

Taylor

This is a large but, in topographic terms, relatively simple suburb which provides the some of the highest residential land in Canberra and occupies the north west corner of Gungahlin. It slopes west to east from the ridge which forms the ACT border. It has been possible to define two axis which give structure to the area; north-south from the high country north of Taylor with a line of sight to Black Mountain Tower and east-west from the lookout adjoining Horse Park Wetland to One Tree Hill. A local centre and a primary school, which connects via playing fields to a high school site and by linear open space to the ridge, wetlands and water management ponds east of Taylor. The group centre straddles a major road intersection between Taylor and Moncrieff and is adjacent to the school site. This area and intersection forms a major node in North Gungahlin and provides good connections back to central Gungahlin. A local precinct park contains mature and young elms and marks the site of a former European settler's home (see **Figure 38**).

Land Type	Area (ha) (approx)	Dwellings (approx)	Population (approx)
Residential @13d/ha & 2.6 p/dw	206	2680	6970
Urban Residential @20 d/ha & 1.8 p/dw	23	460	830
Open Space	48.0	-	-
Community Facility	10.6	-	-
Population Total			7800

Amaroo (Part)

The residential areas of Amaroo are now all released and largely developed. The Structure Plan proposes the development of the Amaroo commercial area, expanding to a group centre size over the next 20 years, to serve the wider catchment with retail and commercial uses once it is fully developed (see **Figure 39**). The Structure Plan also reflects the revised stormwater management approach with the replacement of the large water quality control pond with a small pond and dry retardation basin for flood mitigation purposes.

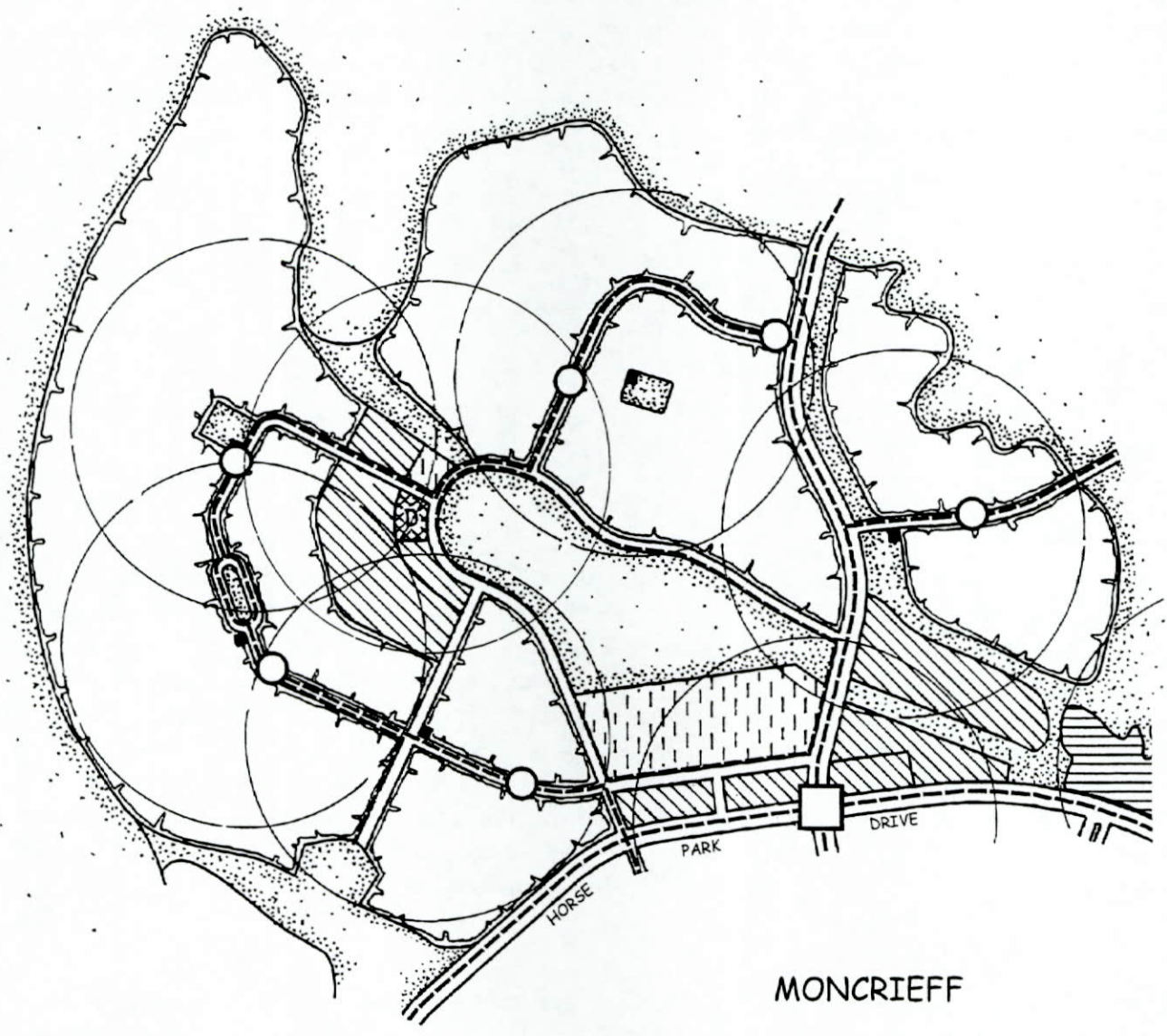
The Amaroo community precinct, although outside the study area, provides schools and ovals for communities in Amaroo, Bonner and Moncrieff. The precinct consists of a catholic primary school, government pre-school, primary and high schools, neighbourhood oval and district playing fields.

Ngunnawal (Part)

The northern portion of Ngunnawal is included in the Structure Plan. This area is undeveloped and the current Territory Plan indicates a group centre adjacent to Horse Park Drive. As this area will be close to the proposed group centre at Casey, the Structure Plan recommends that Mirrabai Group Centre be located further east between Moncrieff and Taylor and that the remaining part of Ngunnawal be available for housing (see **Figure 39**).

Land Type	Area (ha) approx	Dwellings (approx)	Population (approx)
Residential @13d/ha & 2.6 p/dw	34	442	1150
Open Space	4.1	-	-
Population Total	-	-	1150

LAND TYPE	AREA (ha) approx	DWELLINGS approx.	POPULATION approx
Residential @ 13dw/ha and 2.6p/dw	206	2680	6970
Urban residential @ 20dw/ha and 1.8p/dw	23	460	830
Open space	48		
Community facility	10.6		
Total population			7800



CASEY

MONCRIEFF

LEGEND

- Residential
- Higher density residential
- Open space
- Community facility (including schools)
- Local centre
- Water detention feature

- Possible community facility site
- Possible bus route
- Possible bus stop
- Possible bus terminus
- 400m radius - 5min walk

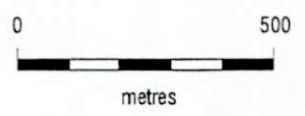
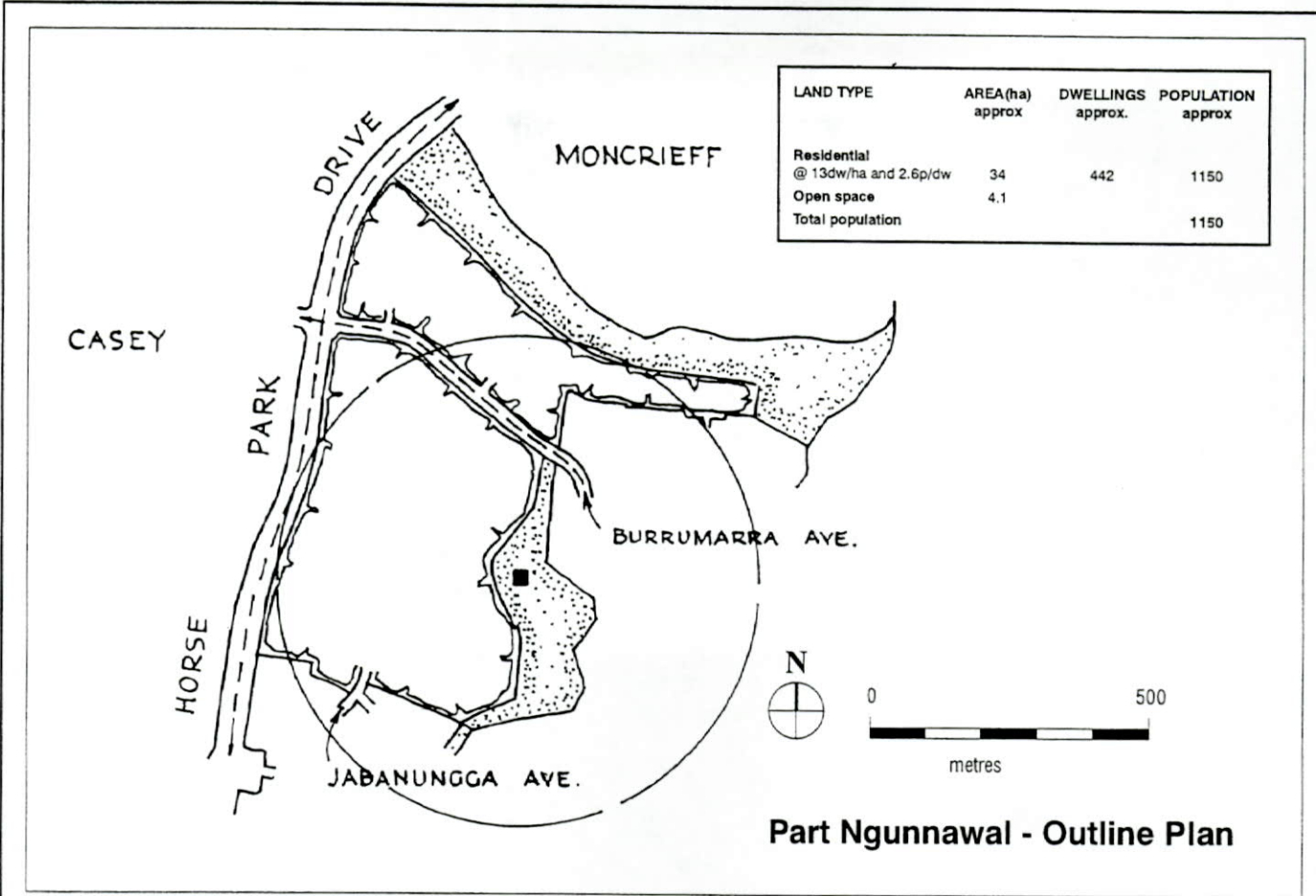
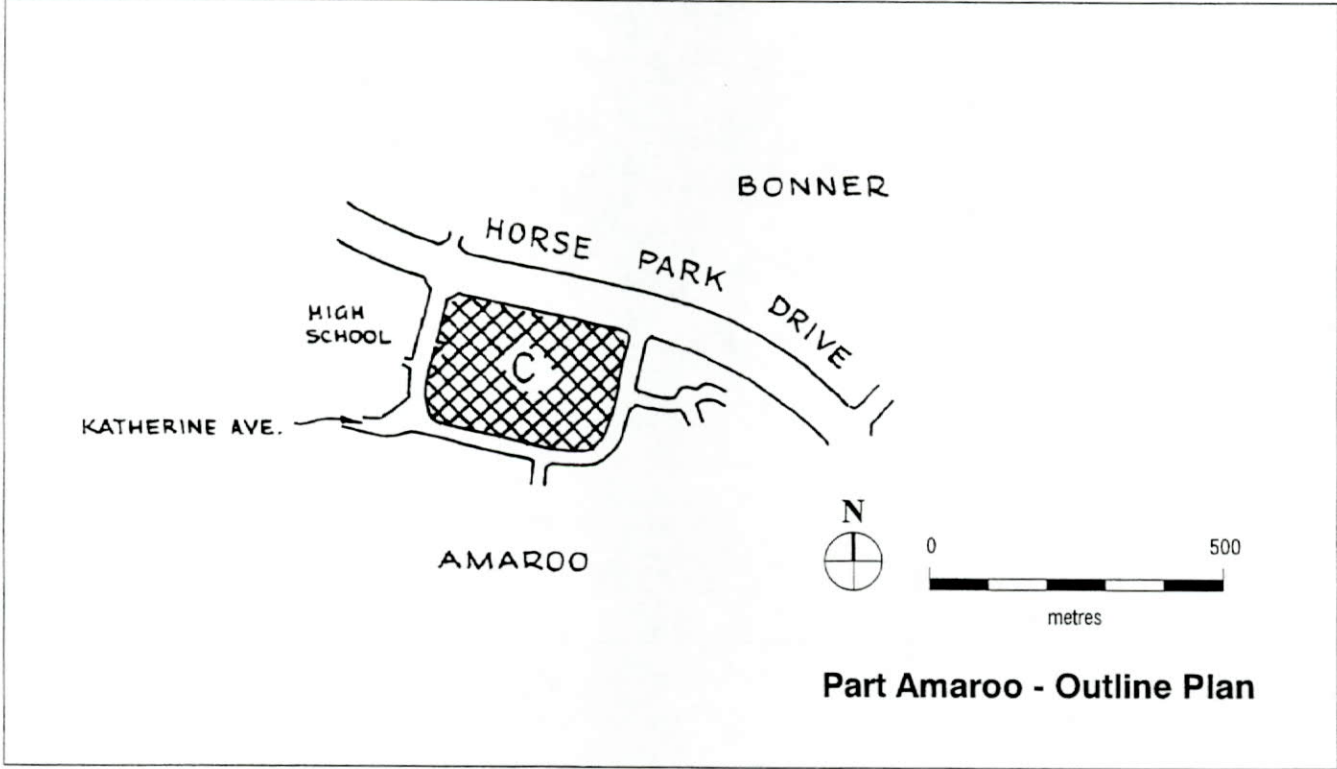


Figure 38
Taylor - Outline Plan














Part Ngunnawal - Outline Plan



Part Amaroo - Outline Plan

LEGEND

-  Residential
-  Water detention feature
-  Higher density residential
-  Possible community facility site
-  Open space
-  Possible bus route and stop
-  Community facility (including schools)
-  400m radius - 5min walk
-  Local centre
-  Bus terminus
-  Group centre

**Figure 39
Ngunnawal/Amaroo -
Outline Plans**

Residential Suburbs Strategy

Provide separately zoned areas of low density housing and concentrate medium density housing in areas which lie adjacent to local and group centres.

Provide for medium density housing to be urban in character, with streetscapes which link directly into the heart of each centre;

Allow subsidiary zoning (B8) for limited areas of medium density housing which may include commercial, community, and entertainment uses, in a form which fosters the adaptation of housing to incorporate other uses over time.

The draft Variation identifies the area as defined land in accordance with the provisions of the Land Act. The Defined Land process enables the Territory Plan to be progressively updated as the detailed designs for the area unfold. Detailed principles and policies for the development of the area are included in the draft Variation.

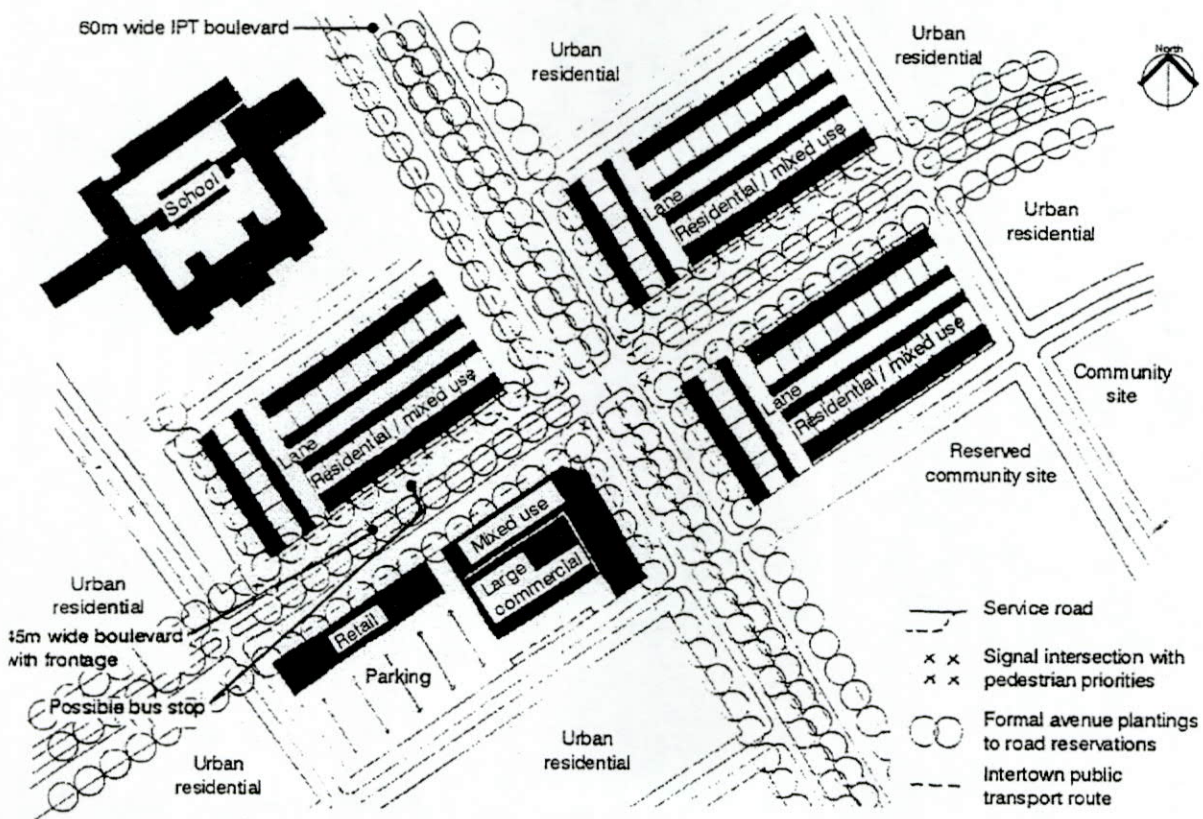


Figure 41 Indicative layout of the Taylor/Moncrieff Group Centre

10.3.4 Open Space and Landscape

A linear open space system is proposed which protects the natural drainage system, maintains and enhances existing landscape values, and provides recreational opportunities. This open space web creates the opportunity for a comprehensive off-road movement system suitable for pedestrian, cycle and equestrian use. An important feature of the open space system is that it has been designed to interlock with local centres, community facilities and bus stops to maximise connections and facilitate multi-purpose trips (see **Figures 14 and 16**).

The open space system is also designed to link all major nodes and most potential local focus points; incorporate nature corridors, green ridge backdrops and drainage lines; provide a central feature to each suburb; and include all major playing field and parkland sites.

The Structure Plan proposes a neighbourhood oval adjacent to each of the proposed primary school sites of Taylor, Jacka, Bonner and Forde, and district playing fields in Taylor and Jacka.

Urban development should be designed to address the open space system through the use of streets along the edges of parks, controls on fences and other planning controls which achieve greater community safety and reverse the perception of open space corridors in Gungahlin as "barriers". The August 1993 ACTCode is currently under review, and is expected to clarify procedures for resolving these issues. At the urban edge, cut-off drains and perimeter roads will be required to manage floods from open space up to and including the 1:100 AEP.

Within the urban area, a series of locations is proposed for permanent reservation as managed open space of various types. Many of these will require further investigation and refinement at later detailed planning stages prior to estate development. Additional local open space opportunities will be identified at this stage. Each open space element will contribute to future urban amenity, and will require specific and appropriate management policies. Major areas of open space identified in the Structure Plan include the major ridge dividing the suburbs of Taylor and Jacka. This ridge delineates these two large suburbs providing a green backdrop, and from certain angles a skyline to urban development. It also forms a natural corridor linking major non-urban land further north to open space systems within Gungahlin, providing opportunities for a nature trail to the high country and for a lookout on the eastern hill overlooking Horse Park Wetland.

Other major areas of open space proposed include major drainage lines, the escarpment which divides Amaroo from Moncrieff which continues the Taylor ridge open space corridor, remnant tree stands of woodland including the Yellow Box-Red Gum grassy woodland, water retention/water quality ponds which also create valuable urban/open space edges, other ridges and hills identified as landmarks, highlights or "separators" in the urban area and existing significant landscape features.

Within the suburb of Jacka, the Horse Park Homestead and Wetland area will be reserved by including it within a substantial area of urban open space, generally adopting the boundary identified in the Register of the National Estate (see **Figure 11**). The western boundary of this reserve will directly adjoin the Taylor ridge open space reserve. Further detailed investigation of the sub-surface water regime and options for stormwater management is needed to determine how this area should be developed and managed to protect the wetland without unnecessarily constraining surrounding land uses.

A lookout is proposed near the lower end of the Taylor ridge open space reserve, overlooking the Horse Park Homestead and Wetlands. This lookout will give people an opportunity to visit and better understand the future Gungahlin urban area, and provide a place early in its development for gatherings and celebrations.

The Structure Plan adopts the stormwater strategy as contained in the Gungahlin Policy Plan (1984) for a series of ponds. A study to coordinate Lake Ginninderra Dam PMF (Probable Maximum Flood) Protection with Gungahlin Flood Retardation Planning was completed June 2002, and may modify proposals in detail. In particular, the possibility of creating a single larger pond between Moncrieff and Taylor warrants further engineering and urban design investigation before later detailed planning for this area occurs. Where ponds have the dual role of catering for both water quality and visual amenity, the lakes formed for this purpose should have stabilised water levels, and developed landscaping and recreation features. It is not realistic to expect that these

lakes would have a sufficiently high level of water quality to allow their use for body-contact recreation.

The Structure Plan also removes a pond proposed in the original Gungahlin planning for north-west Amaroo, in accordance with the stormwater strategy. A dry retardation basin in this location remains the preferred option.

Open Space and Landscape Strategy

The policy is to balance the need to maximise both biodiversity and human use by providing an interlinked web of open spaces, which extends from the surrounding hills and ridges into the urban areas. The web should comprise dominant ridgelines, together with natural drainage lines, playing fields, and recreation parklands (including any associated conservation and heritage areas) to form an interlocking sustainable urban stormwater network, other public open spaces and ridgelines.

Major ridgelines should be restored as bushland settings, which define the visual boundaries and give a sense of containment and scale to residential areas.

Opportunities to be provided for small scale community facility sites in open space in convenient locations along public transport routes.

Areas used for active and passive recreation should be developed in a manner that maximises the potential for joint use of facilities: schools should co-locate together with neighbourhood and district playing fields and parks. Drainage lines should be utilised for cycle and pedestrian pathways or nature trails. Conservation and heritage areas should receive appropriate protection, while securing public and educational opportunities for access. Areas intended for high public use should be provided with clear points of access from major roads.

The category and layout of any new plantings shall be of a form which increases the potential gains to the biodiversity of the area as a whole.

10.3.5 Urban Edge Interface

Natural hazard planning for residential areas in the ACT has predominantly focussed on storm events. Strategies employed to deal with storm water in the planning of residential areas include detailed engineering investigation to inform the design of infrastructure for water volume and flow management, and application of policies such as the exclusion of buildings from the 1 in 100 year flood zones. In a similar way, planning needs also to consider bushfire hazard, particularly when new urban edge interface areas are created as the community continues to grow. The design of the interface is critical to the level of risk that is imposed on the community.

Recent bushfires both locally and regionally have demonstrated the potential for such events to occur in close proximity to residential areas, and the need for consideration of a range of prevention and management strategies in the design of new residential interface areas.

The principal objective when designing new residential areas that create urban/bushland interfaces, is to ensure that the level of fire risk is reduced at that interface, and that the level of fire protection is improved.

Protection of the community from bushfire impacts requires consideration and integration of four main strategies. These are:

- land use planning – urban edge treatment, edge roads versus side and rear fences, fence materials, landscape treatment and setbacks to building envelopes;
- bushfire fuel management – land management objectives, hazard reduction activities such as clearing and grazing;
- community awareness – creating a self help culture through awareness and education campaigns, landcare/parkcare groups, partnerships between the community and industry, ‘neighbourhood watch’ style programs; and
- response capability – land manager involvement, detection systems, communications and training.

To ensure that the level of risk from the threat of bushfire is reduced at the interface with the new suburbs, the Structure Plan recognises provision for buffer or fire management zones extending into the Hills, Ridges and Buffer areas to create a fuel load modified area between the residential and bushland areas. These zones may range from between 60m to 100m in width, depending on adjacent topography and aspect (see figure below). In addition to their function for fire management, these zones will also contain a service corridor which may include infrastructure services, access tracks for land management purposes, recreation trails, and catch drains for water management purposes in accordance with the Urban Edge Zone section of the Canberra Landscape Guidelines.

The Hills Ridges and Buffers land use area boundaries have been adjusted at the suburb interface to reflect more detailed planning and consideration of topographic features surrounding and within the new suburbs. Whether the interfaces are permanent or in transition, (ie the interface is only temporary due to further development) they will require different management applications to reduce the impact of bushfires on the immediate community.

These adjustments will continue to be made at later detailed planning stages, in addition to the inclusion of more detailed measures to minimise the effects of fire. These include ensuring that adequate reticulated water supply infrastructure for both domestic and fire fighting purposes is made available, that road design and location ensures multiple safe access and egress points for fire fighting and evacuation, and that the design and siting of buildings and proposed vegetation at the interface reduces the potential for increased fire risk.

Implementation of the other strategies such as bushfire fuel reduction would be reflected in a fire management plan prepared by the relevant land manager. Awareness and education strategies targeted at the resident population can be implemented as the community becomes established on these interim and final interface areas. The close proximity of the One Tree Hill fire observation tower to the west of the Taylor will ensure an immediate alert to any outbreak of fire in and around the North Gungahlin area.

Mulligans Flat Nature Reserve

The Mulligans Flat Nature Reserve abuts the eastern side of Forde and a northern section of Bonner. Topographical features of the Reserve include lower slopes, less treed than the higher sloping bushland interface with the new suburbs and is predominantly an easterly aspect.

To fulfil this important conservation requirement, the proposed buffer area for the urban interface will contain several elements to create an overall zone which fulfils both conservation and fire management requirements. The zone will include a fenced area of between 30m to 60m wide

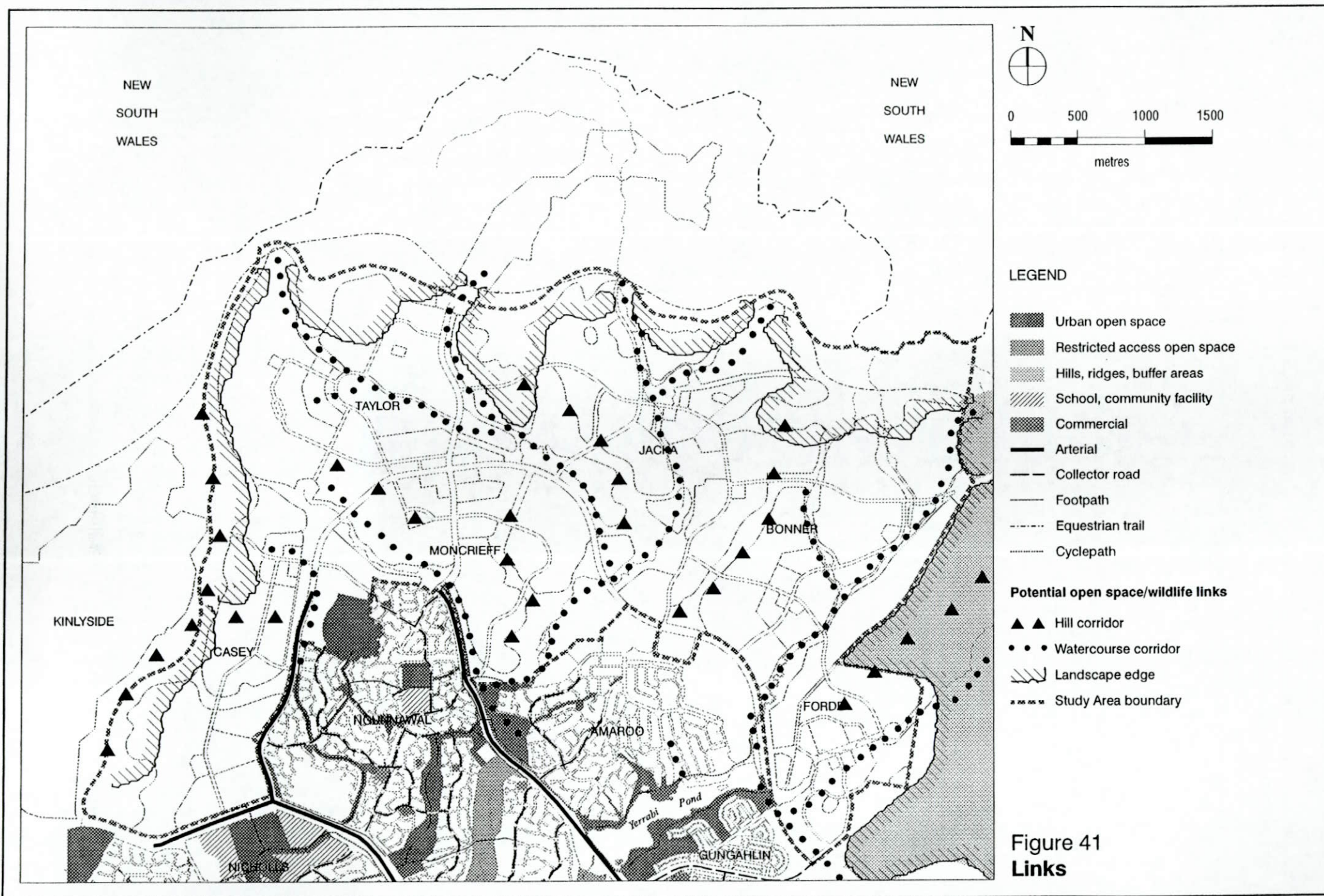
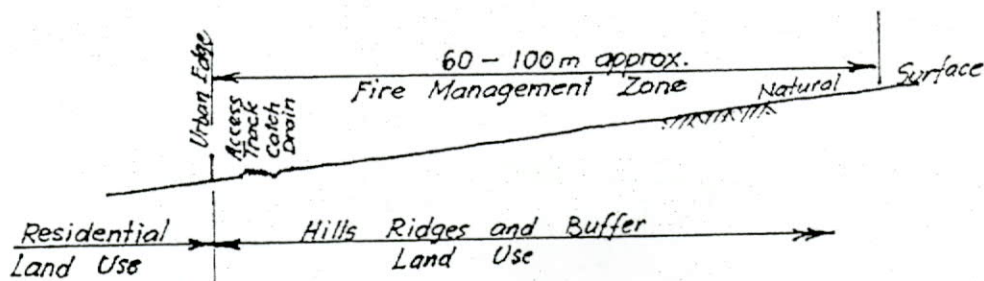


Figure 41
Links

within the standard buffer. This will create a higher maintenance conservation management area within the buffer area. This conservation management area will assist in reducing the potential impacts associated with nearby residential areas including the incursion of weeds, predation by domestic pets, dumping of rubbish, inappropriate access and removal of plants/timber. This buffer will also form part of the fire management zone, similar to that described earlier in this section between residential areas and Hills Ridges and Buffer land use areas or the Nature Reserve.



TYPICAL SECTION (Other Interface)

Equestrian Trails

An off-road trail for equestrian and other uses has been planned to follow the urban edge, linking up with the existing National Trail where it enters the ACT from NSW along Gundaroo Road, to the existing trail, showground and horse facilities at Hall. It will require the widening of the verge alongside Gundaroo Road where it passes adjacent to the Nature Reserve to accommodate the parallel trail, then follow the edge of the existing urban development, moving incrementally as the urban edge develops (see **Figure 41**).

10.3.6 Transport Network

Travel destinations will be more widely dispersed in North Gungahlin than in other areas of Canberra, resulting in increased trip lengths and therefore lower levels of pedestrian and cycle movement unless the preference of residents to drive can be effectively reduced by strong competition from public transport and other modes. As a result, the road network has been specially designed to support very high service standards using buses, and the pedestrian and cycle network has been designed to link residential areas with schools, suburbs and group centres, recreational resources, the public transport system generally, and the Town Centre (see **Figures 42 and 43**).

10.3.7 Roads

The road network has been established using a range of road types including arterial, boulevard, avenue, local road, minor road and laneways. A feature of the boulevards is the provision of service roads which allow for residential frontage but not necessarily access to these key roads. This approach achieves urban design objectives but may result in some increase in traffic noise which will be addressed if required in the design and development stage. Avenues are a smaller scale version of boulevards, without the service roads and catering to a lower vehicle capacity.

One of the two key roads for North Gungahlin is Horse Park Drive which provides the trunk route in and out of the area. It protects existing and planned urban areas from traffic infiltration and carries traffic to destinations outside of Gungahlin. It is supplemented by Mirrabai Drive which provides a direct connection from North Gungahlin to the Town Centre.

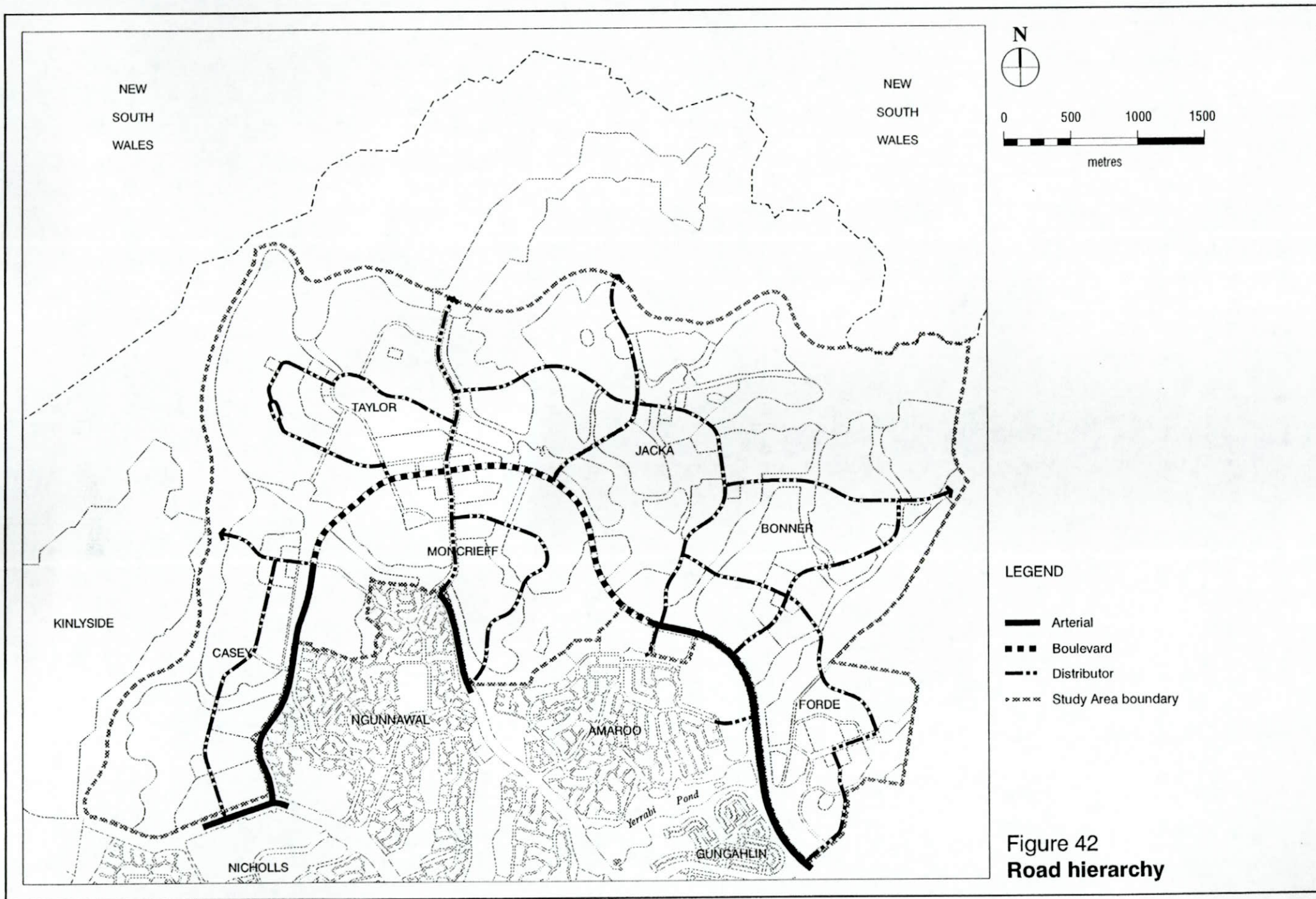
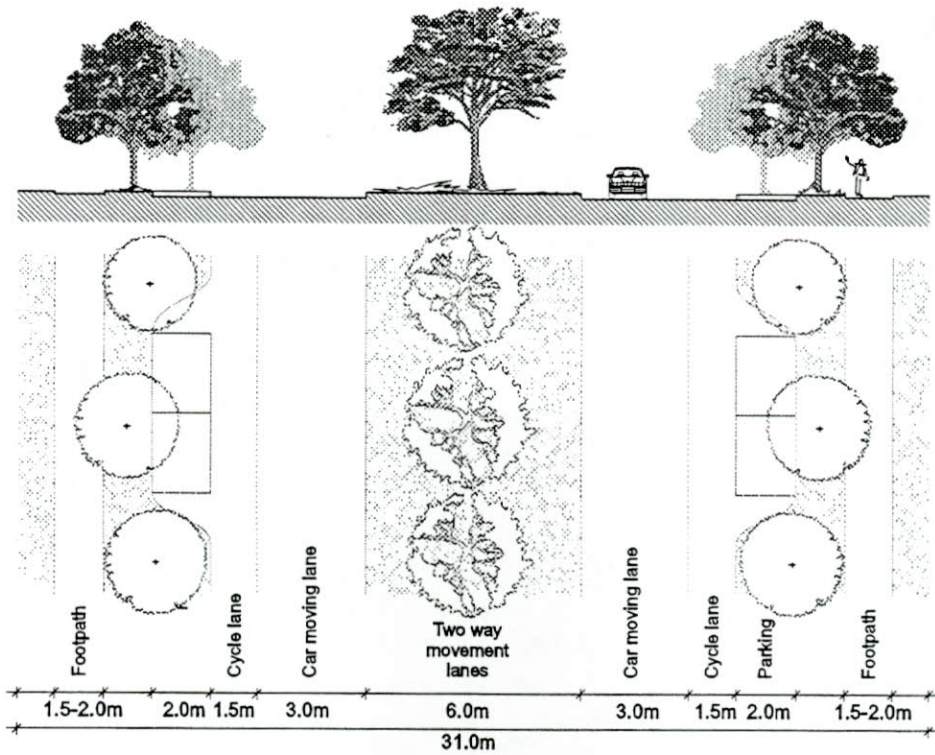


Figure 42
Road hierarchy

Boulevard - 31.0m wide (up to 20,000 vpd)



Boulevard with service road - 45.0m wide

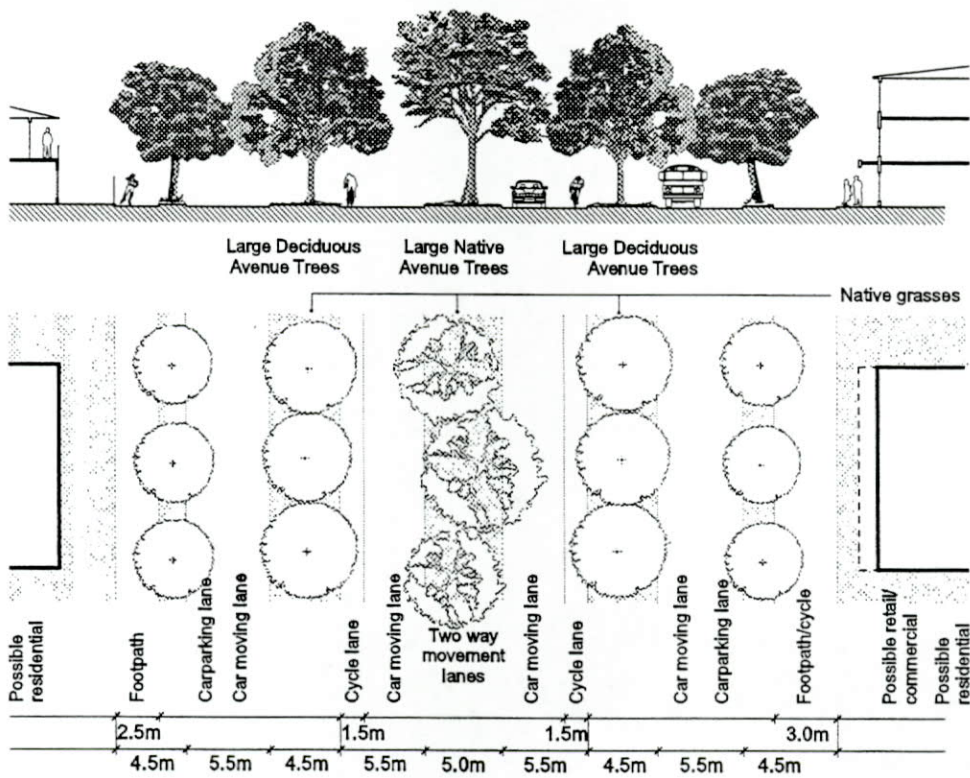


Figure 43
Typical street elements

A number of roads are effectively radial to Horse Park Drive to service proposed neighbourhoods. These radial roads in general will carry traffic volumes that will restrict direct frontage access close to Horse Park Drive.

Wells Station Drive will distribute traffic from Horse Park Drive, Flemington Road and the Hoskins Street extension to Gungahlin Drive (the primary route in and out of Gungahlin in the foreseeable future).

Intersections on key roads are proposed to be controlled by either future traffic signals or roundabouts. Traffic signals are proposed for all major intersections on Flemington Road to enable priority to be given to public transport movements in the future. Signals are also proposed at the mixed use centres for access to Horse Park Drive to improve pedestrian and cycle movements.

Roundabouts are proposed where pedestrian and cycle movements are expected to be low. The local road network generally has been designed to achieve the speed requirements under current planning controls. Road profiles have been prepared which demonstrate that there are no excessive grades or potential sight distance problems.

Roads Strategy

The level of road provision will provide for a component of public transport use. The road layout will connect the major arterials of Horse Park and Mirrabai Drives to a series of inter-linked sub-loops forming the sub-arterial and collector roads which serve each suburb. The system of major roads is to be designed to limit vehicle speeds, and to provide both access and settings of high amenity for the developments which front these roads.

Construction of new roads will provide adequate capacity for vehicle traffic on the assumption that up to 20% of total peak hour travel will take place using public transport. Public transport routes will use the inter-connected sub-loops of sub-arterial and collector roads. A dedicated IPT route will be located in the median of Mirrabai Drive. Interchange facilities will be provided at Mirrabai Group Centre. Park and Ride facilities will be provided at Horse Park District Park.

Suburban development areas are connected firstly to sub-arterial and then to collector roads. Arterial and sub-arterial roads will be designed as boulevards, with a consistent form of continuous verge plantings, and be provided with frontage roads, footpaths, and trunk cycle paths. Boulevards will provide access to fronting developments. The relevant indicative cross sections are illustrated in the diagrams.

Where warranted, intersections on the major roads will be controlled by traffic lights, with phased pedestrian crossings. Pedestrian and cycle movements will interconnect with off-road cycle and pathway systems adjacent to underpasses in the locations indicated on the diagram.

10.3.8 Public Transport

The Structure Plan strives to achieve increased public transport usage by increasing residential density around local and group centres and catering for bus services to terminate at these centres. A key public transport corridor is the Flemington Road IPT route through the town centre to Mirrabai Drive. This is located in the median of Flemington Road with stops only at key nodes. The future Gungahlin Drive extension from the Barton Highway to Belconnen Way may offer a complementary IPT route, especially for express commuter services.

The local road network has been carefully designed to maximise population within reasonable walking distances of likely bus stops. Current ACTION policy requires that 90% of the population lie within 500m of a bus route. The Structure Plan has aimed to achieve a very high standard of accessibility and aims for 90% of all dwellings within 400m of a potential bus route and 95% of all dwellings within 500m of a potential bus stop. (See **Figure 44**)

Public Transport Strategy

Public transport provision and urban planning measures shall be directed towards reducing the dependence on private vehicle usage. Measures that would support this objective include:

- *encouraging car pooling.*
- *providing dense nodal group and local centres.*
- *providing for Park and Ride facilities at bus layovers.*
- *Providing for mixed use and home business provisions around group and local centres.*
- *Providing, in the longer term, for express inter-town transport services.*
- *Preparing a Sustainable Public Transport Strategy.*

10.3.9 Cycleways, Pedestrian Pathways, and Equestrian Trails.

An extensive off-road recreation and cycle network has been designed which serves the proposed schools, together with the town centre, local and group centres. This network will continue to be further refined as additional information about the local user needs and provision types becomes available. An on-road cycle network has also been designed which serves the main employment centres and connects to the intertown routes (see **Figure 45**).

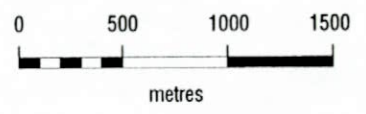
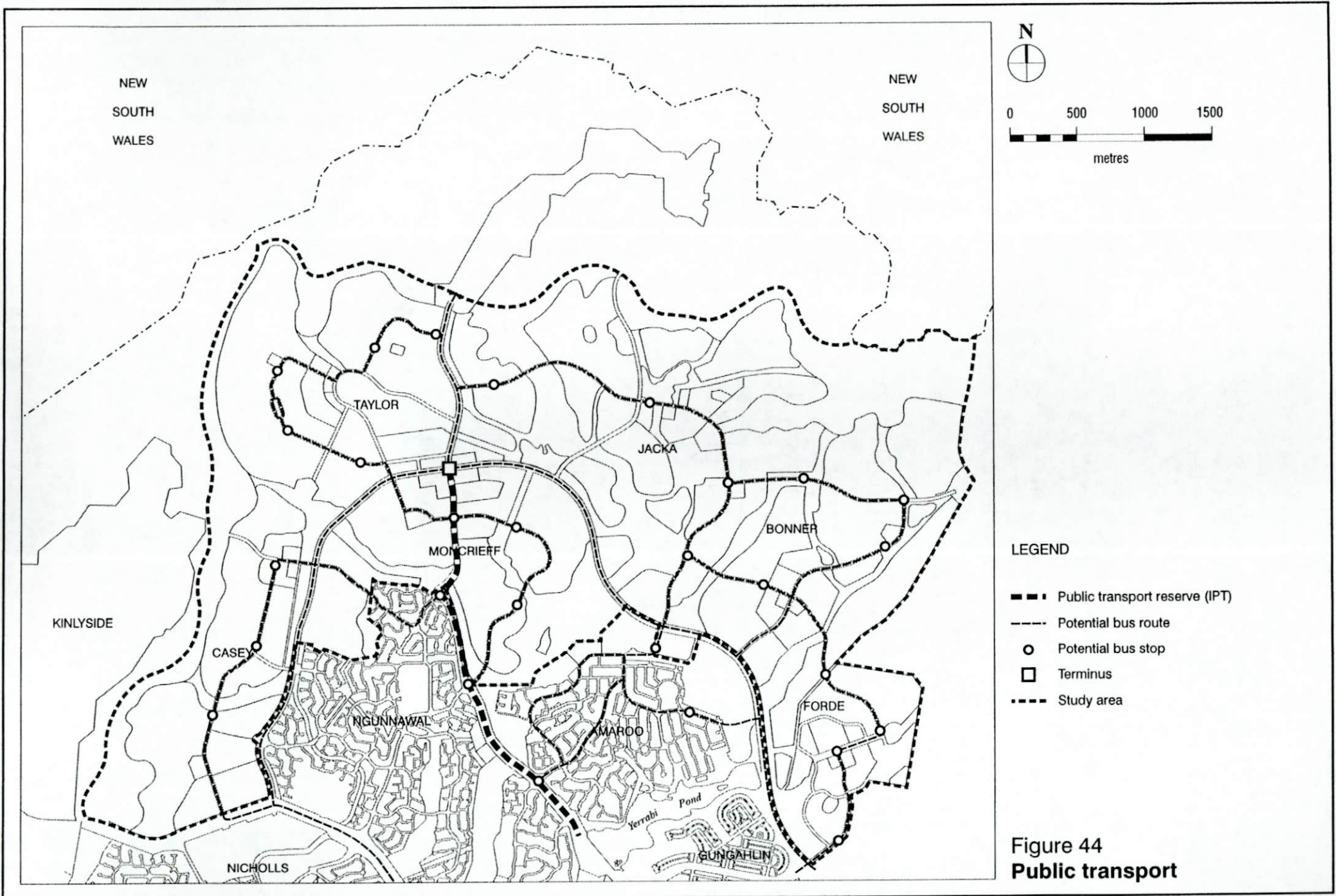
The off-road system provides for a minimum of three underpasses along Horse Park Drive. Other road crossings are proposed at grade.

Australia's National Trail route is the longest marked equestrian route in the world. It extends 5,330 kilometres in length from Cooktown in North Queensland to Healesville in Victoria. It attempts to follow fire trails, country roads, stock routes, and historic wagon trails where possible.

An off-road trail for equestrian and other uses is intended to follow the urban edge. It will link up with the existing National Trail entering the ACT from NSW in the north-east, to the existing trail, showground and horse facilities at Hall to the west of North Gungahlin. It will require the widening of the road reserve alongside Gundaroo Road through the Nature Reserve to accommodate the parallel trail, then follow the edge of the existing urban development and will move incrementally as the urban edge develops (see **Figure 41**).

This urban edge trail will function both as a local equestrian trail and as section of the National Trail. Future planning studies will investigate opportunities for further development of recreation/equestrian trails in North Gungahlin, including the possibility of trails extending into the Hills, Ridges and Buffer areas.

The retention of the Gundaroo Road alignment in open space and as part of the interface between Forde and Mulligans Flat will create an opportunity to incorporate the trail into the off road pedestrian and equestrian trail system.



LEGEND

- ■ ■ Public transport reserve (IPT)
- - - Potential bus route
- Potential bus stop
- Terminus
- - - Study area

Figure 44
Public transport

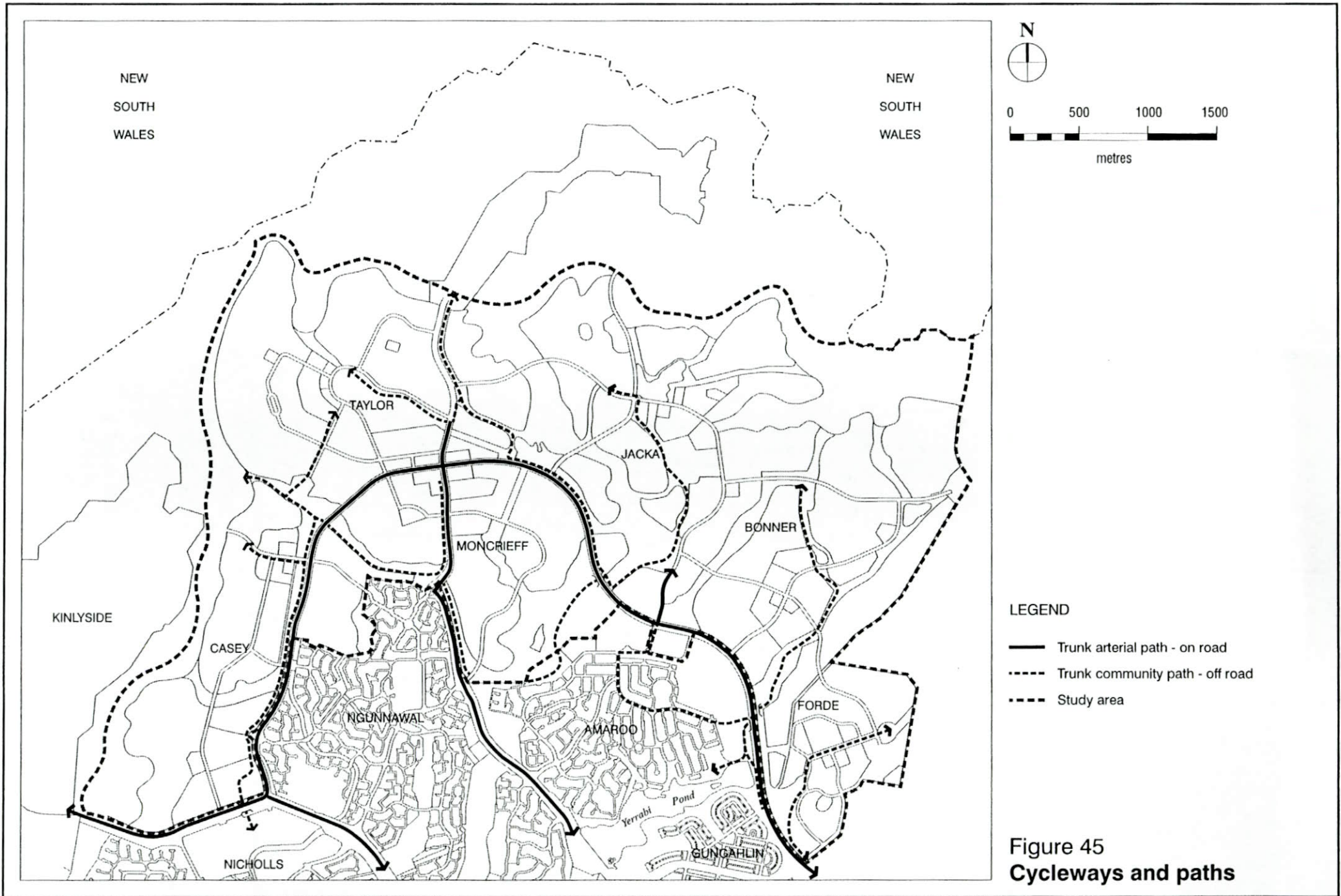


Figure 45
Cycleways and paths

Pathways Strategy

Provide a predominantly continuous off-road system of cycle and pedestrian pathways, and equestrian trails. Provide for other local and long-distance trunk commuter cycling to take place on cycleways located within road reserves.

The off-road system will be designed to provide for both pedestrian and cycle paths connecting to each suburb, to all centres, and to district parklands. This system shall be primarily designed for leisure use and for cycling to schools. Provide underpasses to Horse Park Drive at the district parks located immediately to the north of Amaroo.

The on-road commuter cycle system locates cycle paths on the verges of the arterial and sub-arterial boulevards.

A system of pedestrian and equestrian trails shall provide access to the hills and ridges which lie outside the urban area.

10.3.10 Urban Structure Summary

The policy on urban structure represents a summation of all the elements outlined in this section.

Urban Structure Strategy

The Strategy is to provide an urban structure which provides a clear and efficient arrangement of urban areas, open spaces, community facilities, and major infrastructure, reinforcing the main natural systems and transport links.

Site local parks to allow the inclusion of community uses, in locations at natural service catchment or topographic features. They should be visible and accessible from collector roads.

Suburbs shall have local centres which co-locate primary schools, playing fields, and parklands; together with medium density, community facilities, aged, or other special purpose housing.

District facilities should provide for the co-location of high and other primary schools, district ovals and parks, and more extensive areas of commercial uses and medium density housing.

The local and group centres shall exhibit high quality urban design, and be closely allied to the provision of public transport. Open space shall interface as directly as possible with all centres.

10.4 Additional infrastructure

The size, location and cost of infrastructure services are dependent on the total estimated population, population density, topography, spatial distribution and type of urban development. Within the time frame for the development of Gungahlin, technologies and the way people live will change and affect the use and possibly the performance of infrastructure.

Efficient urban development requires the coordinated provision of infrastructure. Engineered infrastructure tends to involve "lumpy" investment, in that the systems are usually constructed in stages, each stage providing capacity levels which may take many years to fully utilise. Infrastructure planning aims to program construction to closely match the expected completion rates of houses. Provision of individual services to houses and businesses also needs to be coordinated so that all essential services are available from occupancy.

In the past decade, infrastructure provision has been a major focus for Governments seeking to improve efficiency and deliver better outcomes for consumers. Increasingly, infrastructure is being funded by developers and government providers are being privatised. Competition between providers and deregulation of the gas and electricity industries will affect the provision and cost of services. Infrastructure planning for North Gungahlin must ensure flexibility, in terms of various development scenarios and in terms of future providers.

10.4.1 Water supply

There are currently four water pressure zones with the following top water levels (TWL):

Super high zone	TWL 760m
High zone	TWL 715m
Intermediate zone	TWL 685m
Low zone	TWL 652.5m

When fully developed, it is expected that all 'intermediate zone' development in North Gungahlin will lie within 6 km of a proposed reservoir. However, because inlet/outlet mains are incorporated in this zone, the expected slope of the gradeline for this development will be flatter than normal. Currently the Nicholls reservoir is operational and is intended to serve the western half of the Study Area. The eastern half of the Study Area will be serviced by the future Gungahlin 3 reservoir located adjacent to the proposed suburb of Throsby. Until this reservoir is built there will be limitations on the development of higher areas of Amaroo, Forde and Horse Park due to the long pipe runs from the Nicholls reservoir and hence large losses in water pressure. Ultimately, Elmsgrove 1 Reservoir may also need to be constructed to maintain peak hour pressures in the Bonner and Jacka areas.

In general the 'intermediate zone' reservoirs can service residential developments up to two storeys high on land up to RL 650m and commercial development on land up to RL 640m. Closer to the reservoirs, higher land can be serviced.

For the 'high zone', all development lies within 3 km of either of two proposed reservoirs - Kinlyside and Elm 2. In general the high zone reservoirs can service residential developments up to two storeys high on land between RL 640m and 685m, and commercial developments on land between RL 640m and 675m. Once again, closer to the reservoirs higher land can be serviced due to hydraulic gradeline being higher closer to the source.

For the 'super high zone', there is only one reservoir, Taylor, which services development up to 4 km away. In general the 'super high zone' reservoir can service residential development up to two storeys high on land between RL 685m and 720m and commercial development on land between RL 685m and 710m. Again, closer to the reservoir higher land can be serviced.

10.4.2 Sewerage

North Gungahlin is located in the upper areas of the Lower Molonglo Treatment Plant catchment and is made up of a series of small sub-catchments. This means that the trunk pipe systems are relatively small and located adjacent to the floodway systems.

In the majority of the network the proposed pipe sizes can cater for both a low neighbourhood density (ie. 10 dwellings per hectare) scenario and a higher neighbourhood density (ie. 15 dwellings per hectare - note: this will cater for the net residential density of 20dw/ha around neighbourhood and group centres and 13dw/ha elsewhere) scenario. In about 10% of the network (mainly associated with the Mirrabei Drive system) selective upgrading by only one pipe size can allow for all development scenarios to be accommodated economically.

However, upgrading pipe sizes would create problems downstream for sections of the system in Belconnen which would then be undersized. To compensate for this, ACTEW is developing a strategy for the installation of attenuation tanks which could be later converted to online package treatment plants in suitable locations. Suitable locations are sites adjacent to open space where the treated effluent can be used to irrigate playing fields.

For the North Gungahlin area it is recommended that the trunk sewer system not be over sized and consideration be given to the implementation of more sustainable systems such as online package treatment systems.

10.4.3 Sustainable Urban Stormwater Management

Stormwater runoff from urban areas, both during the development phase and after completion, can have a significant negative effect on downstream water quality and stream ecology. The North Gungahlin development area occupies a significant part of the Ginninderra Creek catchment, and unless appropriate measures are taken, could impact on the water quality of this creek and the receiving waters of Lake Ginninderra and ultimately, the Murrumbidgee River.

Recent research¹² and a better understanding of catchment land use and management practices since the initial planning of Gungahlin has identified more sustainable management practices that improve water quality in receiving waters, enhance ecological values and amenity, reduce potable water demand, and potentially provide long term cost savings.

Sustainable urban water management design principles are to be adopted for the development of North Gungahlin. The principal objective is to advance economic, social and environmental benefits of integrated 'water in the landscape' (including water sensitive design techniques) and 'total water cycle' based designs to achieve a better balance of water across the landscape, at the block, neighbourhood, district and catchment levels. Where possible, stormwater will be exposed and integrated in the landscape, rather than piped as a hydraulic system or restricted to a concrete stormwater channel. This will provide habitat for flora and fauna, improve water quality through filtering by vegetation and soil, maintain groundwater levels low enough not to impact on building foundations, reduce the need for irrigation of the landscape from the potable water supply, enhance urban design, and provide recreational opportunities.

Sustainable urban land and water management principles for North Gungahlin aim to secure urban forms and infrastructure arrangements which:

- Yield substantial improvements in ecological sustainability;
- Provide a choice of residential land and housing opportunities and identity;
- Provide special quality of life opportunities, through integration of quality landscapes and open space, and access to recreation facilities and employment and service centres;
- Offer economies in development and recurrent costs; and
- Are without detriment to market value of blocks (lifestyle choice, landscape quality, accessibility, image).

There are four urban land use categories and associated landscape levels for which a range of measures can be applied to achieve the implementation of sustainable urban water management design principles in North Gungahlin. These are:

¹² Integrated Urban Land and Water Management Workshop Report, September 2000, Ian Lawrence CRC for Freshwater Ecology

- The block landscape level;
- The neighbourhood level;
- The major movement/drainage links and their landscape corridors; and
- Receiving waters and their floodplain corridors.

PALM is currently undertaking a study to determine a number of new initiatives in line with the concept of sustainable urban water management that will ultimately be adopted as ACT design standards. Examples of techniques to apply at the estate and block level could be grassed or planted swales for drainage, wetlands and ponds, pervious paving areas, and rubble traps to receive run-off from housing roof structures.

Sustainable urban water management measures within the development area will be adopted after consideration of the overall benefit of each element, considered in a holistic way in conjunction with all planning, environment, social, public risk, economic and maintenance issues. Given that the urban area which is the subject of the Structure Plan is of a similar size to that shown on the current Territory Plan and assessed as part of the 1989 Gungahlin EIS, impacts on water quality will not be exacerbated by the proposals contained in the Structure Plan. On the contrary, adoption of the proposed guidelines and continued implementation of sustainable urban water management techniques will ensure reduced impacts by development on flow rates and water quality within and downstream of North Gungahlin.

10.4.4 Energy and telecommunications

The energy services which exist in Gungahlin are electricity and gas. The Gungahlin telecommunications masterplan (mobile telephone infrastructure) is currently being reviewed. Current electrical, gas and communications master planning remains valid and the Structure Plan does not affect these.

A major telecommunications firm has constructed an exchange in Mitchell to service the whole of the Gungahlin area, using optical fibre technology. This, together with spare capacity at the Spence exchange, can accommodate a significant increase in population over and above the estimate of 100,000 used for infrastructure planning.

Information technology is closely linked to telecommunications, as growing numbers of people seek access to the Internet from home, and as more people choose to work from home using home computers and fax machines. The optical fibre technology installed enables future growth to be accommodated.

10.5 Sustainable Development

The General Principles and Policies (Part A) of the Territory Plan have been adopted through Variation No. 155. The intention is to more clearly reflect current and contemporary policy directions, focusing on the central themes of sustainability and design quality. Sustainable development requires conservation of resources as well as achieving a balance of economic vitality, community wellbeing and environmental quality. A sustainable position on urban development requires a collaborative approach between government, business and community, improving economic opportunities; working towards an equitable, co-operative society; and respecting ecological systems through reduced pollution of the land, water and air.

The achievement of sustainable development outcomes is a blend of forward planning, ongoing management action, and monitoring. The basis for good outcomes is rooted in the Structure Plan, which has arranged the disposition of open space, land uses, and transport. This will foster protection of the natural environment allied to enhancement of biodiversity. It provides a sound

basis for high amenity and liveability in the urban environment. It fosters the development of community identity supported by good social services and places that can develop well-loved qualities; and it represents a duty of care towards the disposition of public and private capital, creating urban settings which are well-considered, and which have a natural robustness to cope with the differences of emphasis that the future might bring.

Ongoing management of the area requires, firstly, that the overall metropolitan systems of waste and energy use are effectively managed. This especially applies to the transport sector, where major reductions in greenhouse gases brought about by increasing public transport use can only be achieved by supportive management of travel demand (eg increased pricing of parking – including Commonwealth employment - in Central Canberra). In addition, improved policies on the recycling of waste water, on construction, and other features are required.

Many of these initiatives are already in train, and the recent release of the publication “Designing for High Quality and Sustainability” by PALM 2001 aims to incorporate new procedures into the development process.

Sustainable Development Strategy

In realisation of the Structure Plan, action should be directed towards achievement of sustainable development outcomes.

Management plans shall be provided which balance protection/conservation, heritage, and public access to open spaces.

Provide for the conservation and enhancement of local biodiversity through restoration and management of natural habitats. Existing trees, including those planted in recent years by rural lessees, shall be retained wherever possible. Public involvement in bushland restoration shall be fostered.

Minimise water consumption by developing a system of sustainable urban stormwater management at the block and neighbourhood level, involving use of detention and irrigation systems.

Design all storm water systems to maximise storm water infiltration and protect down stream water quality. Designs for flood channels shall follow sustainable urban stormwater design principles, and be of a form which fosters safe public use of these open spaces.

Develop and monitor energy use targets for the building and transportation components of the Structure Plan. Define greenhouse gas savings resulting from these initiatives.

Advance best practice outcomes in all deeds for estate and centre development. Encourage leaseholders to contribute to the standard of provision and use of public spaces.

10.6 Issues to be resolved in later planning and estate development stages

Structure planning is necessarily a fairly broadbrush process, and more detailed planning will take place as areas of land are identified for release. At the broader scale, it is not possible to resolve many of the details relating to ecological values, but those areas where further investigation will be required and resolved at later detailed planning stages include:

- The upper edge of Casey, taking into account the extent and nature of future development in the Kinlyside area on the western side of the ridge.
- The woodland corridor connecting the ridge above Casey with the woodland along the old road corridor beside Horse Park Drive
- The northern edges of Taylor and Jacka where development is proposed to extend into regenerating forest and woodland, and into eucalypts plantations
- The Broadacre Land Use Policy as indicated on the Territory Plan
- Hilltop open space area in Moncrieff, which contains a plantation to the north of the hill and regenerating woodland on the southern slopes.
- The area surrounding and upstream of the Horse Park wetland.
- The extent of development into steeper slopes to the north of Bonner and Jacka.
- A grassland area near the current entrance road to Horse Park Homestead
- An open space corridor along the creek downstream of Horse Park Wetland, including aquatic habitat along the creek and woodland on a steep ridge to the west.
- The survey of significant trees for incorporation into the urban fabric where possible throughout the area.

There will also be other opportunities for conserving individual or stands of trees or smaller areas of habitat, particularly in areas of lower density residential where the opportunity to adjust the structure planning is more flexible within urban open space areas and other sympathetic land uses. More detailed ecological analysis of tree condition and groundcover will be required as part of the ongoing planning process.

APPENDICES

APPENDIX A

SUMMARY REPORT OF WORKSHOP A

SUMMARY NOTES OF COMMUNITY WORKSHOP HELD ON 4 APRIL 1998

AT GOLD CREEK HIGH SCHOOL LIBRARY, KELLEWAY AVENUE, NICHOLLS

SESSION 1

QUESTIONS PUT TO THE COMMUNITY

Q1: What do you like most about Gungahlin in terms of.....?

Q2: What do you like least about Gungahlin in terms of.....?

Q3: What are the critical things to include or exclude in future planning?

The workshop was divided into six groups for session 1. These six groups discussed the above questions with a focus on transport and movement, community facilities and centres, residential environment and community safety, community values and character, and environment and open space. A summary of the major issues raised is provided below. A full transcript of the issues raised by each group is at Attachment A.

In summary, the cross-cutting subjects are:

Positives

- Proximity to Civic, Belconnen, Mitchell appears to be a major reason for moving to Gungahlin - travel times, distances and convenience
- Sense of community spirit and of participating in the planning and development of their own area was mentioned by groups as a positive feature of living in Gungahlin
- Landscape and views: rural, water and grassland views were frequently described as a positive feature that may be threatened as Gungahlin grows
- Pedestrian/cycle path connections to shops were cited as a positive feature of the planning of Gungahlin
- Subdivision layout: cul-de-sacs were valued by groups for their contribution to a sense of community, safety for children, a quiet environment and a sense of place
- Social interaction and friendliness were cited as a positive feature of living in Gungahlin, but participants expressed doubts about whether this would last or whether it was a transitory benefit associated with the pioneer phase of development
- Preservation of heritage sites was stated as being a positive feature of the planning of Gungahlin
- Availability of a range of block sizes was viewed positively.

Negatives

- The road system in general figured heavily in the discussion of things about Gungahlin which residents didn't like: narrow roads, roundabouts, street lighting, traffic lights, traffic noise, traffic speeds, trucks, unsafe crossings
- Public transport was criticised as inadequate, slow and often inaccessible
- Parks and open space: groups complained about a lack of suitable open space for ball sports and other recreational activities, too few parks and too few large trees
- Landscape and waterway protection: complaints were received about inadequate maintenance of grasslands, trees and open space areas, inadequate control of runoff, and of buildings being too close to ponds and lakes
- Links: groups objected to poor links between suburbs and between open space areas
- Lack of facilities within Gungahlin to date and reliance on external facilities was repeatedly mentioned, but participants were clearly looking forward to the town centre being developed

- Developers were strongly criticised for failing to meet their obligations to provide infrastructure and for being greedy, and government agencies were criticised for failing to enforce the requirements
- Development impacts: groups disapproved of land clearing (destruction) and construction (disruption)
- Residential estates with imposing entries were criticised for creating barriers within the community
- Lack of architectural variety and streetscape monotony were criticised
- Narrow side setbacks and high plot ratios on small blocks were seen as a problem but the nature of the problem was not clearly identified
- Lack of a police presence was cited as a problem (concern about burglaries was mentioned)
- Location of a youth drop-in centre at the Ngunnawal shops was seen as a problem in that it was regarded as generating anti-social behaviour and leading to older people feeling unsafe
- Lack of attractions for teenagers/young adults was repeatedly mentioned, but was viewed as a Canberra-wide phenomenon.

Q1: LIKES

TRANSPORT & MOVEMENT	COMMUNITY FACILITIES & CENTRES	RESIDENTIAL & COMMUNITY SAFETY	COMMUNITY VALUES & CHARACTER	ENVT & OPEN SPACE
Pedestrian system OK	High position in Palmerston - can see around	Own house	Small house blocks - meets needs of smaller family size Physical layout of streets	Beautiful view down creek valley
Good cycle/pathway system	Mix of country and city	▸ Proximity to Civic, Showgrounds, Belconnen, Mitchell - convenience		Concept of ponds and green ways to join suburbs - important to link so open space is used by everybody Yerrabi Pond unspoilt, nice to walk around, will be even better with planting Openness of Gungahlin
Quality of paths good	Can see cows and sheep	Newness, freshness, cleanliness	Mix of house block sizes - suburban and cottage Opportunity for town centre to be developed better based on experience of past - better quality of life and hope of improved house prices	
No through traffic ie. cul-de sacs	Can see grasslands	Low travel times	Quiet and well located Close to city	Country atmosphere Green flowing areas
Movement through Palmerston easy Roundabouts allow traffic to flow during non-peak periods (need lights at roundabouts!) Smaller streets are OK with pedestrian access	Outlook Like cul-de-sacs - no through driving, quiet streets Walkway to shops in Palmerston Good pedestrian access Heritage site being preserved (Crinigans Hut, Amaroo) Stands of trees to stay Buffer zone to heritage site being part of park people around can use No through traffic (Amaroo) Good views Can see kangaroos No more than 10 mins way from bus stop or shops Playgrounds in Amaroo small but safe and well used Know all neighbours - a big happy family Can get what we want within 15 mins Palmerston shops satisfactory: medical centre & pharmacy	Opportunity to build what we wanted Mature trees (in some places) - add character to new suburb Views of pond - natural outlook, peacefulness Community spirit in Palmerston Opportunity for family to make good friends Potential for employment in town Centre and Mitchell - jobs for one's children Proximity to future jobs - short commute Very safe for young children in cul-de-sacs Good for children to play flexibly as they used to ▸ Sense of community helped by cul-de-sacs - sense of place, of containment Availability of large block sizes at affordable prices ▸ Very safe in general Good awareness of what is happening in the area Proximity to tourist attractions when visitors come Sense of living on the rural fringe	Physical planning of natural environment done well, specifically waterways and redevelopment of springs Recognition and preservation of heritage areas Development and landscaping of waterways, lake Sense of participation in the development of the community Friendliness Country town feel Knowing people you see on the street That it is new - builds community spirit because neighbours in similar situations (but may change in future) Narrow streets contribute to sense of safety because people are closer and there are more people on the streets	Shape of Palmerston complex with interconnecting walkways/cycle paths which encourage social interaction Ability to walk around Palmerston without crossing Kosciusko Ave - promotes sense of community

TRANSPORT & MOVEMENT

COMMUNITY FACILITIES & CENTRES

School doing good job with carboot sales which encourage sense of community
People more inclined to talk in new area when houses being built

RESIDENTIAL & COMMUNITY SAFETY

Beauty of the landscape

Grasslands lining Gungahlin Drive

Views of sheep

▸ **Natural setting, trees, ponds, rural views**

COMMUNITY VALUES & CHARACTER

ENVT & OPEN SPACE

Q2: DISLIKES

TRANSPORT & MOVEMENT

COMMUNITY FACILITIES & CENTRES

RESIDENTIAL & COMMUNITY SAFETY

COMMUNITY VALUES & CHARACTER

ENVT & OPEN SPACE

Narrow roads	Road width - problems with garbage trucks, parking made difficult	Land clearing for residential development	Greed of developers	Open space spine down creek has restricted access (used for golf course)
Buses at roundabouts	Lack of shops, school, petrol station, facilities in Amaroo	Lack of large trees due to small blocks	Question government's intent	▸ Poor siltation control from development areas at residential block/street level
Pathways at corners difficult for prams & wheelchairs	Nothing for youth, teenagers	Insufficient parkland	Lack of leadership, vision	▸ Open space overtaken by commercial activities or drainage, no longer suitable for use as open space, unsafe for small children
Paths do not all link Paths are not constructed when housing completed Poor pathway links between suburbs	High prices at Palmerston shops Verges meaner here	Not enough open areas for children to play Grass too high for children to play	Loss of control when developers take over Developers in competitive situation therefore focussed on profit rather than outcomes	Drainage structures unsightly and unsafe Difficulty disposing of waste - lack of a tip
Prams have to be pushed on roads	Overstepped mark with mix of houses	Not enough spaces for ball sports	Lack of large blocks	Lookout at top of Amaroo spoilt by development: fences too close
"Nodes" missing	Greedy development	Inadequate provision of open space with recreational facilities	Small blocks being filled with house itself	Access to edge of Gungahlin pond cut by golf course - route to pond now too indirect
Movement through suburbs (other than Palmerston) difficult, not as direct - pedestrian safety issue Dual carriageways have not been provided in Gungahlin as in other towns	Palmerston burglar alarm very noisy	Lack of inter-connecting open space network	Notice to community about development being shortened	Intensive housing development near Gungahlin pond with inadequate public open space Gundaroo Drive dangerous to cross and underpass blocked
Minimum requirements for roads	Amaroo-Nicholls High school bus takes 45 mins	Conversion of open space to residential - disruption, destruction	Nature strips and footpaths not being developed, or not in way residents preferred	▸ Eucalypts unsuitable for residential areas - branches fall, dieback problems, too large in narrow streets. Residents cut them down.
Emergency services can only use single lane	Only community organised thing is by churches, eg. Salvation Army vacation care	▸ External appearance of medium-density housing	Developers not meeting their contractual obligations	▸ Sense of isolation between Ngannawal and Palmerston due to lack of pedestrian access
Staging of roads is not known Density of houses which use the roads	When house was built was told freestanding perimeters applied but this is not the case	Lack of variety in house design	Who manages nature strips in future?	
Don't believe Real Estate agents	Grasslands not policed - motorbikes, rubbish dumped, big tree dying Trucks at "tip" - Crace - fire there recently Trucks/all traffic speeding from pond through Amaroo - need traffic calming	Cheap housing ugly, depressing	Lack of communication	
Roundabouts do not handle peak times	Gungahlin Drive traffic speeds Fridays and Saturdays - noise problem, acoustic fences inadequate	Monotonous streetscapes, repetitiveness Strips of medium-density along streets (prefer courtyard layouts)	Public space appears not to be managed Shopping centres need to enhance sense of community - community billboard, seating, gathering place, shade, weather protection, public toilets, postbox Lack of land for community facilities	
	School exit onto roundabout - very dangerous, can't see with evening sun	▸ Unsafe transport corridors, inadequate transport provision	Schools too expensive	
		Lack of traffic lights early to prevent accidents		

TRANSPORT & MOVEMENT

Traffic lights are a nuisance in off-peak times
 Roundabouts on slopes - dangerous

Build roads first then houses

Build arterial roads first or earlier - provide for buses
 Bus stops not always easily accessible

Footpaths do not always go anywhere useful eg. bus stops
 Inter-nodal access

Heavy traffic on small/narrow roads

John Dedman delay (10 years)

Roads not wide enough for cars to pull over
 Clear of obstructions - road reservations
 Appalling street lighting

No street lighting on arterial roads

Status of residential areas defined by entrance elements

COMMUNITY FACILITIES & CENTRES

Townhouse driveways on roundabout - unsafe
 No playing fields at Amaroo for ball sports

No scout halls

Rollerblades on cycle paths - skateboard rink needed

Lack of on-lake activities (is lake safe to swim in?)
 Swimming pool needed

Youth centre at Ngunnawal - young people not using it

Halfway house residents sometimes cause noise problems
 Lack of places for nursing mothers

Elderly lack peer group contact
 Problems for elderly and people without cars
 Once houses are built all interest focussed outside Gungahlin
 People work too much, don't have time to socialise

Lack of petrol station and banks - some things must be local
 No place large eg. to hold a dance
 Was no bus from Amaroo
 Not happy with transport
 Hard to get out in peak hour
 Small scale - compressed
 Not keen on architecture
 Long wait for facilities in Amaroo

RESIDENTIAL & COMMUNITY SAFETY

Lack of adequate external road connections

Kelleway Ave - bad example of road design, small and winding and carries high traffic volumes - causes drivers to feel impatient
 Safety of Ngunnawal shops - people feel uncomfortable - youth centre may contribute

Invisibility of police

Not enough for young people to do (not just here but in Canberra generally)
 Sense of being unsafe for older people

▸ **Lack of facilities generally and delayed provision of open space, recreational facilities**

Buildings adjacent to small ponds instead of foreshore parks
 Poorly managed urban development - wasting scarce resources
 Lack of public toilets

COMMUNITY VALUES & CHARACTER

Community centres charge users

Lack of employment in the area

Everything we have to do we have to go outside Gungahlin (petrol, banking, business, work, recreation, picnics)

ENVT & OPEN SPACE