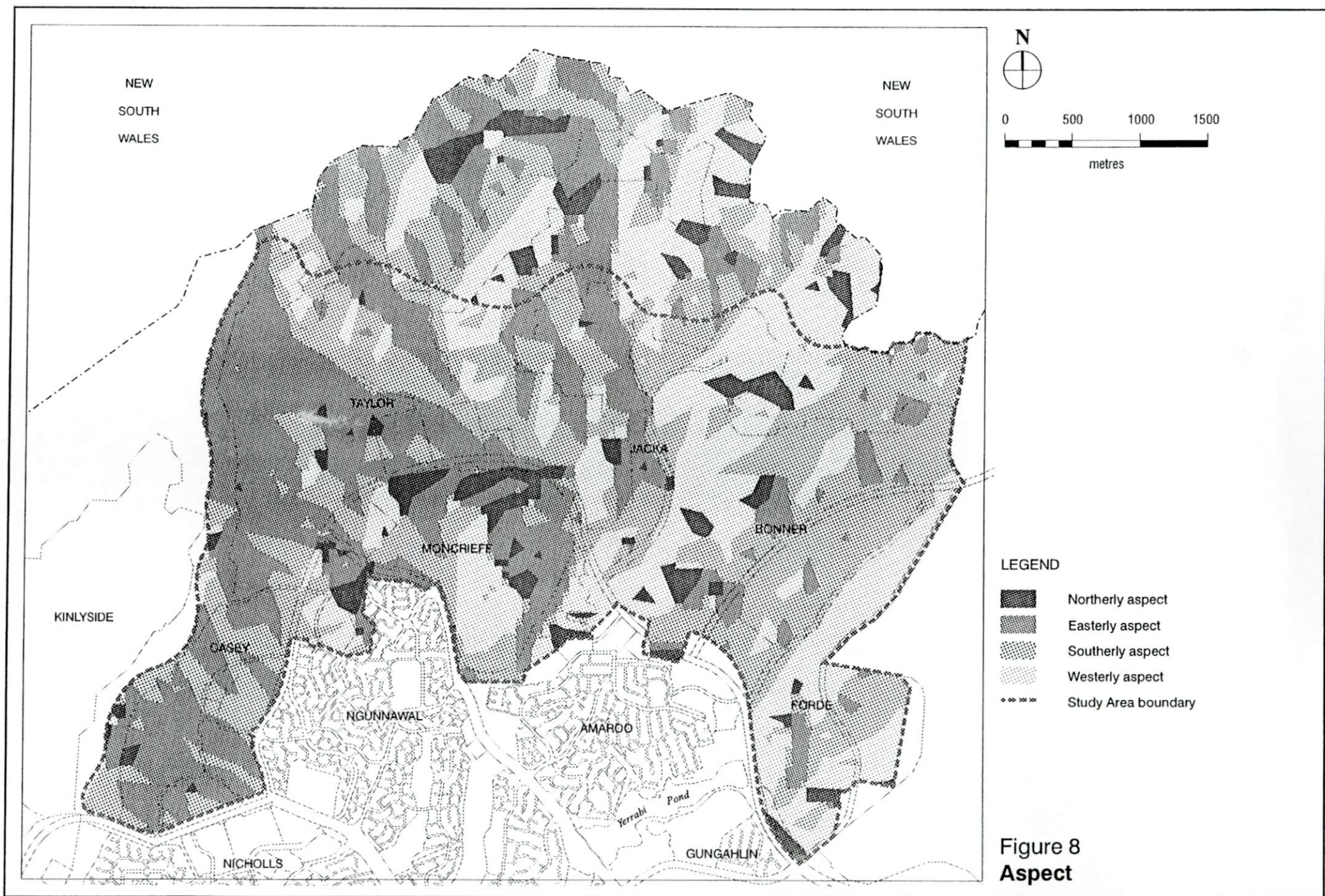


Figure 8
Aspect

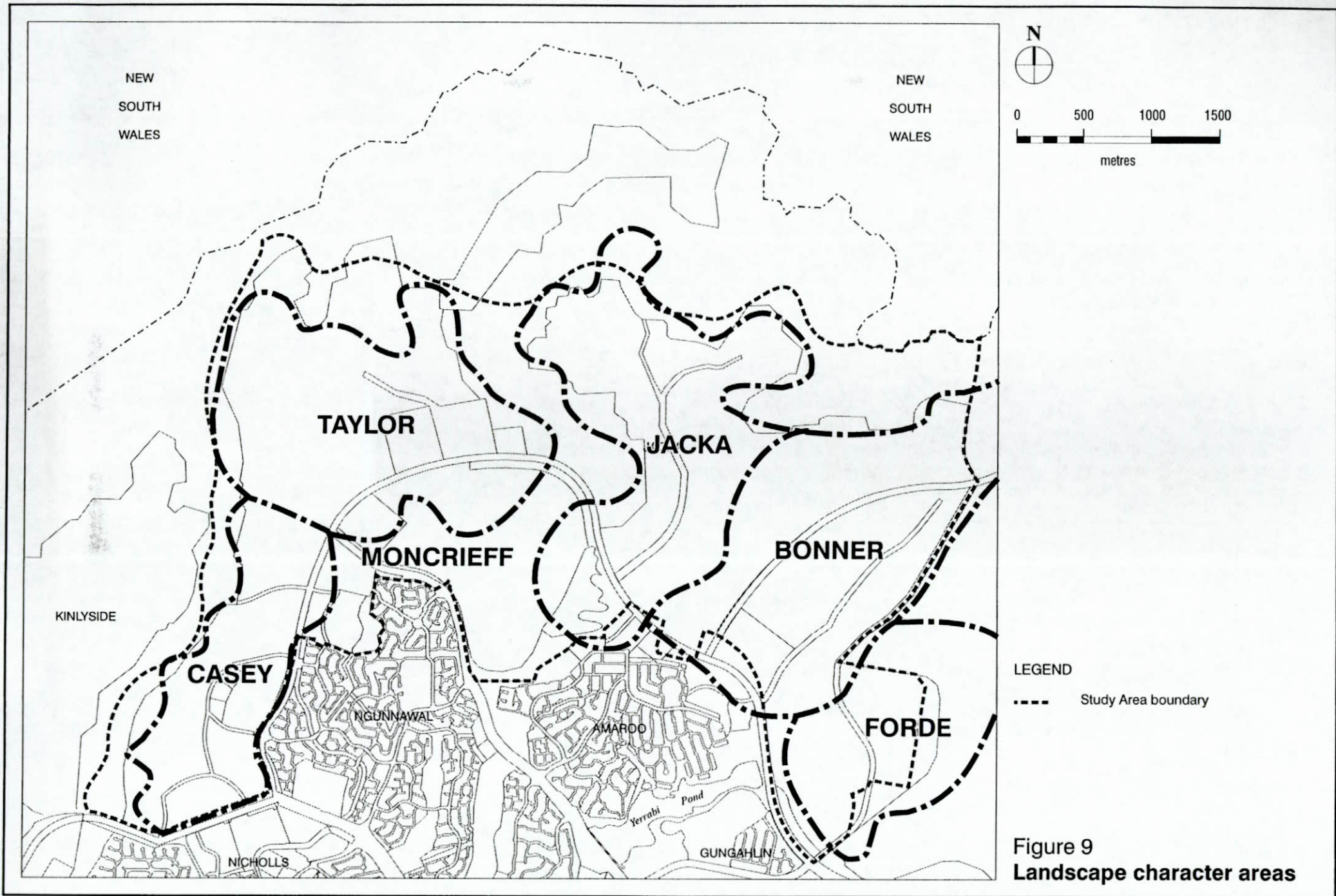


Figure 9
Landscape character areas

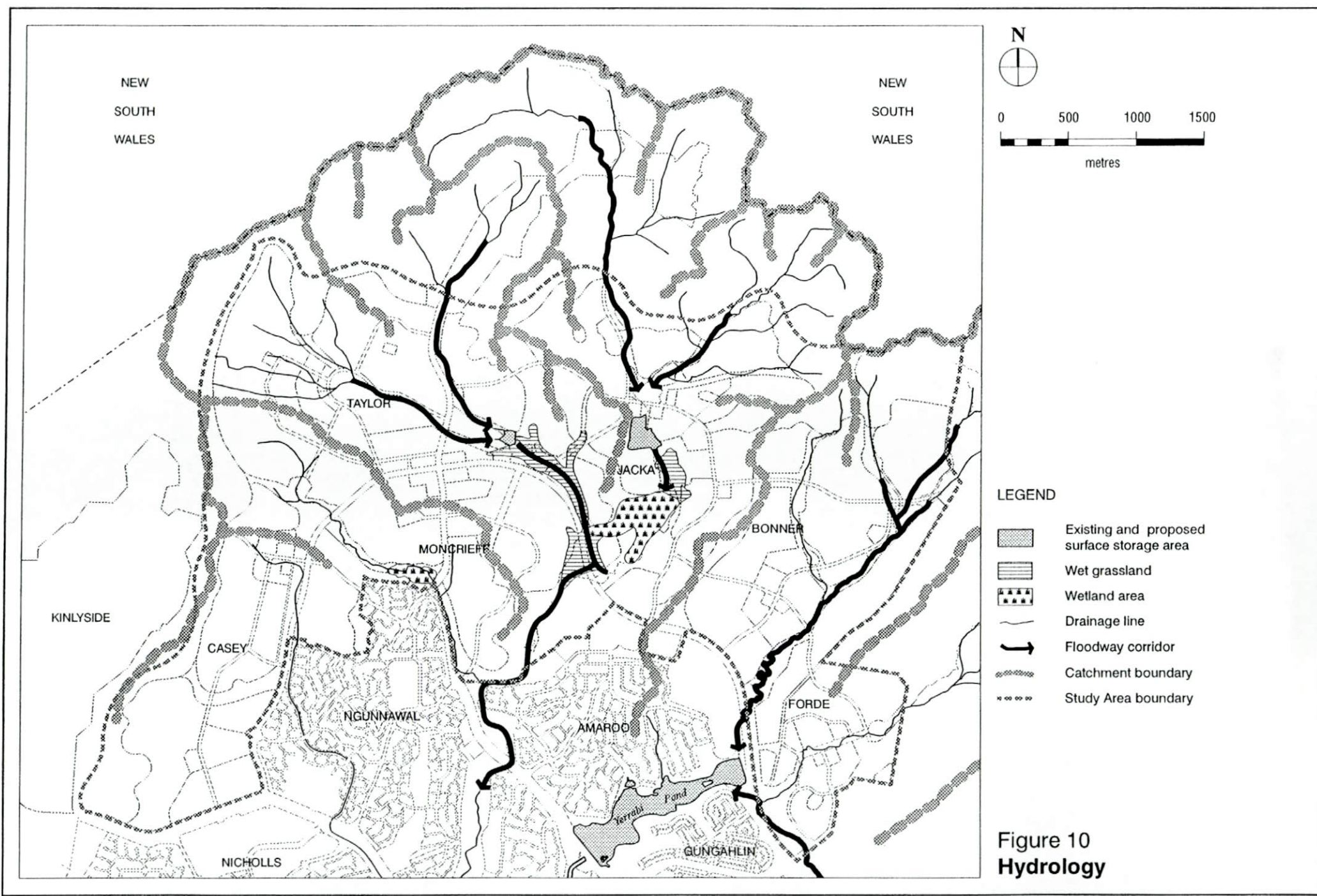


Figure 10
Hydrology

3.4.2 Significant Landscape Features

The Gungahlin Landscape Policy Plan, prepared in 1996, identifies a number of sites within Gungahlin of particular visual landscape significance. The policy states that "neighbourhood landscape design should recognise these existing landscape features and, where appropriate, retain and reinforce their specific characteristics." The following sites of landscape significance are relevant to North Gungahlin:

- Arcade of existing mature eucalypts near Gold Creek (alongside Casey).
- Horse Park Homestead and environs (including Horse Park Wetlands).
- East View and Stray Leaf homesteads and their environs, which include mixed landscape of mature pines and eucalypts.
- Mulligans Flat - a complex ecological system with a strong sense of containment; a major flora and fauna habitat, adjacent to the North Gungahlin urban area.
- Gundaroo Road - delineated by arcading mature eucalypts.

3.5 Hydrology

The outer rim of hills and internal ridges form the watershed for a major water catchment (the Ginninderra Creek Catchment) draining towards the town centre and Yerrabi and Gungahlin water quality control pond system, and then into the Belconnen District. The Ginninderra Creek Catchment covers the majority of the North Gungahlin area (see **Figure 10**).

There are extensive tracts of slow draining wet grasslands and wetlands adjacent to Horse Park Homestead and in nearby valleys. The valley alluvium is frequently fed with groundwater and run-off as the soils of the surrounding hills are relatively shallow. The source of and movement of groundwater entering the wetland have not been determined.

3.6 Natural Resources

The North Gungahlin area contains a large component of remnant native vegetation that varies in terms of its ecological integrity, depending on the nature of previous land uses. The value of the area for wildlife depends to a significant degree on this previous land use history, and current land uses.

The ACT Flora and Fauna Committee, established under the *Nature Conservation Act 1980* is responsible for assessing the conservation status of flora and fauna in the ACT, and the ecological significance of potentially threatening processes. Where in its opinion a species or community is under threat, a recommendation for declaration is made, and if adopted, an Action Plan is prepared in response by the Conservator of Flora and Fauna. An Action Plan includes proposals for the identification, protection and survival of a threatened species or community.

All Action Plans were reviewed to determine the extent of recorded information and conservation recommendations for endangered communities or vulnerable/threatened species in the ACT, and the following were found to be relevant to the North Gungahlin Structure Plan:

- | | |
|-------------------|--|
| Action Plan No. 1 | Natural Temperate Grassland |
| Action Plan No. 7 | Golden Sun Moth (<i>Synemon plana</i>) |

Action Plan No. 10	Yellow Box/Red Gum Grassy Woodland
Action Plan No. 15	Hooded Robin (<i>Melanodryas cucullata</i>)
Action Plan No. 16	Swift Parrot (<i>Lathamus discolor</i>)
Action Plan No. 17	Superb Parrot (<i>Polytelis swainsonii</i>)
Action Plan No. 18	Brown Treecreeper (<i>Climacteris picumnus</i>)
Action Plan No. 20	Regent Honeyeater (<i>Xanthomyza phryga</i>)

Each of these items is discussed in more detail below and in section 9.2.4. (see **Figure 11**).

(a) Woodlands

Yellow Box/Red Gum Grassy Woodland

There are several woodland communities in the ACT, the most significant of which in North Gungahlin being the Yellow Box/Red Gum (YBRG) Grassy Woodland. Action Plan No. 10 for the YBRG Grassy Woodland was prepared in response to the declaration of this woodland as an endangered ecological community in the ACT (see **Figure 12**). The YBRG woodland community is described in the Action Plan as “an open woodland community in which either or both of Yellow Box *Eucalyptus melliodora* and Blakely’s Red Gum *E. blakelyi* are usually present and commonly dominant or co-dominant. Apple Box *E. bridgesiana* is a frequent associate”². The trees form an open canopy over a rich understorey of native tussock grasses, herbs and scattered shrubs.

Most of the remaining YBRG grassy woodland community in the ACT can be found in the northern parts of the ACT. Large areas of YBRG identified as of very high conservation value by the Action Plan are located in areas adjacent to North Gungahlin, particularly in the Mulligans Flat Nature Reserve and Gooroo to the east and in the Kinlyside area to the west. Smaller remnant patches of high conservation value YBRG woodland (totalling 178ha) are located in the central, northern and western parts of North Gungahlin, within the area proposed for future urban development.

The Mulligans Flat Nature Reserve, to the east of the North Gungahlin development area contains about 310ha of YBRG woodland together with other woodland types with significant conservation values. This includes a 19 hectares of YBRG grassy woodland, recently added to the south western side of the Reserve, removing it from the proposed urban development area of Forde. The grassy woodland ecosystem protected in the Reserve provides habitat for approximately 150 native bird species, and is an important refuge for a suite of woodland bird species considered to be in decline (refer to The Action Plan for Australian Birds 2000, Environment Australia).

Woodland habitat value

In the ACT, woodlands support a wide diversity of animals, including birds, bats, reptiles, ground dwelling and arboreal mammals, and invertebrates. Tree hollows developed in older trunks and branches, together with fallen timber, provide habitat for many of these species. In the better woodlands, structural complexity is created by the presence of tree hollows, trees of different ages, a mid-level shrub layer and a grassy understorey which provide nesting sites, shelter and food resources for fauna.

About fifty bird species including some that are listed as threatened species in the ACT (eg Hooded Robin, Brown Treecreeper) occur as residents or summer migrants in woodland which is important breeding habitat for many species (Taylor 1992). Many woodland birds rely on fallen timber or native shrubs as key habitat features which are now depleted due to past land use practices. Small fragmented patches of woodland separated from larger areas and sometimes with depleted understorey vegetation are also of reduced value to birds and other animals.

² Action Plan 10 Yellow Box/Red Gum grassy Woodland – An Endangered Ecological Community. Environment ACT

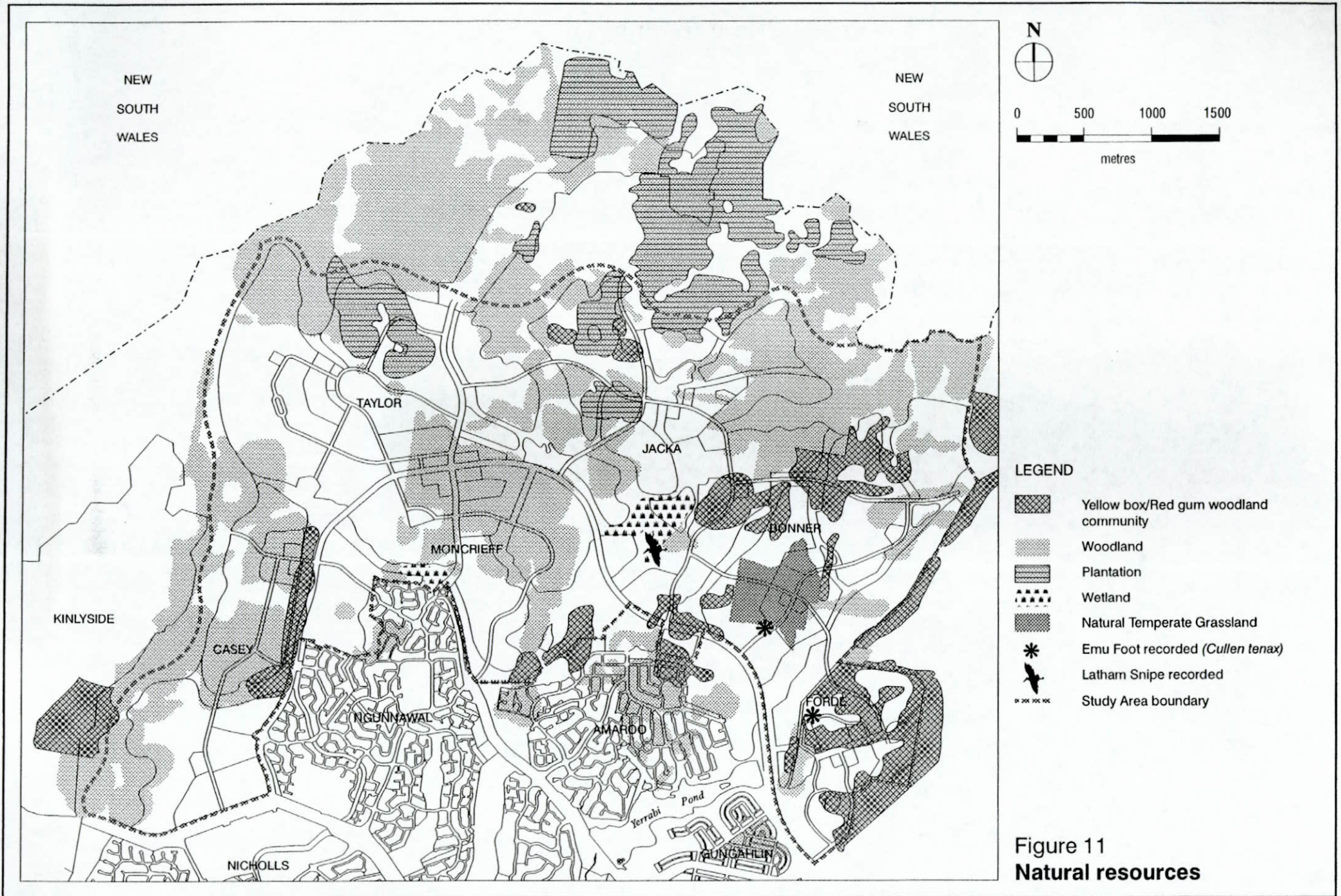
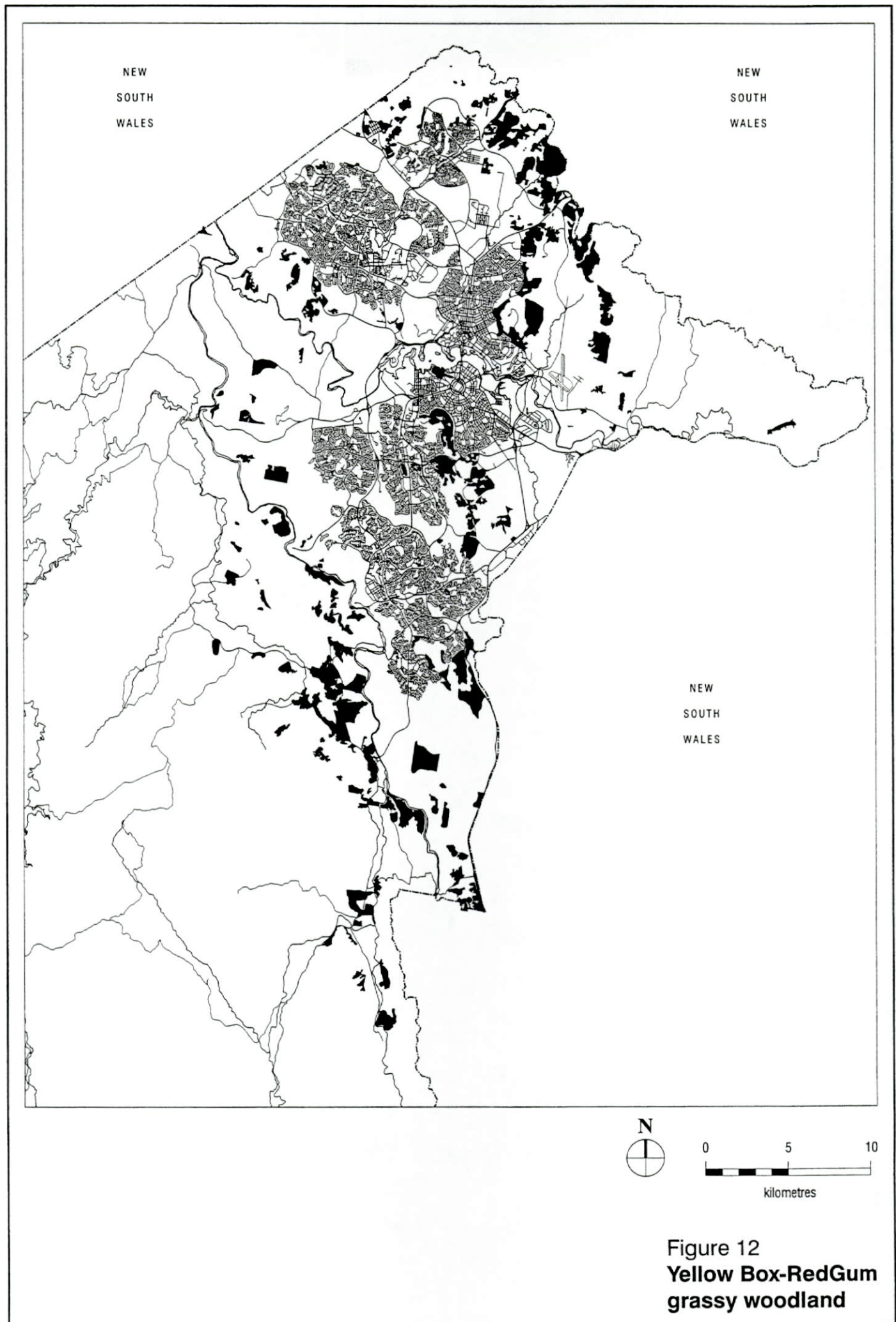


Figure 11
Natural resources



Other Woodlands

North Gungahlin also contains other woodland communities, which have intrinsic botanical and ecological value. Their significance is derived primarily from their value as wildlife habitat and contribution to wildlife corridors.

A large continuous corridor of woodland with high conservation values is located on the high land which forms the northern perimeter for North Gungahlin. It extends from the proposed future suburb of Casey in the west, to Mulligans Flat Nature Reserve in the east. The width of this corridor is variable, depending on the topography and other land uses. The area is shown on the Territory Plan as Hills, Ridges and Buffer land use policy area. This area is part of the Territory's open space system and contributes to the unique landscape setting of Canberra.

Upper slopes within the area were originally dry sclerophyll forest which have been thinned, but tended to regenerate naturally due to low levels of pasture improvement and low intensity grazing. Other areas containing high quality woodlands are found on the mid to lower slopes, but these tend to be smaller, more fragmented patches having experienced a higher level of clearing and pasture improvement due to their greater agricultural potential. As a result the connectivity between these remnant patches is poor.

Action Plan 10 identifies these woodlands as being dominated by other species such as Apple Box *E. bridgesiana*, Red Box *E. polyanthemos*, Mealy Bundy *E. nortonii*, Bundy *E. goniocalyx* and rarely Black Cypress Pine *Callitris endlicheri* or Kurrajong *Brachychiton populneum*, none of which are declared an endangered or vulnerable species or community.

(b) Forestry Plantation

To the north of the proposed future urban area of North Gungahlin abutting the ACT/NSW border is a eucalypt plantation. It consists of native, but not necessarily local, species within a former woodland area. The plantation occupies approximately 3 square kilometres, and is contained within an overlay policy in the Hills, Ridges and Buffer Areas land use policy of the Territory Plan. Despite modification, the area retains some value as wildlife habitat and contributes to wildlife connectivity in this northern area of the ACT.

Areas of forward tree plantation are located within Jacka and Taylor. These areas are part of a forward tree planting program implemented throughout the ACT by previous governments and agencies, predominantly for landscape purposes. (See **Figure 11**).

(c) Natural Temperate Grasslands

Natural Temperate Grassland is an ecological community that is dominated by native species of perennial grasses, with a diversity of native herbaceous plants present. An important characteristic is that the grassland is naturally treeless or has less than 10% projective foliage cover of trees, shrubs and sedges³. Dominant species include Kangaroo Grass *Themeda triandra*, Wallaby grasses *Danthonia* spp., Spear grasses *Stipa* spp., Red Grass *Bothriochloa macra* and Tussock grasses *Poa* spp.

Some areas of Natural Temperate Grassland occur in Gungahlin, though relatively little of this community occurs in the study area. Typically native grassland is associated with cold air drainage valleys, which were originally concentrated in parts of southern Gungahlin. A total of 358 Ha Natural Temperate Grassland of a high conservation significance occur to the south of the study

³ Action Plan No. 1 Natural Temperate Grassland – An Endangered Ecological Community

area, and are protected in the Mulanggarri, Gungaderra and Crace nature reserves. These reserves are also significant in providing habitat for the vulnerable Striped Legless Lizard (*Delma impar*). Action Plan No.1 for the Natural Temperate Grassland was prepared in response to the declaration of this grassland as an endangered ecological community in the ACT.

The Action Plan identifies an area of Natural Temperate Grassland within the study area, to the east of the Horse Park Homestead and Wetland area. It consists of 10.3 Ha of Wet Themeda grassland and 21.8 Ha of *Danthonia* grassland. Its botanical significance is assessed in the Action Plan as moderate, its native species diversity is assessed as medium, its exotic species diversity is moderate and the area has been subject to moderate alteration. It contains a population of an uncommon plant species which is not listed as a threatened species, the Emu Foot *Cullen tenax* to the south of the grassland area. The Emu Foot also occurs in another grassland site adjacent to Gundaroo Road in the suburb of Forde. The population in the grassland to the east of the Horse Park Homestead is the biggest known in the ACT (See **Figure 11**).

(d) Wetlands

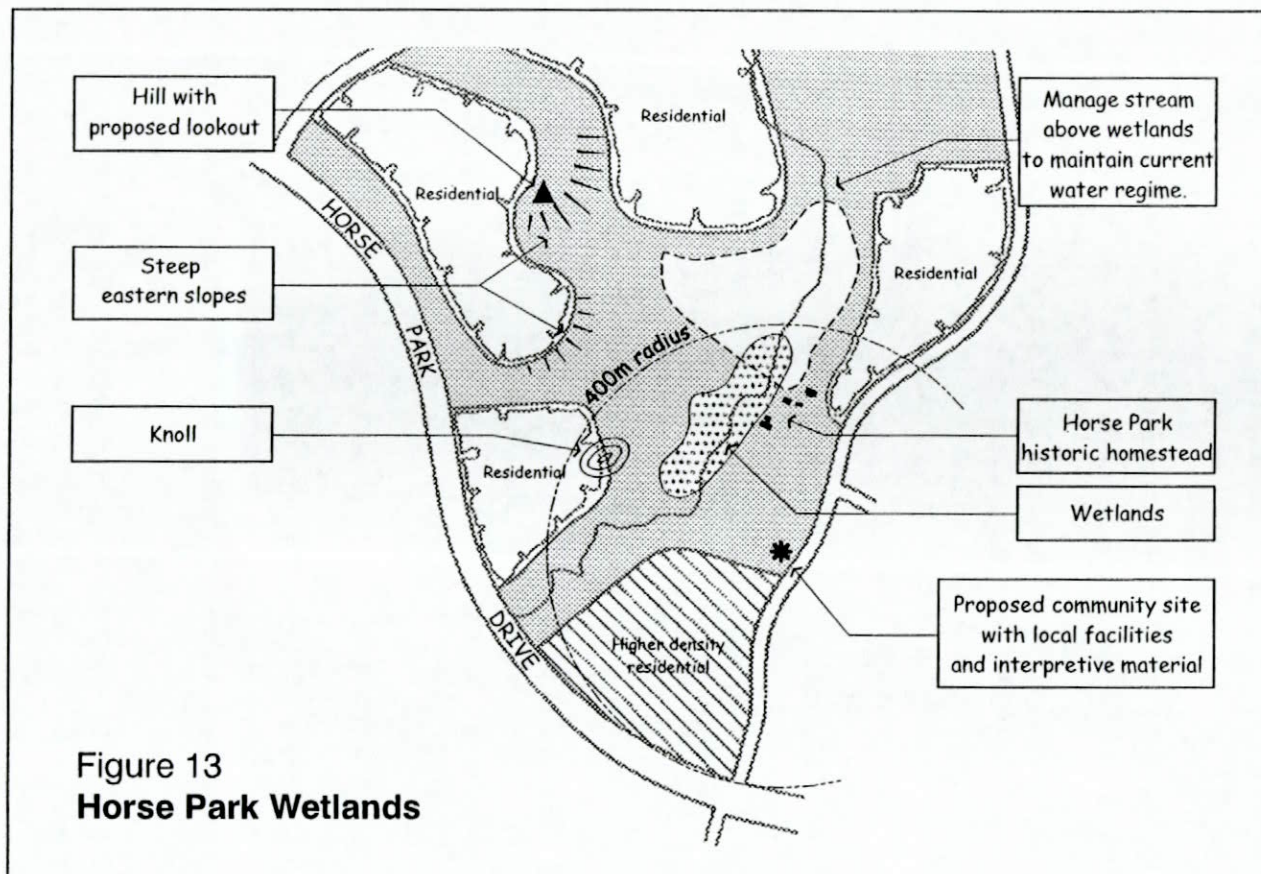
There are several slow draining areas that are of value as wetlands in the North Gungahlin area. The most significant of these is the Horse Park Wetland, adjacent to the Horse Park Homestead, see **Figure 13**. It was once part of a much more extensive wetland area that extended upstream and downstream of the present site and into an adjacent valley. The original extent of the wetland is recognisable as an area of slow drainage, where pasture modification has occurred but which still supports some native wetland plant species.

The Horse Park wetland is included as part of the listing of the 'Horse Park Homestead Complex, Sedgeland and Surrounds' on the Register of the National Estate (RNE). Listed on 15 May 1990, the statement of significance recognises the sedgeland as being of regional significance, being the best example of such vegetation type in the northern area of the ACT. It is also an important temporary wetland habitat in the region for waterbirds, including the migratory Latham's Snipe.

The curtilage proposed for the wetland covers quite a substantial area, though it does not appear to relate to any topographical feature or fence line. Since the date of listing on the RNE further ecological and cultural studies have been undertaken of the area, providing more detailed information on the values associated with the wetland and surrounds. The curtilage boundary will be examined further, in conjunction with Environment ACT at later detailed planning stages to ensure appropriate protection and management options for the range of values associated with the wetland and homestead area.

The Horse Park Wetland is included in "A Directory of Important Wetlands in Australia", published by the Australian Nature Conservation Agency in 1996. The most significant natural feature of the wetland is that it is a good example of a relatively intact, lowland, freshwater marsh with significant European and Aboriginal cultural values. The wetland is also an important habitat for Latham's Snipe *Gallinago hardwickii* which is one of the species subject to a migratory bird treaty between the Australian and Japanese (JAMBA) and Australian and Chinese (CAMBA) Governments. The wetland is dominated by *Carex* and *Juncus* species, and also contains Brownback Wallaby Grass *Danthonia duttoniana*, Buttercup *Ranunculus papulentus* and *Nymphoides crenata*, which are considered locally uncommon in the ACT.

The precinct containing the wetland has been nominated for the ACT Heritage Register but has yet to be assessed. The nomination takes into account the significant European and Aboriginal cultural values of the area, however a curtilage is not identified in this nomination. The area is also classified by the National Trust of Australia (ACT).



Other wetland and aquatic ecosystem habitat occur throughout the drainage lines in North Gungahlin. An area of swampy lowlands is located in Forde, to the north of Horse Park Drive.

(e) Wildlife

As mentioned above, ACT woodlands support a wide diversity of animals, in particular native birds. Key characteristics of these woodland ecosystems provide vital habitat for many of the 150 common and threatened bird species known to occur in and around the North Gungahlin area. The Mulligans Flat Nature Reserve, to the east of the proposed future North Gungahlin suburbs contains many of the known species that occur in the area, either as residents or summer migrants. The ACT Parks and Conservation Service have produced a brochure in February 2000 titled *Birds of Mulligans Flat* which contains a comprehensive listing of the native bird species known to occur in the Nature Reserve.

Action Plans address six bird species declared as vulnerable or endangered in the ACT, of which five have been recorded within the North Gungahlin area.

Action Plan No. 15 addresses the Hooded Robin *Melanodryas cucullata*, declared as a vulnerable species. It has been reported as being in decline in its known habitat range, and reported locally extinct in several areas of the ACT. Small groups have been observed in the grassy woodlands in the north of the ACT and Mulligans Flat, often with scattered Yellow Box or Blakely's Red Gum with long grass, low shrubs and fallen logs.

Action Plan No. 16 addresses the Swift Parrot *Lathamus discolor*, also declared as a vulnerable species. This species breeds in Tasmania and over-winters on the Australian mainland from April/May until October. Small numbers of the species have been recorded intermittently in the ACT, though not each year. They inhabit mainly dry open eucalypt forests and woodlands, usually box-ironbark communities and the Yellow Box/Red Gum Grassy Woodland community.

Action Plan No. 17 addresses the Superb Parrot *Polytelis swainsonii*, declared a vulnerable species in May 1997. Most recorded sightings of the species in the ACT have occurred in the Hall/Kinlyside area and Mulligans Flat Nature Reserve, during their spring-summer breeding season. They are sparsely distributed between the ACT and surrounding region, coinciding with Yellow Box/Red Gum Grassy Woodland communities.

Action Plan No. 18 addresses the Brown Treecreeper *Climacteris picumnus*, another of the bird species declared vulnerable in the ACT. Populations of this species occur in the northern part of the ACT, particularly in the Mulligans Flat Nature Reserve. The species is recorded as in decline since 1994, and has become locally extinct in some parts of the ACT. It is known to frequent drier forests and relatively undisturbed woodlands, where the native understorey, particularly grasses, have been preserved.

Action Plan No. 20 addresses the Regent Honeyeater *Xanthomyza phrygia*, declared an endangered species in the ACT and also nationally and internationally. Recorded occurrences in the ACT are located throughout Gungahlin and in the Mulligans Flat Nature Reserve. Once fairly common, it is now rarely observed in the ACT region, and thought to be in decline nationally since the 1920's. Locally, the majority of records of the species are from naturally occurring, flowering Yellow Box/Red Gum Grassy Woodlands in the northern parts of the ACT.

As mentioned above, the Horse Park wetlands are, in part, significant due to their habitat value for the migratory Latham's Snipe *Gallinago hardwickii*, a seasonal inhabitant of the wetlands. The listing of the Horse Park Wetland in the *Directory of Important Wetlands in*

Australia (2nd edition), ANCA 1996 claims that this wetland is possibly the most important site for this species in the ACT. The species breeds in Japan, and is an uncommon summer migrant arriving in south-east Australia from late August and remaining through to February. They are found in grasslands and sedgeland characterised by waterlogged depressions.

The Eastern Grey Kangaroo *Macropus giganteus* is abundant in the ACT and occurs in all types of grassy woodland on both rural and reserve lands in the study area. Other mammals typically found in ACT woodlands include the Swamp Wallaby *Wallabia bicolor*, Red-necked Wallaby *Macropus rufogriseus*, arboreal Brush-tailed Possum *Trichosurus vulpecula*, Sugar Glider *Petaurus breviceps*. The Echidna *Tachyglossus aculeata* is a known terrestrial woodland inhabitant in this part of the ACT. The Common Dunnart *Sminthopsis murina*, locally uncommon but widely distributed across south-east Australia, is known to occur in the Mulligans Flat area.

Three species of bats *Vespadelus vulturnus*, *V. regulus* and *Nyctinomus australis* occur in lowland woodland and use hollows have formed in the branches and trunks of trees.

Thirteen reptile species have been recorded in the Mulligans Flat area, including snakes, skinks, geckos, lizards and the Long-necked Turtle *Chelodina longicollis*, in addition to eight frog species. Of these the Black-headed Snake *Unechis dwyeri*, Shingleback *Trachydosaurus rugosus*, unnamed skink *Ctenotus uber orientalis*, Spotted Burrowing Frog *Neobatrachus sudelli* and Whistling Treefrog *Litoria verreauxi* are uncommon in the ACT.

Action Plan No. 7 addresses the Golden Sun Moth *Synemon plana*, declared an endangered species in the ACT. This species is recorded at Mulligans Flat North (Action Plan Site No. 6), though more extensive populations are known to occur elsewhere within the ACT, including Lawson, Majura Valley, Jerrabomberra West and the Mulanggarri grassland reserve. These locations are regarded as having higher conservation values that warrant protection as the higher conservation value sites. The species occurs in Natural Temperate Grassland, and sometimes in grassy areas within open woodlands.

Introduced species including foxes, rabbits, hares and several bird species have also been observed in the North Gungahlin area.

3.7 Climate and air quality

The climate of the Gungahlin area is similar to other areas of Canberra although there are local variations in rainfall, cold air drainage and wind patterns. The annual rainfall in the area is slightly higher than in adjacent urban areas, with highest monthly falls in spring associated with thunderstorms which often cause local flooding. Fogs frequently occur during winter, typically in the low lying valleys, grasslands and open woodland. Low lying flat areas with significant frost hollows occur along the lower Taylor creek line, at Horse Park Wetland, and at Amaroo below Horse Park Wetland.

Temperatures in Gungahlin in areas below contour level 640m are similar to those in the northern suburbs of Canberra. North westerly winds prevail throughout the year. One Tree Hill tends to shield the area from westerly winds.

The present air quality in North Gungahlin is very high due to the low intensity of existing development. The potential for urban development to impact on the local air quality is low as the area is relatively open and well ventilated. However, in winter months cold still conditions may lead to development of temperature inversions trapping lower quality air at ground level.

3.8 Infrastructure and services

The North Gungahlin area contains very few roads, unsealed minor roads servicing the rural homesteads providing the only access into the area. Several roads exist around the proposed new areas associated with existing suburbs of Gungahlin. These include Mirrabei Drive to the south of Moncrieff and a small section of Horse Park Drive adjacent to Casey. Gundaroo Drive to the east is an unsealed road providing access into NSW.

A number of arterial roads are proposed for North Gungahlin. They are planned and designed as two carriageway arterials, with the exception of a portion of Horse Park Drive, designed as a single carriageway. Cycle paths are in place in the existing areas of Gungahlin, and will connect into North Gungahlin.

Various traffic studies have been conducted in conjunction with earlier planning for Gungahlin, the town centre and the proposed Gungahlin Drive extension. The conclusion from those studies for North Gungahlin is the importance of encouraging greater use of public transport, for commuter efficiency and environmental benefits.

The proposed road system will meet demands from public and private transport to and from North Gungahlin, as well as within Gungahlin. There will be some congestion on arterial road connections from Gungahlin to the rest of Canberra during peak periods, as occurs on the existing road network across Canberra. Most of the road network functions, and will continue to function adequately during peak times.

Trunk sewers, stormwater management systems, trunk water mains, gas mains, trunk electricity mains and telecommunication mains are installed at the southern end of the Study Area. New development will link into and extend this existing infrastructure.

Gungahlin currently has two large water quality control ponds (Yerrabi and Gungahlin Ponds in the Ginninderra Creek catchment). The approach is for a combination of dry retention basins and larger water quality ponds. Further smaller, localised treatments within a linked watercourse park system allows for a number of other goals to be achieved, such as off-road bicycle paths, and the linking of wildlife corridors. In the Ginninderra Creek catchment, Yerrabi Pond and Gungahlin Pond were for other reasons made larger than necessary for water quality purposes, meaning the function and design of Horse Park Pond is now as a dry retardation basin. If wet retardation basins are built for urban reasons then care is required to maintain their water quality.

There is currently a large range of community facilities developed and operating within Gungahlin including schools, community halls, a youth centre, health facilities, recreation and sporting facilities. A number of community services and organisations operate from temporary facilities and private homes, including scout and guide groups and religious organisations.

A Government high school with associated district playing fields is developed in Nicholls to serve the Gungahlin district, and primary schools with adjacent neighbourhood ovals are developed in Nicholls, Palmerston, and Ngunnawal. One of the major innovations in the provision of community facilities is the co-location of primary and high school facilities and shared use of primary school facilities between government and non-government sectors at Nicholls. The Nicholls primary school is also co-located with other community facilities including child care. This is likely to act as a model for future provision of education and other community facilities.

3.9 Site opportunities and constraints

Due to its previous rural use, some parts of the North Gungahlin area have been degraded, but the natural ecosystems show evidence of regeneration. With varying degrees of significance, the main constraints in relation to future urban development of the area can be summarised as follows:

- shallow rocky soils in the northern upland valleys which may add to development costs and limit landscaping opportunities, even in terrain which is gently sloping;
- special challenges and risks due to slopes, terrain and soils in upland areas (high fire risk, erosion-prone soils, limited access, and increased servicing costs);
- the need to ensure the flow and quality of water entering Horse Park Wetland from future urban development in its catchment;
- the need to conserve significant vegetation and fauna habitat;
- the need to preserve the bushland periphery as a natural scenic backdrop to urban development;
- the need to protect significant heritage sites;
- the need to preserve significant landscape features; and
- areas of land below the 1 in 100 year flood level.

The significant opportunities in relation to future development of the area stem from the fact that it is a relatively large open area, and therefore capable of supplying affordable urban land for an extended period. The main development opportunities can be summarised as:

- the opportunity to preserve watercourses and use existing drainage corridors as linear stormwater parks;
- the opportunity for stormwater retention and management within public open space areas with a continuous pedestrian and cycle network and a variety of recreation settings, as well as on-site block retention;
- the opportunity to preserve a range of ecosystems and significant vegetation within public open space;
- the opportunity to preserve the bushland periphery as a scenic backdrop and recreation setting;
- the opportunity to take advantage of views from higher land; and
- the opportunity to form neighbourhoods shaped by landscape character areas.

There are other important opportunities that arise from the characteristics of North Gungahlin. In particular, there is the opportunity to:

- learn from the existing Gungahlin community about the performance of urban development to date and improve that performance in new areas;
- provide a wider range of housing choice and style of living; and
- incorporate high quality urban design principles in the built environment.

North Gungahlin also presents a very significant opportunity for applying sustainability principles. Careful planning and management are capable of converting many of the environmental constraints referred to above into valuable opportunities to trial highly self-contained development, and to implement best practice in areas such as water cycle management, energy efficient subdivision and housing design, electronic communications and reduced dependency on private transport.

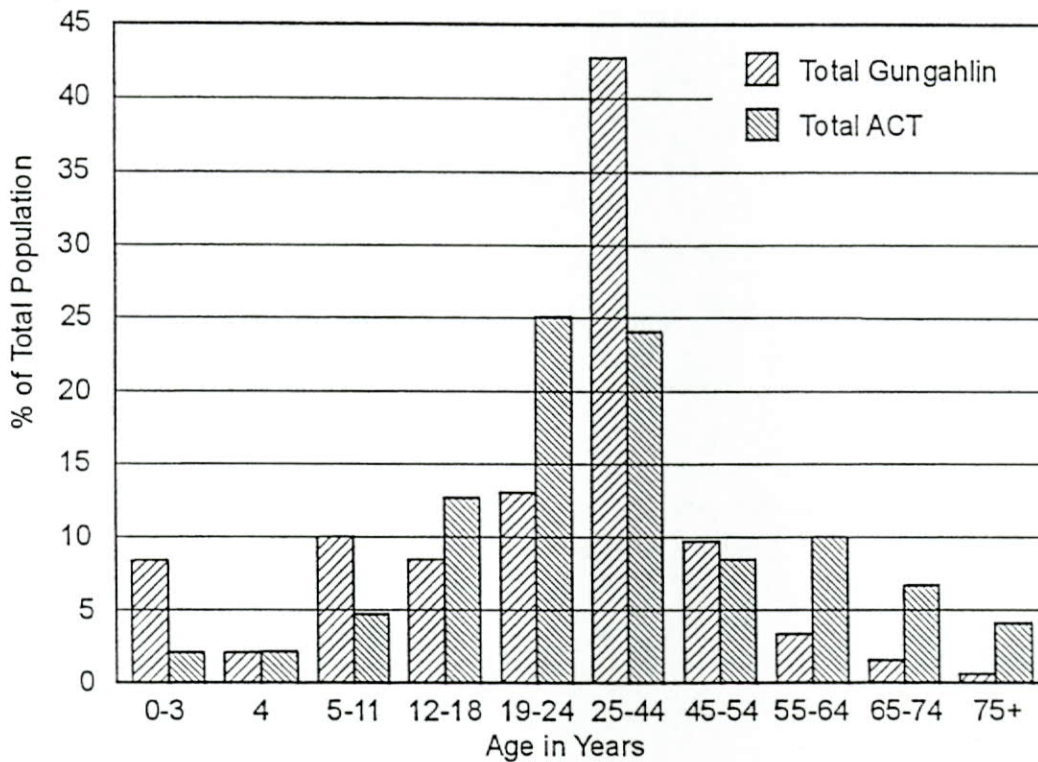
4. POPULATION AND EMPLOYMENT

4.1 Existing demographic profile

At the time of the 1996 ABS census, the population of Gungahlin was approximately 12,350 (about 4% of the total ACT population). By June 2001, the population had risen further to 20,800.

The age structure of Gungahlin in 1996 was weighted heavily towards the 25-44 age group, with corresponding high proportions in the under 12 age groups. There were also notably smaller proportions of older people aged 55+ than the ACT average. The median age of the population at June 1998 was 28.0 years compared to the ACT net age of 32.1 years (See **Table 4.1**).

Table 4.1 Gungahlin Age Structure 1996



Gungahlin age structure 1996

The principal demographic characteristics based on the 1996 census are summarised below:

- high proportion of people aged 25-44;
- high proportion of children;
- low proportion of people aged 55+;
- high proportion of couples without children;
- low proportion of single-person households;
- low proportion of public housing tenants;
- high proportion of middle-income households;
- high proportion of residents employed full-time;
- high proportion of households owning one or more cars;
- high proportion of people who speak a language other than English at home; and
- low proportion of Aboriginal or Torres Strait Islander people.