Schedule 5 - Landscape and Open Space Strategy

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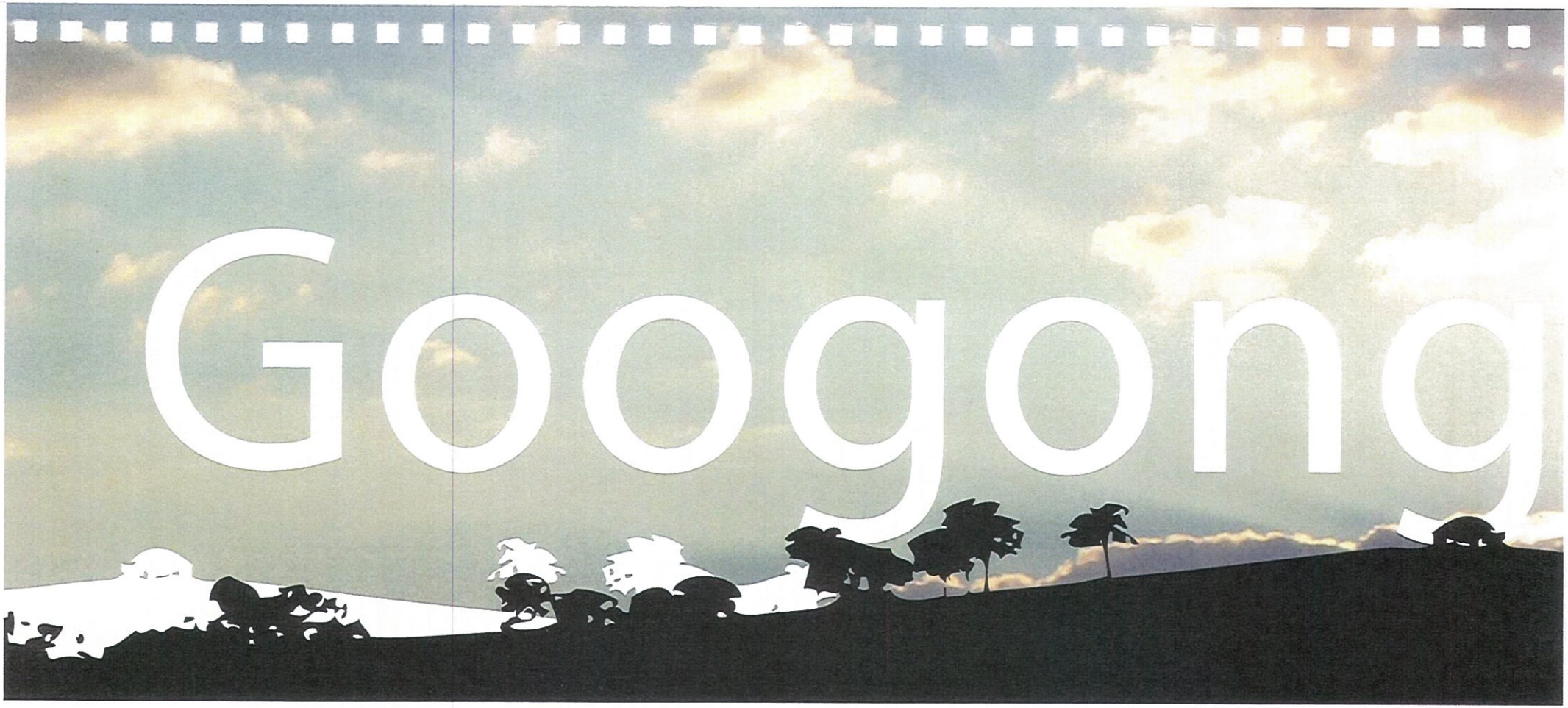

Landscape and Open Space Strategy

23 March 2011

AECOM

Project	Googong Township
Project No.	08502904.02
Report Title	Summarised Landscape and Open Space Strategy
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Revision History

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A	10 July 2009	JR	Issue to Queanbeyan City Council
B	19 August 2010	JR	Issue to Queanbeyan City Council
C	23 March 2011	JR	Issue to CIC

Contents

FIGURES

DISCLAIMER

This document represents a conceptual and strategic approach to Googong's landscape and open space. It may be subject to change due to negotiations with Queanbeyan City Council regarding the Voluntary Planning Agreement, site and detailed design considerations and other physical or commercial issues.

Vision

LANDSCAPE VISION STATEMENT

To create a high quality, sustainable landscape with a distinctive character & diverse range of open space areas and facilities for the enjoyment and well being of Googong Township's residents.

The landscape and open space vision for Googong Township is predicated on a fundamental understanding of the site opportunities and constraints. The vision reflects the following:

» creation of a sense of place;

» capturing the 'essence' of the Monaro by preserving unique natural features while establishing a distintive landscape character and identity for the township;

» creation of special places to meet, relax, play, recreate and learn about heritage and ecological processes;

» promotion of an active lifestyle;

» formation of attractive, legible, safe and funtional streetscapes and cycleways and pedestrian pathways that reduce car dependency;

» foster environmental stewardship by re-establishing lost indigenous ecologies and celebrating histories and heritage;

» integration of Water Sensitive Urban Design (WSUD) into the landscape and streetscape;

» utilisation of water harvesting and passive irrigation to irrigate key landscape and open space areas,






Design Principles

KEY PRINCIPLES AND OBJECTIVES

Liveability and Community

» Provide safe functional linkages along streets and in open spaces between places of activity.

» Ensure strong visual connection and way-finding between key facilities and the neighbourhood centres and town centre.

» Create a comfortable, enjoyable and sustainable environment for all residents.

» Create places for people to meet and engage in the Googong Township Community at both active (formal) and passive (informal) levels.

» Utilise and accommodate the CIC designed Community Scheme as the means by which the new community manages, maintains and facilitates community engagement.

» Ensure appropriate quantity and distribution (access) to services and facilities.

» Build upon the Community Clubhouse (Club Googong) concept developed by CIC as the key centres of community engagement.

» Provide a range of landscape experiences that reveal the existing (and lost) ecologies from the Googong Township site.

» Engage and consult a varied group of participants and interest groups in the creation of the new Googong community.

» Show respect and develop strategies for celebration of both indigenous and non-indigenous heritage.

» Create a sense of ownership over the public domain and encourage passive surveillance creating community guardianship.

» Provide non-vehicular connection points to local and regional recreation destinations.

Environmental Sensibility

» Create linkages between open spaces, streetscape and the surrounding area by establishing an extensive street tree planting strategy.

» Ensure effective connection, both ecological and visual, to Montgomery Creek corridor and water pathways across the site.

» Be sensitive to a broad range of site specific environmental issues.

» Respond to site solar and climatic conditions to create environments that provide an increased thermal comfort.

» Take advantage of key and minor views to provide a sense of orientation and identity for the site.

» Retain existing established mature trees where possible

» Re-establishment endemic communities where possible.

» Integrate and celebrate stormwater and environmental strategies.

Climate Adaptation and Water

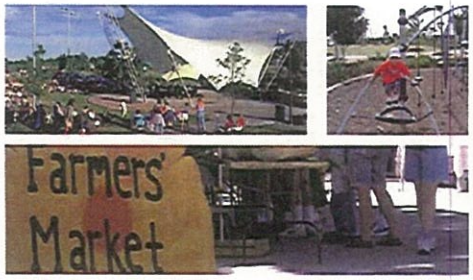
» Minimise impacts on the natural water cycle and protect the health of aquatic ecosystems through WSUD.

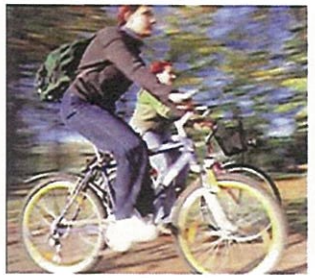
» Integrate planning of the urban water streams, namely stormwater, water supply, sewerage management and groundwater, to deliver sustainable water cycle solutions .

» Identify opportunities for irrigation through the Integrated Water Cycle Management Plan (IWCMP)

» Use WSUD to integrate recycled water into the planning and design of buildings and landscapes.

» Identify unique hydraulic systems in Montgomery Creek and where possible reinstate them to pre-European conditions.





Design Principles

Access and Safety

» Provide easily accessible and safe open space networks.

» Provide a sense of arrival at key entry points.

» Create a sense of ownership over public domain and encourage passive surveillance to create community guardianship.

» Establish movement corridors (pedestrian and cycle) through open space networks.

» Sitewide distribution of open spaces to ensure equitable access by all members of the community.

» Incorporate Crime Prevention Through Environmental Design (CPTED) principles within designs.

» Ensure accessibility to open space and ecological corridors for emergency service vehicles.

Recreation and Sports

» Provide appropriately located and adequately sized open spaces and facilities that support a range of both active and passive uses.

» Provide facilities that encourage activity, comfort and safety across generational requirements.

» Meet requirements identified in the Googong Township Community Plan.

» Provide spaces for multi-functional adaptable usage.

» Complement other Googong objectives, in paticular water management and passive recreational activities.

Sustainability and Materiality

» Enhance the sustainability of the development by optimising water usage, contributing to biodiversity and the reinstatement of threatened communities.

» Provide for water re-use in open space areas, both passive and active.

» Retain existing and established mature trees where possible.

» Establish ecological connectivity through Montgomery Creek, terrestrial habitat and wildlife corridors.

» Ensure quality, maintainability and durability of the open space assets.

» Where possible use locally sourced materials and vegetations.

» Salvage, stockpile, sort, process and reuse site-sourced materials (primarily rock and soil) for landscape works.

Character and Identity

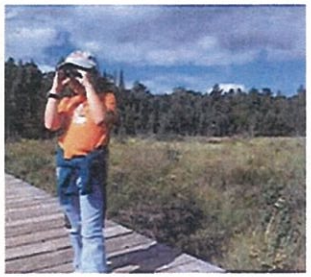
» The landscape character identified from existing site conditions shall be capitalised upon and celebrated.

» Create distinct but cohesive landscape character zones which respond to the environmental conditions of the site (e.g. wind, solar, aspect, soils) and the urban transect.

» Explore a newly defined aesthetic that responds pragmatically to the sites climate.

» Streetscape character is to reflect street hierarchy, the urban transect and strategic connections/routes/entries/destinations.

» Existing site features of note are to be identified and integrated into open spaces and streetscapes where possible.





Site Analysis

TOPOGRAPHY

The topography of the site primarily consists of a gentle undulating plateau of ~750 m which is dissected by minor creek lines and bordered to the east by the entrenched Queanbeyan River (~100 m below). The drainage lines of this plateau have been levelled by a valley wide blanket of sediment dating from the high erosion rates of the last glacial maximum. The drainage lines seen today have developed on top of this depositional area leading to the formation characteristic of chain of ponds fluvial systems.

Major landscape features include Hill 800 and the marked increase in ruggedness of the terrain as the stream lines pass through the Googong adamellite to the north east of the site. Maximum slopes in this area are in the order of ~25%, with slopes greater than 18% common (Mitchell 2007).

These areas of high slope (>18 %) and the levelled valley bottoms of the plateau have been identified as limits to development due to issues such as bushfire hazard and protection of hydrological integrity of the fluvial system.

Mitchell, P.B. (2007) Geological and Geomorphic Impressions of Googong Township. Groundtruth Consulting.

FUTURE APPROACH

» Residential development limited to the base of Hill 800.

» Bushfire hazard slopes to be identified and managed.

View northeast from Hill 800.

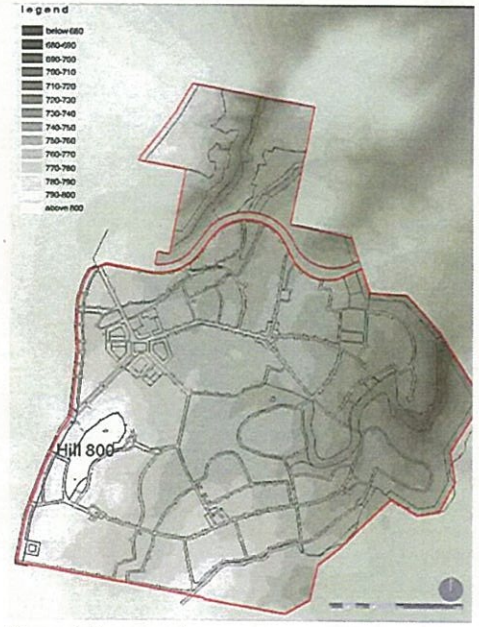


Figure 1: Topography
The relief of Googong ranges from ~570 m at the bottom of Montgomery Creek up to ~810 m at Hill 800

SOILS

The soil landscapes of Googong are generally thin with low chemical fertility and a high proportion of small rock. Deeper soils are found in depositional areas (accumulated in the last glacial period) relatively high in the catchment and show structural weakness when wet. Soils are generally magnesic (high in magnesium), low in calcium with moderate sodicity in subsoil clays.

FUTURE APPROACH

The management of soils on the site with regard to planting in open space areas requires the following general points to be considered:

» Soils are generally thin with a high proportion of small rock which, in some parts will require shallow excavation, ripping of underlying material and importation of ameliorated site soil or imported soil to achieve good root depths and tree growth.

» General chemical amelioration for site soils will involve the addition of gypsum and provision of trace elements.

» All soils will benefit considerably from additional organic matter both in the form of composts as well as litter layers in the form of 'mixed material' mulches.

» De-stocking followed by periodic slashing of grass growth will assist in the improvement of structure, fertility and biological activity of soils.

» Natural rainfall is perhaps the most limiting factor for plant growth over and above soil constraints (which can be addressed). The use of reclaimed water from sources such as stormwater harvesting and greywater recycling will supplement natural rainfall.

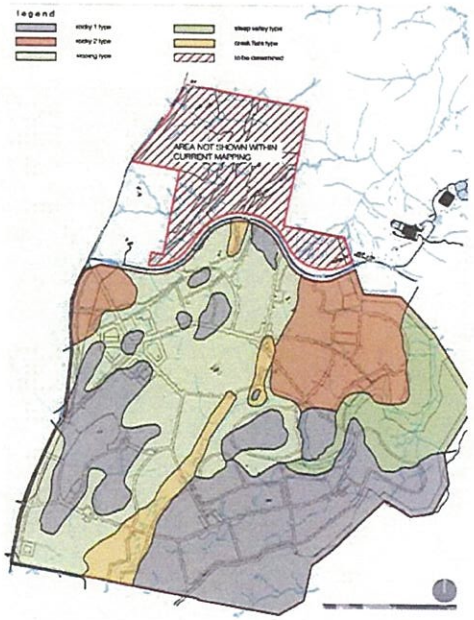


Figure 2: Preliminary Site Soil Mapping
(source: Sydney Environmental Soil Laboratory, 2007)

CLIMATE

Googong is located to the southeast of Canberra approximately 4 km south of Queanbeyan.

The climatic conditions of Googong are considerably influenced by the surrounding terrain - namely the rainshadow effect covering the eastern side of the highest part of the southeastern highlands and created by the interaction of the Snowy Mountains and Kybean Range. This rainshadow is typified (in this region) by the occurrence of lands up to 1000 m that receive less than 600 mm of annual rainfall - indicating semi-arid conditions with alpine elevations.

The average annual rainfall for Queanbeyan is ~570 mm/yr, which is relatively consistent across the year as 5 to 6 raindays per month, however a shortfall of water in summer is likely.

FUTURE APPROACH

» Identify distribution of water across the development through the Integrated Water Cycle Management Plan (IWCMP).

» Identify key areas for irrigation such as entry gateways and sports pitches.

» Specify plant species suitable for climatic conditions.

» Create microclimates for the enjoyment of residents.

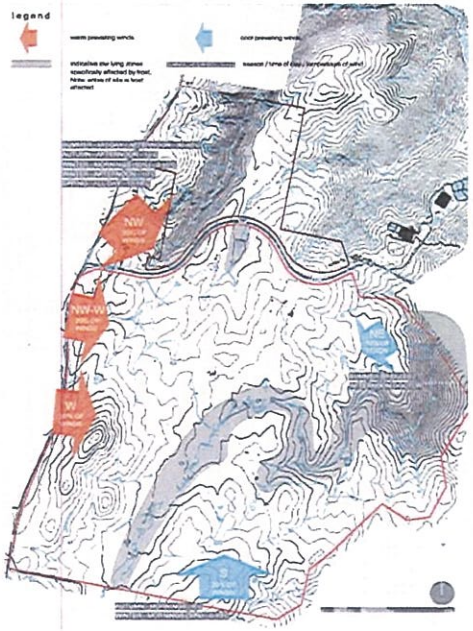


Figure 3: Climatic Summary
Primary wind direction and frequently frost affected areas are indicated in Figure 3. Note that the entire region is subject to periodic frosts, yet these are expected to be most frequent along drainage lines where cold air collects. The region experiences an average of 99 days of frost per year. Low humidity in December (36%) and June (60%).

DRAINAGE

The site is defined by two main catchments which direct waters to the Queanbeyan River through Montgomery Creek and an unnamed tributary of the Queanbeyan River. There are additional catchments which drain to the Googong Dam, Jerrabomberra Creek, and other tributaries of the Queanbeyan River to the north of the site.

Montgomery Creek is the major watercourse on the site and flows through a broad floodplain from the southern boundary to a clearly defined waterway in the north eastern corner of the site and from there into the Queanbeyan River. The catchment within the site totals approximately 459 ha, within the broader Montgomery Creek catchment of 804 ha.

An unnamed tributary of the Queanbeyan River drains the north western part of the site (Neighbourhood 1 and 2), an area of 161 ha. The catchment forms a natural amphitheatre and directs flows to an online dam located on the southern side of Googong Dam Road. This watercourse combines with flows from a second small catchment at the northern boundary of the site, upstream of the Queanbeyan River.

FUTURE APPROACH

It is proposed to restore and enhance part of the upper reaches of Montgomery Creek utilising Natural Temperate Grassland communities as the vegetation pallet. The variety of wetting and drying regimes in combination with the structural function of the chain of ponds system will enable the establishment of a greater diversity of vegetation, the integration of ecological productivity and resilience through incorporation of the increased runoff delivered from the progressive urbanisation of the catchment. This system presumes the use of flood detention to attenuate erosive flows but accommodates extra duration volumes.

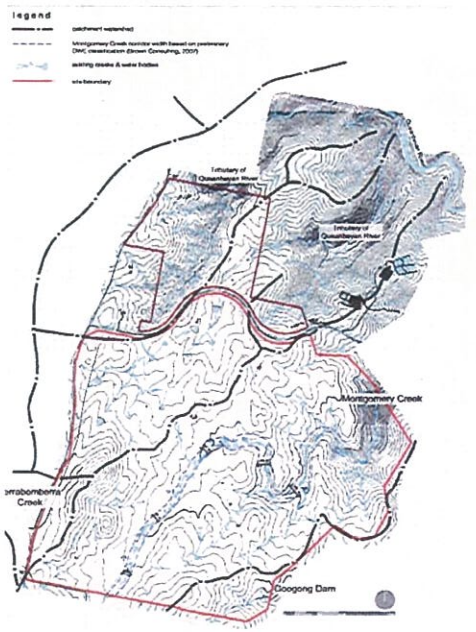


Figure 4: Drainage / Catchments
The main catchments direct waters to the Queanbeyan River through Montgomery Creek and an unnamed tributary of the Queanbeyan River. There are additional catchments which drain to the Googong Dam, Jerrabomberra Creek, and other tributaries of the Queanbeyan River to the north of the site

Open Space Hierarchy

OPEN SPACE STRUCTURE

The strategy for the Googong open spaces and streetscapes shown in Figure 5 illustrates major compoments - open space distribution and key linkages.

Within the landscape structure plan a number of key open spaces and ecological zones are preserved. The most significant being Googong Common sited around Montgomery Creek.

Likewise a critical component of the structure plan is Googong Avenue, the main connector street that serves to link all neighbourhood centres into one grand avenue.

A hierarchy of open space has been established within Googong to support the development and assist the establishment of a vibrant community.

The open spaces are structured and distributed to provide the right function within a reasonable distance for all residents.

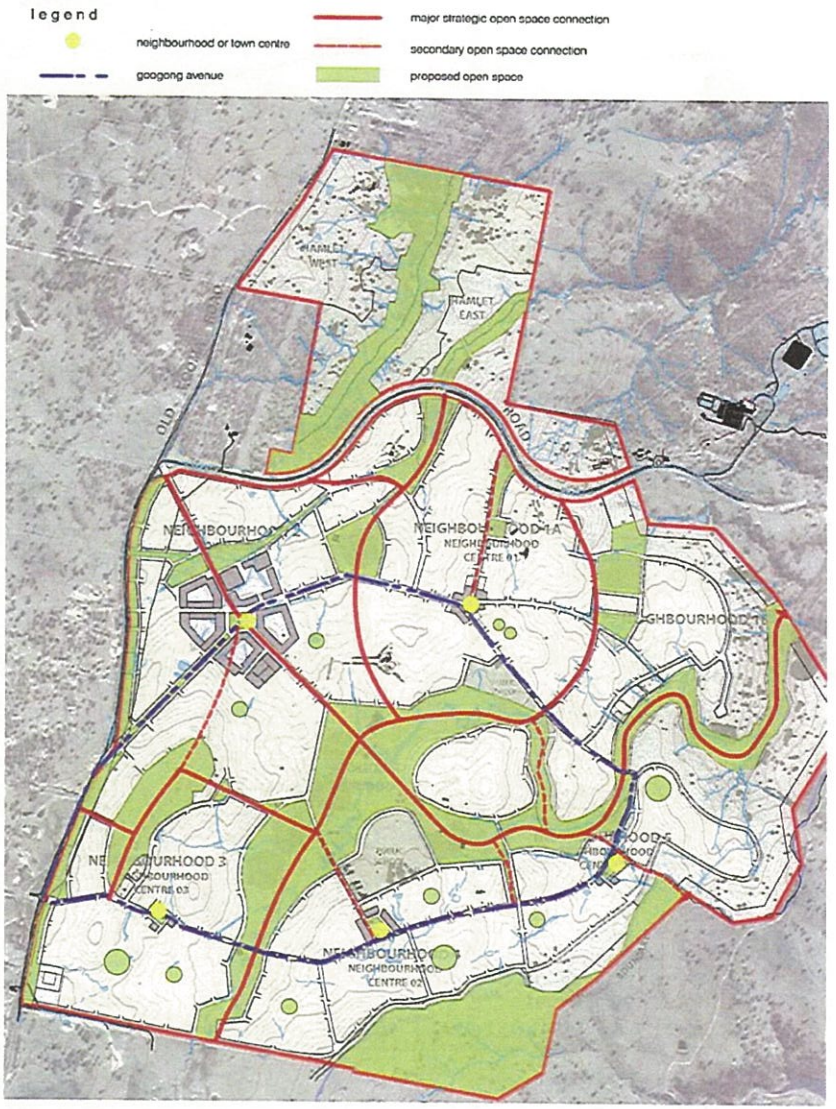


Figure 5: Googong Open Space Structure Plan
(base map source: Roberts Day, 2009)

CIRCULATION

There are six onsite components that work in concert to establish a well connected cycle and pedestrian network at Googong Township (refer Figure 7). These are:

» standard pedestrian paths;

» dedicated cycle lanes on key streets;

» key paths in verges for both pedestrians and cyclists;

» share paths in open space for both pedestrians and cyclists;

Opportunities exist to integrate internal circulation with existing external networks, especially those walking trails associated with the Googong Dam. These are shown in Figure 6.

OBJECTIVES

» Create a safe pedestrian and bicycle network to:

- promote active transport and a healthy community;
- provide a network of connected pathways to promote walking, bicycle use and safety. Network to connect to site features and broader destinations and networks;
- encourage 'street life' through provision of meeting points in parks readily accessible through the pedestrian network;
- provide equal access for all both in the public domain and access to private lots, and
- provide a variety of path types to access and connect varying landscape types.

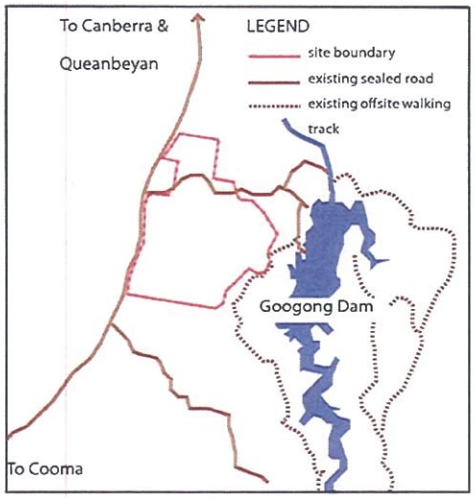


Figure 6: Regional Offsite Circulation
souce: www.directory.act.gov.au/

PRINCIPLES

» Locate pathways where possible and practical to enhance connectivity to parks and other destinations and to minimise street crossings.

» Footpaths are to comply with AS1428.1 (2001) and AS1428.2-5 (1998) and are to be continuous with smooth transitions in level. Pram ramps are to grade down to carriageway level.

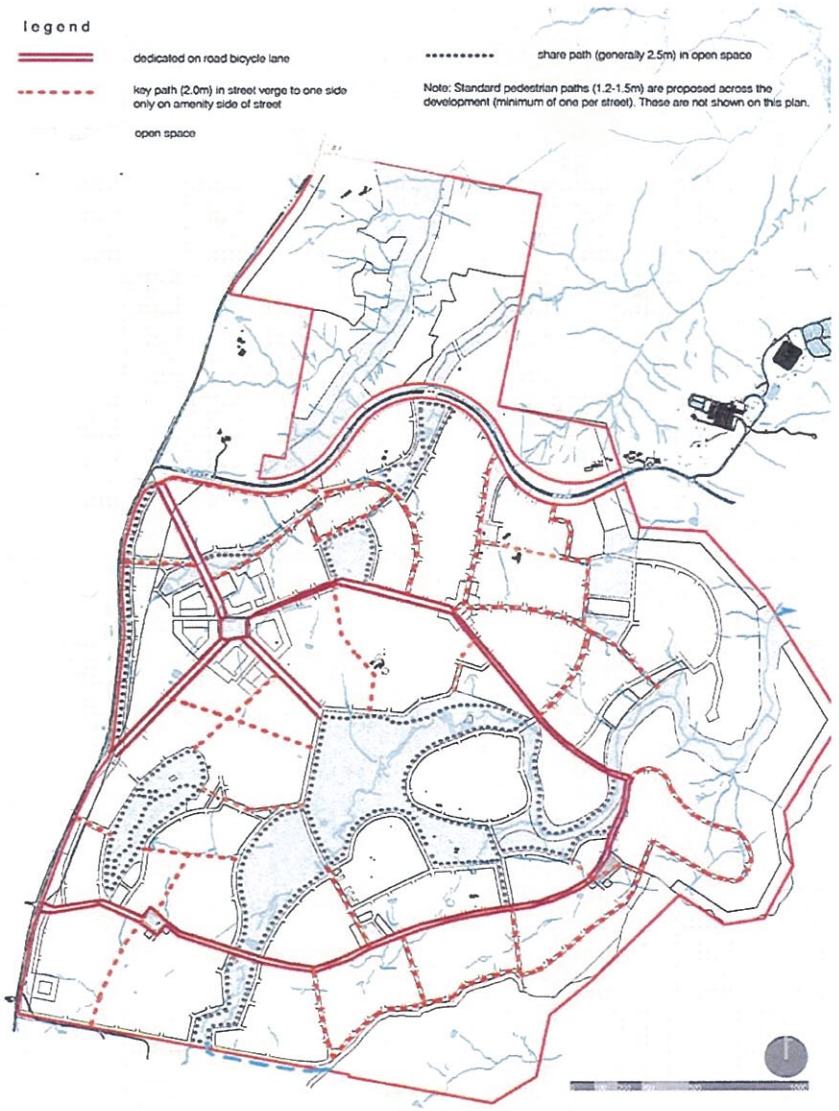


Figure 7: Non-Vehicular Circulation
Note: locations are indicative only and subject to further review and detail design at Neighbourhood DA stage.

Open Space Hierarchy

OPEN SPACE TYPOLOGY

The open space system contains a number of elements (typologies) which will cater for Googong's residents and visitors. These are arranged in hierarchy from Googong Common through to linear parks and drainage reserves.

OBJECTIVES

» Spatially arrange open space to meet demand and establish a hierarchy to inform use, distribution and planning of all open space.

» Establish open spaces that are an interconnected network of elements, such as parks, local parks, squares and streets, rather than a series of unrelated, disconnected spaces.

» Provide a mix of both active and passive and formal and informal recreation/play opportunities across the spectrum of age groups.

» Enhance and create a culturally significant natural setting by integrating open spaces with the Neighbourhood Centres and Town Centre.

The following elements constitute the open space components:

» 1. Googong Common, Upper Montgomery Creek Corridor (RE1 Public Recreation) and Hill 800

» 2. Sports Facilities

» 3. Town Centre / Neighbourhood Centres

» 4. Neighbourhood Parks x 5

» 5. Local Parks x 13

» 6. Linear Parks and Drainage Reserves

» 7. Entry Gateways x 6

» 8. E2 Environmental Conservation (Drainage)

- Lower Montgomery Creek
- Hamlets Tributaries

» 9. Dam Foreshore Protection Reserve

» 10. Road Buffer Corridors

- Old Cooma Road
- Googong Dam Road

The precise location and distribution of the above elements will evolve over time as the township develops.

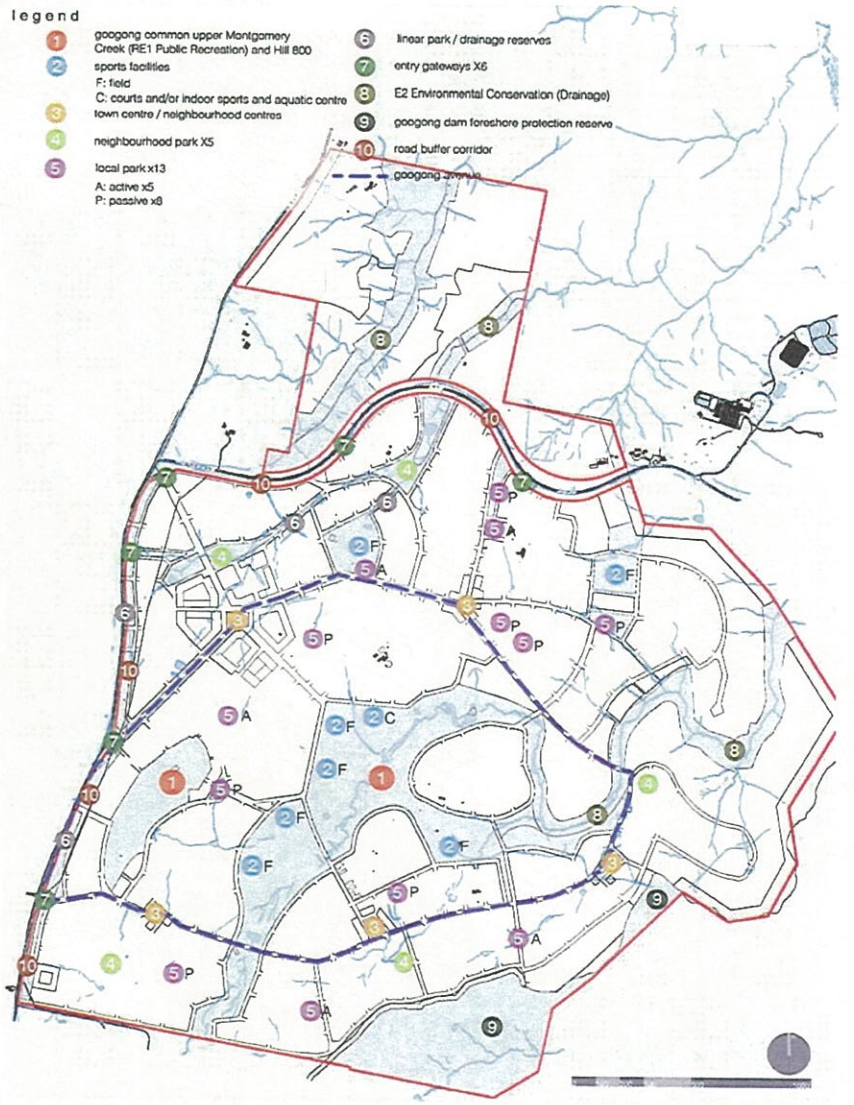


Figure 8: Open Space Typology & Distribution

Note: locations are indicative only and subject to further review and detail design at Neighbourhood DA stage.

GOOGONG COMMON, UPPER MONTGOMERY CREEK CORRIDOR (RE1 PUBLIC RECREATION) AND HILL 800

Googong Common

The design strategy for Googong Common began with establishing the creekline components to determine extent of flood plain and set backs associated with ecological buffers and detention requirements.

Broad detention requirements for Googong Common have been provided in the Stormwater Masterplan. Given the preliminary and strategic nature of this report and availability of accurate data, detention areas will be reconsidered in more detail during the Stage DA's.

» The Common will combine; recreation, commercial, functional, environmental and cultural roles.

» It will provide an extensive open space resource, the 'lungs and playground' for Googong Township.

» Its design will embody the character and environmental attributes of the Monaro landscape.

» A diverse range of uses will be provided which may include:

- an Indoor Sports & Aquatic Centre;
- active sports facilities;
- amenity buildings;
- shelters;
- passive recreation/BBQ areas;
- children's playgrounds(regional and local);
- tennis courts;
- netball courts;
- boardwalks;
- art and heritage interpretation;
- community garden plots;
- plant nursery/cafe;
- hike and bike network;
- bridle trails;
- pedestrian bridges over the creekline;
- water bodies and a wetland corridor in a 'chain of ponds' configuration.

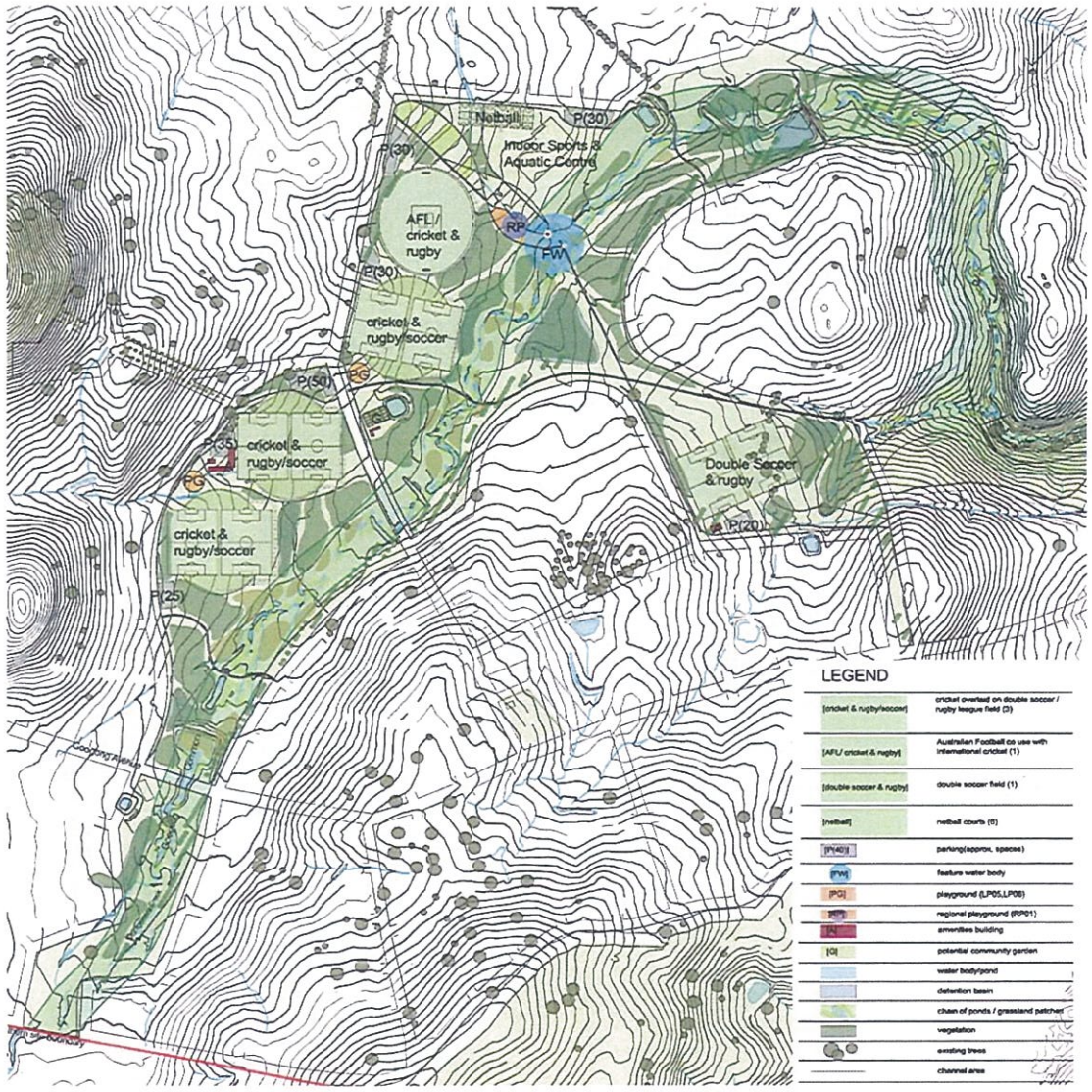


Figure 9: Googong Common Landscape Structure Plan

Note: -12 shelters with BBQ facility, 4 shelters with interpretive signage and 17 general shelters are proposed within Googong Common.
-Locations are indicative only and subject to further review and detail design at Neighbourhood DA stage.

Open Space Hierarchy

Upper Montgomery Creek Corridor (RE1 Public Recreation Zone)

The main waterway on the site (Montgomery Creek) can be considered in three distinct sections. These have been defined by the existing topographic and geomorphic conditions. The interventions for public recreation, drainage, environmental conservation and for proposed landscape character are distinct for these three zones:

» the broad upland floodplain with chain of ponds (RE1 Public Recreation Zone)

» a transitional zone (the upper section of the E2 Environmental Conservation Zone)

» defined channel section with granite bed (the remainder of the E2 Environmental Conservation Zone)

For all of these zones, management of urban stormwater, through detention of peak flows and water quality improvement, would occur outside the creek corridor and typically beyond the existing major flood extent (1 in 100 year average recurrence interval flood extent).

BROAD UPLAND FLOODPLAIN WITH CHAIN OF PONDS

There are relic chain of pond formations observed on the site.

It is proposed to restore and enhance the remnant chain of ponds system within the broad upland floodplain. Wetland and ephemeral wetland species will be selected for revegetation of the chain of ponds and low flow channel. Natural Temperate Grassland communities will be re-established through the broader flood plain. Local reclaimed stone would be used as required for stabilisation works and for control structures to slow and spread flows.

The advantages of this approach include:

» Increased ability of the fluvial system to:

- hold water for longer
- regulate and convey flow

» Excellent water quality through biological filtering

» Highly productive ecosystems and provision of habitat for birds, fish, invertebrates and herbivores

» Reduced likelihood of stream incision and erosion with urbanisation

» Maintains the hydrological connection of the floodplain

» Restoration and enhancement of a rare geomorphic system that is a unique part of the Australian landscape - a considerable point of difference

» Allows multiple benefits such as use of rare vegetation communities, reclaimed rock from site, unique access and viewing options and a rich, thematic continuation of landscape

» Excellent educational options for local schools including

- water quality monitoring
- macroinvertibrate counts
- studies in ecology and natural systems
- bird watching

» Avoids construction of a single channel and associated hard engineering necessary to concentrate a previously dispersed flow system into a narrow channel

» A major feature water body is also proposed within the creek corridor.

Top to Bottom: Example of alpine waterway with combination of stone and grass channel; Natural grassy chute - Upper Montgomery's Creek.

Top to Bottom: One of the more permanent ponds in the upper sections of Montgomery Creek; Several ephemeral ponds in the upper sections of Montgomery Creek.

Hill 800 (Twin Hills)

As the highest elevation point on the site Hill 800 occupies a dominant position. It is visible from most of the Googong site and 360 degree views extend in all directions from its summit.

As part of the integrated water management strategy a series of water reservoirs are required to be located on Hill 800 within the saddle and directly at its summit. It is intended that these structures be celebrated as iconic features rather than attempt to buffer or camouflage them.

In addition to the reservoirs and associated infrastructure a series of additional elements are proposed to make the hill a place accessible for the community to enjoy the elevation, views and to learn about the surrounding area, including:

» a series of pathways;

» a lookout or series of lookouts with provision of sun and rain shelter,

» an ecological and/or historical interpretative signage strategy;

» minor art work(s); and

» the regeneration of native grasslands and establishment of plant species responsive to the character and exposed nature of the area.

LOOK OUT

The structure of the lookout should interact with topography to develop a dynamic looking element visible from the town centre.

Other principles include:

» Structures to be considered as features or landmarks and be sited, designed and detailed accordingly.

» Strategic views are to be maintained and enhanced.

» Provide interpretive signage to reflect upon cultural and ecological landscape.

» Minimal removal of existing rock formations to hill top to preserve the geological heritage of the site.

» Provide adequate level of parking to base of Hill 800 for visitors to the lookout.

VEGETATION

The Hill 800 planting palette has been constrained to native groundcovers only which will be used primarily to 'make good' the edges of infrastructure and public element works such as roads, paths and the lookout area.

» Groundcovers:

Atriplex semibaccata – Creeping Salt Bush

Austrodanthonia spp. – Wallaby Grasses

Brachyscome multifida – Cut Leafed Daisy

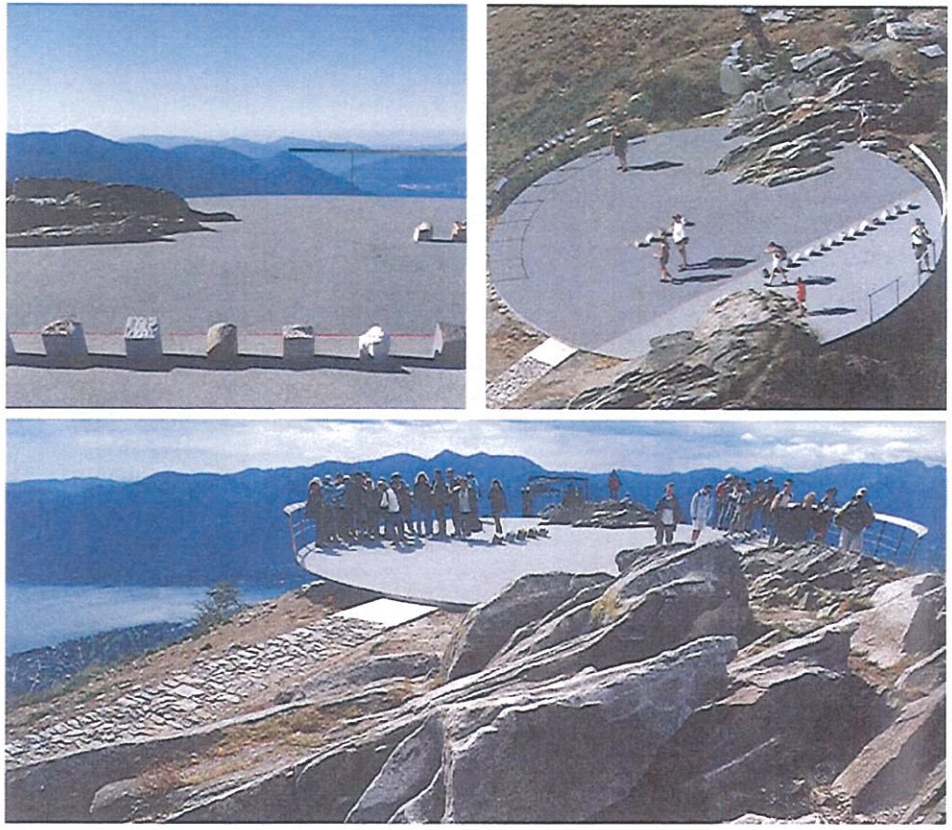
Brachyscome multifida 'Break O Day' – Break O Day Daisy

Myoporum acuminatum 'Monaro Marvel' – Monaro Marvel Boobialla

Correa 'Dusky Bells' – Dusky Bells

Poa sieberiana – Snow grass

Themeda australis – Kangaroo Grass



Indicative lookout imagery

Open Space Hierarchy

SPORTS AND PLAY FACILITIES

The Googong Township Community Plan outlines the sports facilities required to meet the needs of Googong's residents

The key sports and play facilities are:

- Sportsfields and courts
- Indoor Sports and Aquatic Centre
- Community clubhouses and
- Children's play facilities

These facilities have been spacially located within the Googong Open Space Structure Plan.

COMMUNITY CLUBHOUSES

While not being a Contribution Item to be delivered under the Googong Urban Development Local Planning Agreement, Community Clubhouses are proposed to provide a focus of community and recreational activity in the Township. A series of Community Clubhouses are envisaged by Googong Development Corporation the first of which will be developed in Neighbourhood 1A. The scale of the Community Clubhouses will vary depending on the scale of the neighborhoods in which they are located although members, friends and family of Googong's community associations will eventually share access to all Clubhouses. Typical facilities proposed for the Community Clubhouses include pools, gymnasiums and adjacent tennis courts.

INDOOR SPORTS AND AQUATIC CENTRE

Located in Googong Common, this centre will provide an 8 lane 25m pool, children's wading pool and 2 indoor sports courts.

SPORTSFIELDS and COURTS

The provision of sportsfields and courts has been identified in the Googong Community Plan and located spatially on the Open Space Typology & Distribution Plan, Figure 8.

The bulk of Googong Township sportsfields and courts are located within Googong Common forming the central open space hub / spine for this new community. Given that Googong Common is generally located in the central and southern portion of the development, an additional AFL / International Cricket Field will be located to the west of Neighbourhood One (Sportsfield 1) and a double soccer / rugby league field located to the east of Neighbourhood One (Sportsfield 2).

Fields are designed to accommodate either one large cricket / AFL oval with two soccer fields / rugby league field overlaid or a double soccer / rugby league field. These formats take advantage of summer/winter playing seasons in the same space. Sports fields are located to maximise grouping of shared facilities. Netball and tennis courts are also located in Googong Common.

CHILDREN'S PLAY FACILITIES

The distribution of children's play facilities aims to achieve appropriate numbers and locations of play facilities across Googong Township. There are 14 playgrounds provided within the development (one regional, five neighbourhood and eight local playgrounds) accommodating a range of experiences and age groups.

One significant regional playground will be located in Googong Common as the premier and high order play facilitiy. It will feature an adventure style play area for all ages and potentially involve water play.

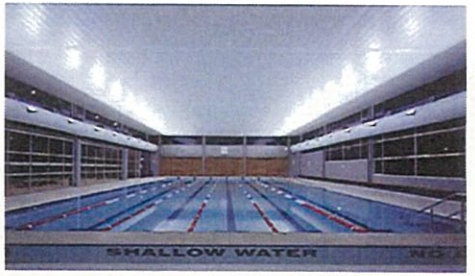
This location is chosen for its centrality but also proximity to the Googong Town Centre, and Montgomery creekline.

Neighbourhood playgrounds will be allocated within each of the five neighbourhoods parks. Small local playgrounds are spread evenly aross the site based on the requirement that 80% of residents are within 400m walking distance of a play facility.

The larger facilities generally cater for more age groups while small facilities typically provide for younger age groups.

Indicative tennis courts character imagery

Indicative community clubhouse (Club Googong) character imagery



Indicative indoor sports and aquatic centre character imagery

Indicative play facilities character imagery

TOWN CENTRE / NEIGHBOURHOOD CENTRES

The Town Centre / Neighbourhood Centres include a variety of open spaces which will be the main focus of identity and community gathering for the whole Googong Township and each neighbourhood. They will provide open space for informal and formal gatherings and provide spectacle in the form of public artwork or water features. They will maintain a strong connection to Googong Avenue and will function as a transport node within each neighbourhood.

Principles include:

» One space located central to each neighbourhood centre

» Provide vegetation and other buffering elements from NW to SE winds to provide protected enjoyable spaces.

» Provide areas and facilities for both active and passive recreation and café/spill out zone from adjoining retail or community facility.

» Provide detail grading and retaining systems to allow for levels associated with existing trees to be retained and to achieve a satisfactory and practical park grade.

» Tree planting to be integrated with street tree strategy in terms of species and character.

» Provide entry and signage (park name) elements.

» Provide interpretive signage to reflect upon cultural and ecological landscape.

» Provide and integrate artwork.

» Provide and integrate cycle parking.

» Provide for and integrate WSUD elements where appropriate (refer WSUD and Water Management Chapter).

MATERIALITY

» 50% hard surface area

» Concrete paving (in situ and unit)

» Decomposed granite feature groundplane

» Feature stone paving/exposed aggregate concrete

» Concrete and timber seating

» Steel and timber shade structures

» Concrete retaining wall

VEGETATION

Centres will be predominately planted with a single identifier species. This will be deciduous to maximise winter sun. The following are suggested species:

» Ulmus parvifolia - Chinese Elm

» Zelkova serrata - Japanese Zelkova

» Fraxinus pennsylvania 'Cimmzam' - Cimmaron Ash

» Pyrus calleryana 'Bradford' - Ornamental Pear

» Magnolia grandiflora 'Exmouth' - Exmouth Magnolia (Evergreen feature tree)

» Eucalyptus sideroxylon - Red Ironbark (Evergreen feature tree)

» Understorey of native grasses and groundcovers

» Turf

Indicative character imagery

Open Space Hierarchy

NEIGHBOURHOOD PARKS

The largest individual parks located within suburban areas are the neighbourhood parks. They provide an easily accessible and safe kick-about and play area for children. They are also magnets for the immediate community with the provision of BBQ and shelter facilities.

Neighbourhood parks are located to ensure most of the community are within a 800m radius. They should also be located to provide additional benefits to either water management, retention of heritage items/landscapes or key views.

The following is a list of principles:

» Ensure minimum one park per neighbourhood within 800m of most residents.

» Minimum area 16,000m2.

» Locate neighbourhood parks in association with drainage lines or ridgelines to accommodate stormwater management and views where possible.

» Provide areas and facilities for both active and passive recreation.

» Provide detail grading and retaining systems to allow for levels associated with existing trees to be retained and to achieve a satisfactory and practical park grade.

» Tree planting to be integrated with Street Tree Masterplan(Figure 13) in terms of species and character.

» Provide one large play area with adequate shade facility and fencing/planting to define play zone.

» Provide elements (can be play orientated) that contribute to the 'celebration of water' across the development.

» Provide a large shelter facility with BBQ facility with seating and tables.

» Provide entry and signage (park name) elements.

» Ensure heritage overlay where appropriate through interpretive signage, artwork installations or retention of existing shelter belt and cultural plantings.

WSUD & WATER MANAGEMENT

To include the following:

» Large vegetated swales

» Minor creeklines

» Bioretention basins

» Passive irrigation

» Detention ponds as required

MATERIALITY

» Concrete (textured) and site stone retaining walls

» Steel and timber structures

» Steel and timber play equipment

» Bark mulch and rubber softfall play surfaces

» In situ concrete paths (smooth and exposed aggregate)

» Timber seating and picnic benches

» Rural materials, timber/steel (weathered) for signage

VEGETATION

» Eucalyptus cinerea - Argyle Apple

» Eucalyptus melliodora – Yellow Box

» Eucalyptus mannifera spp. maculosa – Red Spotted Gum

» Eucalyptus polyanthemos – Red Box

» Eucalyptus rossii – White Scribble Gum

» Native grasses and small-medium shrubs as understorey

» Turf

Indicative Character Imagery

LOCAL PARKS

Local parks can provide critical amenity when located well and designed into the streetscape. They provide a moment of respite within the suburban street form. They are critical in developing a sense of place and orientation within the neighbourhoods.

Local parks should be located where existing features may wish to be retained. For example; trees or existing site rock outcrops. They may also incorporate any necessary water management strategies.

Parks are categorised as either passive or active depending on whether or not they contain a children's play area. Figure 8 indicates eight passive parks and five active parks (local playgrounds 02, 04, 07, 08 and 09).

The following is a list of principles:

» A minimum area of 1,000m2.

» Be within 200m of most residents (unless that resident is within 400m of a neighbourhood park).

» Allow for passive and / or active recreation.

» Provide seating and pathways for circulation.

» Incorporate small children's play facility if neighbouring residents are more than 400m from another children's play facility.

» Provide perimeter fencing to children's play facility if required.

» Provide entry and signage elements.

» Provide screen planting to adjoining residential properties.

» Integrate open space with stormwater management and environmental strategies.

» Optimise ecological functionality through planting of endemic species.

WSUD & WATER MANAGEMENT

May include the following:

» Vegetated swales

» Passive irrigation

» Minor or temporary detetion ponds

MATERIALITY

» Timber seating and picnic benches

» Timber shade and picnic structures

» Site stone retaining walls

» Exposed aggregate concrete paths

» Informal gravel/decomposed granite paths

» Bark mulch play safety surface

VEGETATION

» Eucalyptus glaucescens – Tingiringi Gum

» Eucalyptus cinerea – Argyle Apple

» Eucalyptus rossii – White Scribbly Gum

» Eucalyptus Stellulata

» Native grasses and small-medium shrubs as understorey

» Turf

Indicative character imagery

Open Space Hierarchy

LINEAR PARKS AND DRAINAGE RESERVES

Linear parks and drainage reserves are similar in that they are both lineal open space elements. Their function is to provide transmission and connectivity. Often flanked by a road to both sides they are well defined and controlled areas, but provide a critical functional and aesthetic role.

A linear park may run along a ridgeline whilst a drainage reserve will typically run down a valley. The following principles apply:

» Optimise ecological functionality through planting of endemic species.

» Celebrated within streetscape profiles to enhance character and perception of open space.

» Linear parks may link neighbourhood and local parks and other key community focal points into the continuous open space network.

» Facilitate overland flow requirements where practical.

» Integrate non-vehicular circulation to increase safety and connectivity.

WSUD & WATER MANAGEMENT

May include the following:

» Weir structures to control water flow around drainage lines and create pooling where required

» Urban creeklines along streets to aid stormwater management

» Existing vegetated creeklines

MATERIALITY

» Site stone retaining walls and weirs

» Exposed aggregate paths

» Informal decomposed granite/crushed rock paths

» Timber seating

» Timber bridges and stone water crossings

» Site stone/gravel/boulders to drainage lines

VEGETATION

» Eucalyptus cinerea – Argyle Apple

» Eucalyptus mannifera ssp. maculosa – Red Spotted Gum

» Eucalyptus rossii – White Scribbly Gum

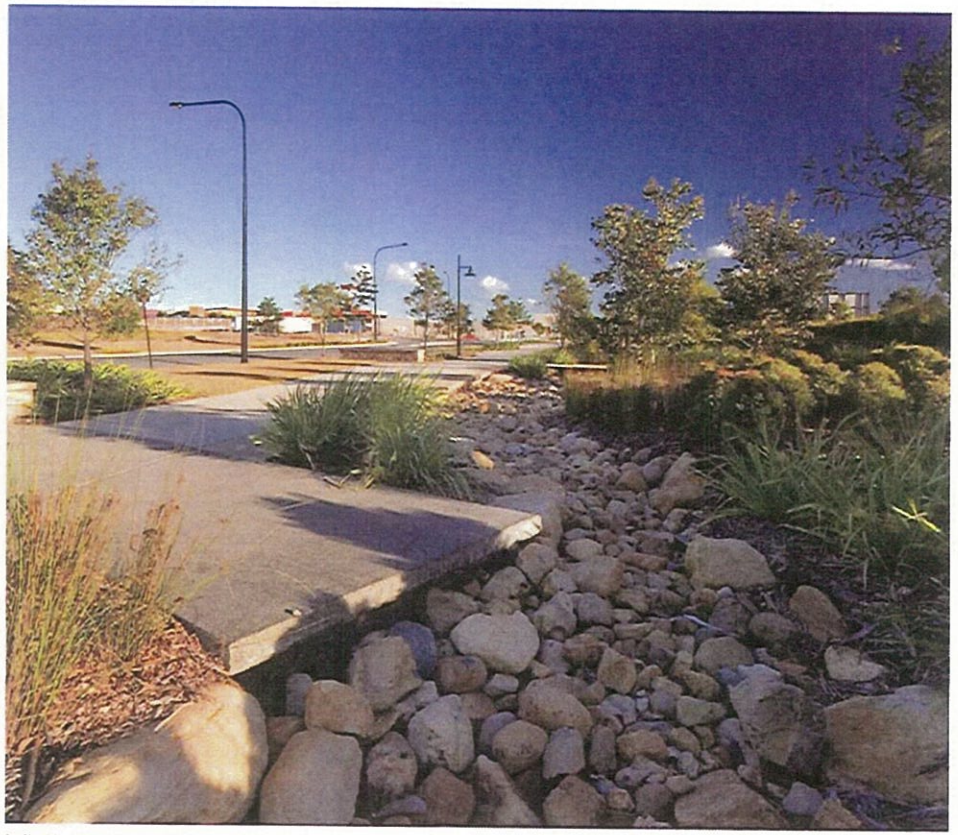
» Eucalyptus sideroxylon – Red Ironbark

» Eucalyptus elata - River Peppermint

» Eucalyptus stellulata - Black Sallee

» Riparian sedge and grass species along drainage lines

» Water tolerant tree species such as Melaleuca and Casuarina along drainage lines



Indicative character imagery

ENTRY GATEWAYS

There are six major entries (off OCR and GDR) and a number of minor entries to parks and open space, the four neighbourhoods and towns centre within Googong Township. A design language based around a clear use of form and material is proposed for all the entries to establish a visual identity and orientation for the site. It must be clear when you arrive, leave and navigate throughout the development both from a marketing and neighbourhood identity perspective.

A design language based around a clear use of form and material is proposed for all the entries to establish a visual identity and orientation for the site. It must be clear when you arrive, leave and navigate throughout the development from a neighbourhood identity perspective.

Entry gateway can create a sense of belonging that fosters ownership, pride, maintenance and protection of the neighbourhood.

A series of suggested installations have been developed that respond to the surrounding sociological, environmental and geological landscapes. These will include walls where possible made of local stone to varying degrees of finish. A screen will sit behind the wall; its associated wall determining its shape and size. A gap between screen and wall will provide for appropriate planting to complete the piece and integrate it into the surround environment.

These pieces can be used as a single element with a minimum height of screen to provide visual identity to minor places of recreation (local parks and public open space) and minor entries. They can be placed in groups with a combination of maximum and minimum height of screens to create strong visual identity for major entry statements, neighbourhood parks and locations of major public open space such as Googong Common.

Walls are to be finished to varying degrees of refinement to communicate individuality, provide for better visual presence and greater potential for use as a tool for wayfinding.

Screens will respond to their associated wall and may incorporate text and signage in the context identification and wayfinding.

All road entries will be used extensively when the township is established however the intersection of Old Cooma Road and Googong Dam Road will be the key entry. The larger and more critical the entry (e.g. at the corner of OCR and GDR) the more impressive scale should be applied.

A greater number of walls should be constructed in groups of 'families' with a number of screens reaching a maximum height in the order of 8 m high. The layout of these 'families' will respond to immediate infrastructure by addressing the entry road while incorporating view framing of the surround landscape.

Lesser entries may feature constructed shapes in the order of 3 or 4 meters high. These installations are to form a spatial relationship through which entry roads can pass, open space is accessed and an alternative method of site navigation will be achieved.

Elsewhere in the project, elements of the installations such as screens may be used to mark and celebrate a particular location. For example to pedestrian only access points to the site or other points that require marking and notification. Full installations are not to be used for everything, as this will weaken the entry hierarchy.

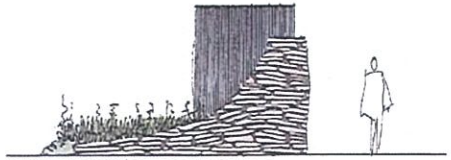
This preliminary concept is to be developed further during the detail design stage.

VEGETATION

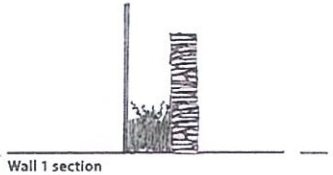
- Eucalyptus mannifera ssp maculosa - Red Spotted Gum
- Eucalyptus pauciflora - Snow Gum
- Fraxinus oxycarpa - Desert Ash
- Liquidambar styraciflua 'Oakville Highlight- Liquidambar
- Pyrus calleryana 'Bradford' - Ornamental Pear
- Native Grasses

Rock type 1 - feature rock for walls

Top to bottom: Suggested stone finish; Suggested screen with text.



Wall 1 with metal screen and planting



Wall 1 section

Open Space Hierarchy

E2 ENVIRONMENTAL CONSERVATION (DRAINAGE)

Lower Montgomery Creek

Lower Montgomery Creek is a locally significant environmental corridor which links the Queanbeyan River and the upper Montgomery Creek catchment.

OBJECTIVES

Vegetation Management within Lower Montgomery Creek will be bushland restoration generally comprising the following;

» bushland regeneration (the removal of weeds/burns/soil scarification/no introduced planting), or

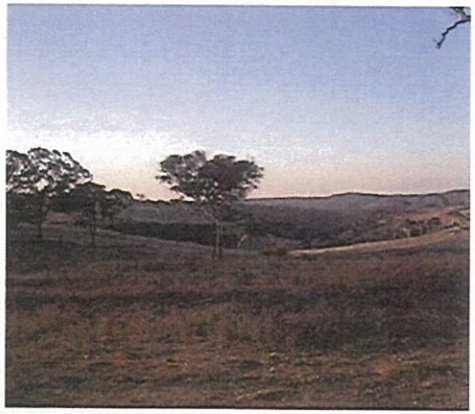
» assisted bushland regeneration (the above and replanting of species missing from the vegetation structure), or

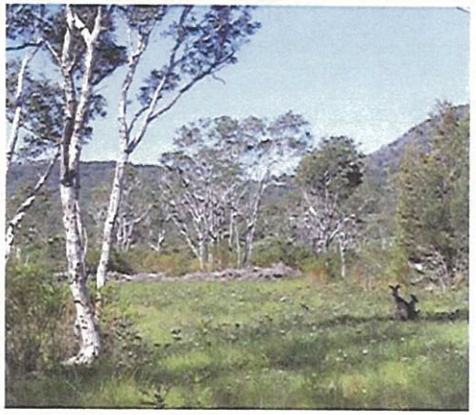
» bushland reconstruction (the above and replanting of full structure vegetation where little vegetation exists).

Generally Lower Montgomery Creek will require assisted bushland regeneration. Over time the area will regenerate to form full structure vegetation. (this will mostly consist shrub growth with scattered trees similar to nearby vegetation on the edges of the Queanbeyan River (20-30 years growth).

The corridor will provide recreational opportunities through a system of paths, wayfinding signage and interpretation signage.

Key plan





Lower Montgomery Creek Images

Hamlets Tributaries

The tributaries provide a link along the regionally significant east-west wildlife corridor between the Queanbeyan River and Jerrabomberra Creek. This wildlife corridor incorporates areas of endangered ecological communities.

OBJECTIVES

It is the vision that these areas (particularly those on the steeper grades) be re-instated to contain fully structured vegetation communities similar that edging the Queenbeyan River. This will occur primarily through natural regeneration which will be triggered by the action of 'de-stocking' the land.

Key plan

Hamlets tributaries images

ROAD BUFFER CORRIDORS

Googong Dam Road

Googong Dam Road will form the approach to the Township's Day 1 Entry and future Town Centre entry.

OBJECTIVES

» vegetation types, species selection, planting density and maintenance will be carried out to ensure the road corridor meets Asset Protection Zone (APZ) requirements.

» the planting concept will consist open woodland - native grasses with sporadic tree planting characteristic of local species.

» feature planting and exotic species will define the entry gateways.

» planting to provide visual screening in key locations to and from the Township.

Old Cooma Road

Old Cooma Road provides a number of secondary entry gateways into the Township. An existing electrical easement (45m) runs parallel.

OBJECTIVES

» vegetation types, species selection, planting density and maintenance will be carried out to ensure the road corridor and easement meet Asset Protection Zone (APZ) requirements.

» the planting concept will consist open woodland as above with vegetation heights restricted along the centre of the easement.

» feature planting and exotic species will define the entry gateways.

» the easement will provide modified habitat value linking the Common and Hill 800 with the east-west wildlife corridor.

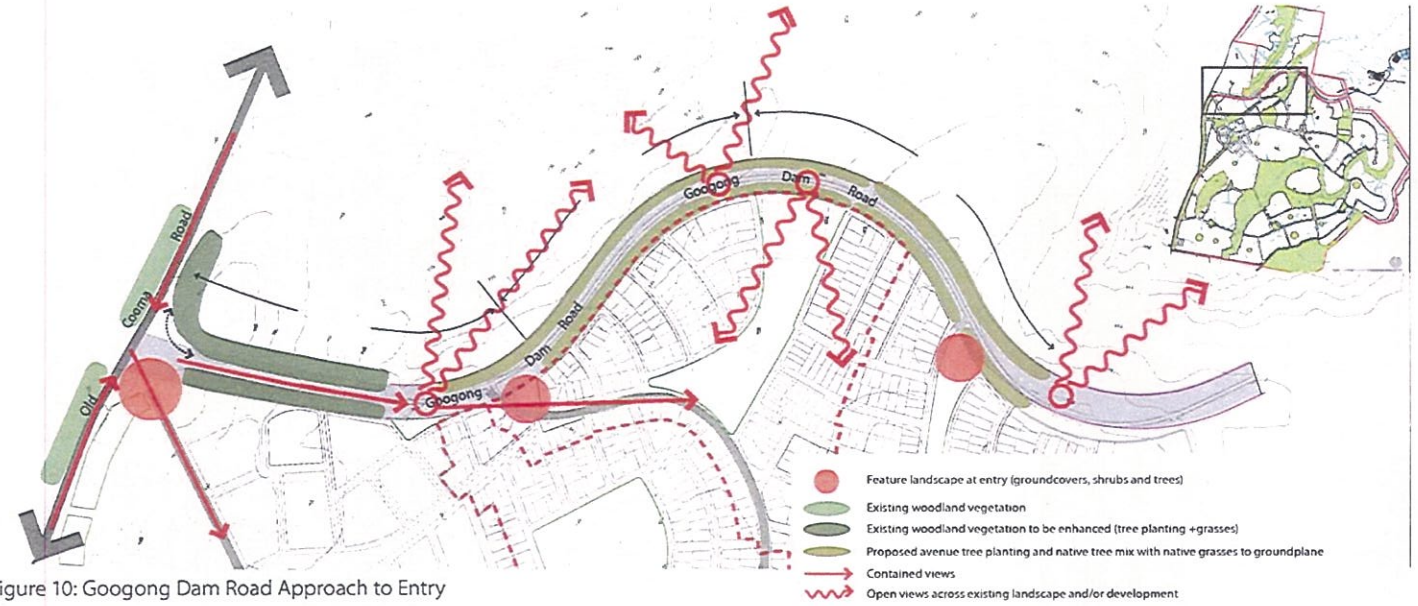


Figure 10: Googong Dam Road Approach to Entry

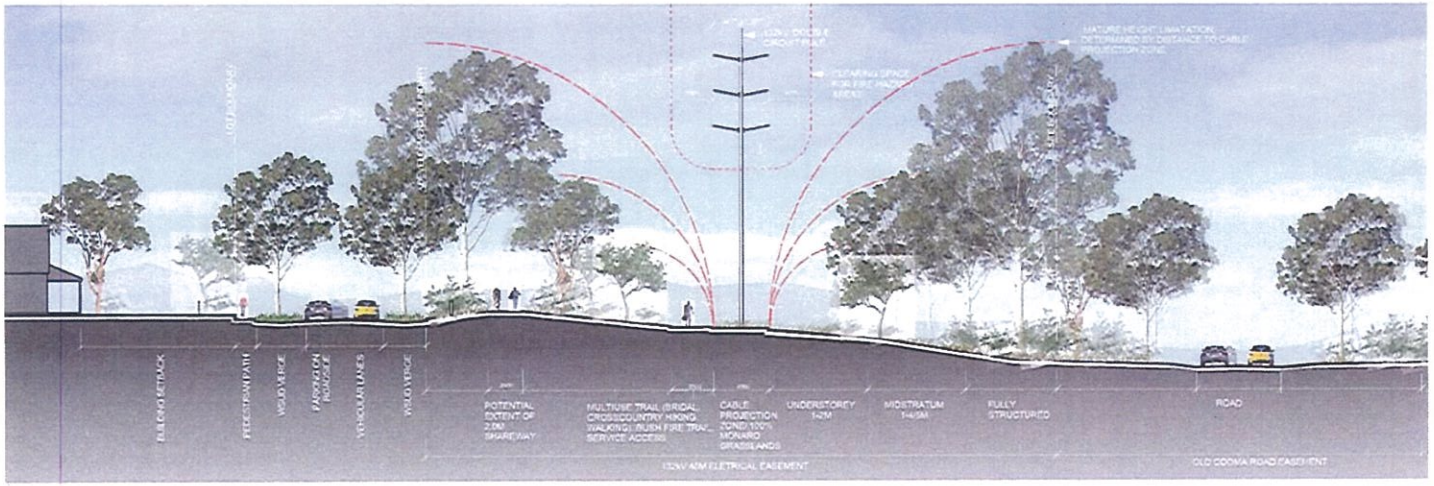


Figure 11: Typical Old Cooma Road Easement Section - Looking South

Open Space Hierarchy

SUMMARY OF MAJOR OPEN SPACE SPORTS & PLAY FACILITIES

The matrix below summarises the major facilities outlined in pages 14-21. There will be an additional 6 tennis courts, 2 in NH1B Local Park 4, 2 in Googong Common (NH3) and 2 in Neighbourhood Park 5 (NH5).

Location	No.	Code	Facility Type	Fields, Courts & Centres	Age Group Focus	Field Dimension (m)
NH1	1	LP01	Local Playground		1-12 Years	
	2	LP02	Local Playground		1-12 Years	
	3	LP03	Local Playground		1-12 Years	
	5	NP01	Neighbourhood Playground		all ages	
	6	CC	Community Clubhouse	2 Tennis Courts, swimming pool	all ages	Tennis 23.77×10.97
	7	G 1	Group Sports Facility - Rec Reserve A	AFL co-use with international cricket	all ages	AFL 165 X 150, ICF 160X142
	8	G 2	Group Sports Facility - Rec Reserve B	Double soccer field & Rugby League	all ages	Soccer 100X76, RL 122x68
NH2	9	LP04	Local Playground		1-12 Years	
	10	NP02	Neighbourhood Playground		all ages	
NH3	11	NP03	Neighbourhood Playground		all ages	
NH4	12	LP07	Local Playground		1-12 Years	
	13	NP04	Neighbourhood Playground		all ages	
	14	CC	Community Clubhouse	2 Tennis Courts, swimming pool	all ages	Tennis 23.77×10.97
NH5	15	LP08	Local Playground		1-12 Years	
	16	NP05	Neighbourhood Playground		all ages	
GOOGONG COMMON	17	LP05	Local Playground		1-12 Years	
	18	LP06	Local Playground		1-12 Years	
	19	RP01	Regional Playground		all ages	
	20	G 3	Local Indoor Sports and Aquatic Centre	Indoor Sports and Aquatic Centre	all ages	8 lane X 25m aquatic pool, chlidren's wading pool and an indoor sports hall that accomodates two indoor courts
	21	G 3	Group Sports Facility	6 Netball Courts	all ages	Netball 30.4X15.25
	22	G 4	Group Sports Facility	AFL co-use with international cricket	all ages	AFL 165 X 150, ICF 160X142
	23	G 5	Group Sports Facility	Double Soccer co-use with international cricket / Rugby League	all ages	Soccer 100X76, ICF 160X142, RL 122x68
	24	G 6	Group Sports Facility	Double Soccer co-use with international cricket / Rugby League	all ages	Soccer 100X76, ICF 160X142, RL 122x68
	25	G 7	Group Sports Facility	Double Soccer co-use with international cricket / Rugby League	all ages	Soccer 100X76, ICF 160X142, RL 122x68
	26	G 8	Group Sports Facility	Double Soccer & Rugby League	all ages	Soccer 100X76, RL 122x68

Figure 12: Summary of Major Open Space Sports & Play Facilities

Character

OPEN SPACE CHARACTER

Other than streetscapes which form the connective network for Googong Township, it is the destinations or physical open space that defines public domain character. The unique ecological and geomorphological qualities of the site will inform the design character. Strong themes will be drawn from these existing qualities and from the surrounding region.

OBJECTIVES

» Provide passive green space to enhance the aesthetics of Googong and contribute to memorable and enjoyable experiences.

» Provide spaces for community expression and engagement.

» Create a distinctive identity across Googong yet variety to each of the defined character zones.

» Retain existing trees and geological formations where possible with the location of parks and open space.

PRINCIPLES

» Create visual rewards through location of amenities in highly visible locations, to enhance visual character, identity, surveillance and guardianship.

» Utilise open space for integrated stormwater management incorporating water sensitive urban design principles.

» Parks are to be located on main roads or provide perimeter road address for standard roads.

» Parks are to be located central to residential neighbourhood areas.

» Visibility across parks should be maintained with limited inclusions of shrub planting or other objects that inhibit site lines.

» Use unobtrusive physical barriers to discourage undesired vehicular access to parks.

» Pedestrian paths to be located on desire lines.

» Provide shade trees and structures to seating and play areas.

» Provide detail grading and retaining systems to allow for levels associated with existing trees and geological formations to be retained.

» All lighting to conform to relevant Australian standards.

» Plant species are to be indigenous where possible except for 'cultural plantings'. Indigenous seed stock to be sourced locally and used for generation of all plant material (again where possible). Plant species to be chosen to accommodate site specific issues such as recycled water management.

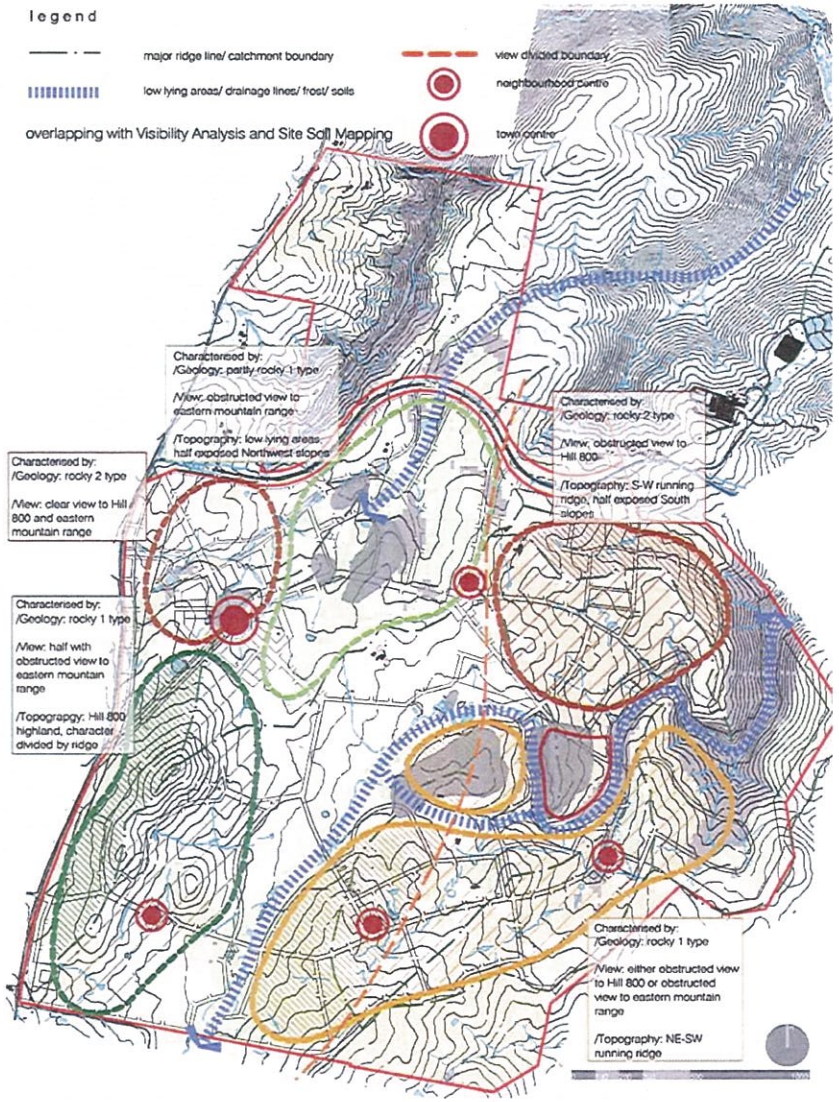


Figure 13: Site Character Analysis
Note: locations are indicative only and subject to further review and detail design at Neighbourhood DA stage.

TRANSECT ZONES

The Googong masterplan consists a sequence of Transect Zones from natural edges to the highly urban character at the heart of the Town Centre. This sequence of characters is the basis for organising the components of the built elements and landscape character of Googong: building, lot, land use, street, and open spaces. Each character zone is comprised of elements that reflect its location within the neighbourhood. The low density edge of a neighbourhood will typically have large residential homes, lawns and streetscape planting which responds to the surrounding landscape. This gradually transitions to the busier neighbourhood centres. Here buildings are closer to the street and there are some attached residential dwellings, shop top housing as well as neighbourhood level retail, commercial and community activities. The most active and urban part of Googong will be the Town Centre. Buildings in the town centre will be larger and be predominantly mixed use. As the civic, commercial and cultural heart of the new community it will be used both day and night.

Each Transect Zone is comprised of elements that reflect its location within the development. There are three zones identified within NH1A;

1. T3 / Sub-Urban Transect Zone – low density edge typically with large residential homes and native planting which responds to the surrounding landscape
There are two sub-urban categories found within NH1A, the Neighbourhood Edge along Googong Dam Road and the Internal Neighbourhood

2. T4 / General Urban Transect Zone – a gradual transition into the Neighbourhood Centre where residential types vary and are mixed with commercial and community activities and planting is predominantly exotic
3. T5 / Urban Core Transect Zone
The Urban-Core Transect Zone (Town Centre) does not occur within NH1A.

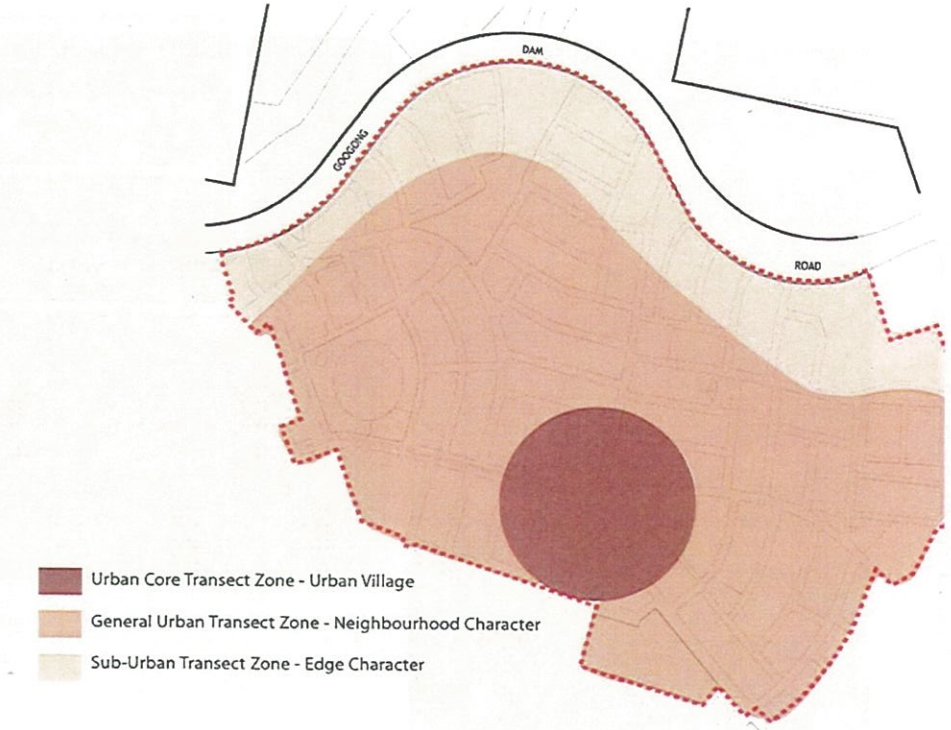


Figure 3.2: Googong NH1A Transect Diagram

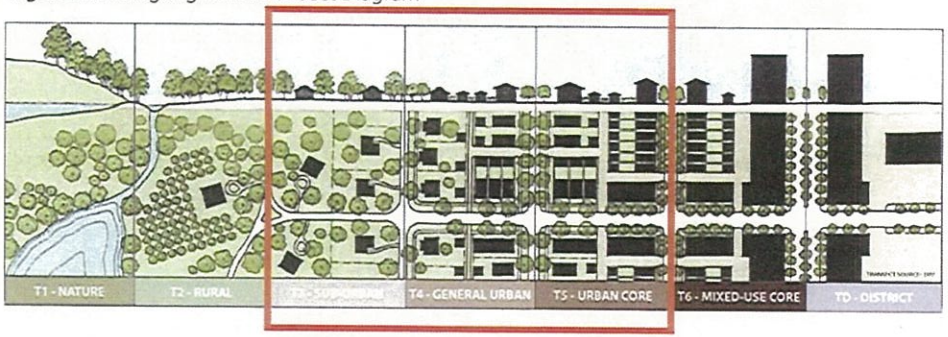


Figure 3.3: Googong Township The Transect Zone indicating NH1A extent
(source: Roberts Day, 2009)

Landscape Palette

MATERIALITY

OBJECTIVES

» Utilise site sourced stone where possible in the construction of retaining walls, concrete surfaces, landscape structures and mulches etc. to embody site character.

» If unavailable from site then where practical obtain landscape materials from local sources to reduce emissions associated with importation of materials from further afield.

» Where possible utilise materials that have had minimal negative environmental and social impacts in their extraction/production and transportation to site.

» Utilise recycled products where possible.

» Materials are to be selected for their robust and resilient qualities.

» Materials are to be selected with the character zones in mind.

SITE MATERIAL

Rock sourced from site may be appropriate for use in a number of applications:

» feature boulders;

» stone walls;

» gabion structures;

» leaky weirs to Montgomery Creek corridor;

» facing to concrete walls;

» feature rock mulch;

» decomposed 'granite' substitute.

It is anticipated that the site will provide a number of different rock types in terms of colour, texture and structure.

LOCAL MATERIAL

A selection of locally sourced landscape materials will be used as feasible in a variety of applications such as those listed above.

Attractive, robust, sustainable, maintainable and cost effective materials have been explored that embody site character and will provide a distinct landscape aesthetic for Googong Township.

PATHS

As outlined in the circulation strategy there are a number of path networks proposed for Googong Township open space. These include:

» Standard footpath - brushed concrete

» Civic footpath - coloured / sandblasted concrete

» Bushtrack - stabilised gravel/decorat granite

» Boardwalks - timber / steel

» Dedicated cycle lanes- bitumen (to engineers specs.)

» Paths in open space - brushed concrete

» Multiuse trail - compacted gravel/soil.

WALLS

» Feature walls/entry elements

» Retaining walls

» Weirs.

MULCHES

» Gravels - available from local quarry and from site

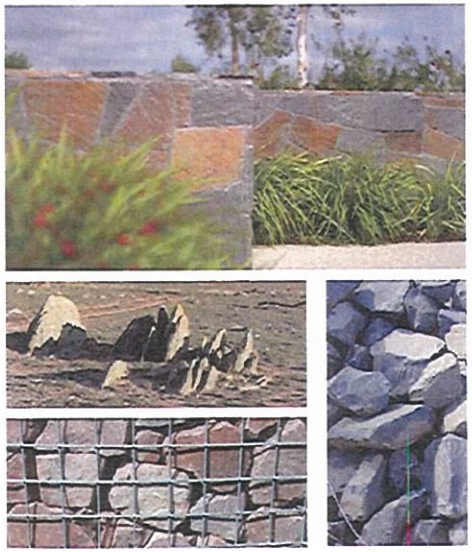
» Organic - locally available where possible.

EDGINGS

» Steel

» Timber

» Concrete.



Top to Bottom: Wall; Rock sourced from site.

Typical finishes

Landscape Palette

STREET TREE STRATEGY

An attractive streetscape requires a considered approach to the selection and location of plant material. Trees are one of the most critical components of a well functioning and attractive streetscape. The following features have been taken into consideration in the preparation of this strategy.

SUSTAINABILITY

» Maintaining a low impact on the environment and natural resources, by selecting plant material that is endemic to the region or exotic plants that will complement the desired character or other aesthetic or functional needs (eg solar access). Plants also need to survive and revive after periods of drought, cold and high winds.

AESTHETICS

» The combination of both endemic native and deciduous species are at the core of the aesthetics of Googong Township. Plant selection criteria includes topography, soil and climate, with focus on achieving a landscape that evokes seasonality and sustainability.

» To provide variety of forms, colours, textures, flowering habitats and seasonality.

MAINTENANCE:

» Careful selection of materials ensures that maintenance for all species is very low to no maintenance.

» Requirement for active water(ing) to be low. Species chosen to withstand periods of drought (within a reasonable time frame).

LONGEVITY

» Species need to be able to withstand the variety of conditions found on the site.

» Good horticultural practices are to be undertaken during the preparations of the sites to ensure longevity of the trees is achievable.

ECOLOGICALLY RELEVANT

Selection will also include suitable species from those communities that are found in the region.

» WSUD beds to be planted with appropriate species to address regular storm water inundation.

» All species to be selected in response to the harsh climatic conditions including frost, drought, dry and cold winds, and skeletal soils.

» Incorporate existing trees into proposed verges where possible.

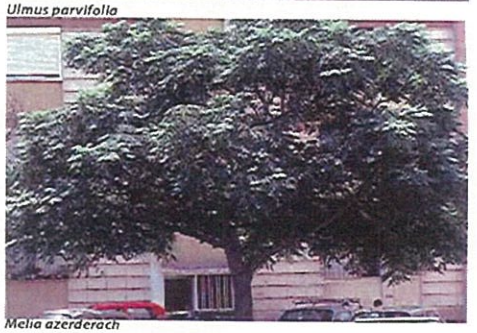
» Final species selection will occur in consultation with Council having regard to the contents of the Googong Landscape and Open Space Strategy.

Eucalyptus elata

Eucalyptus cinerea

Fraxinus oxycarpa 'Raywood'

Ulmus parvifolia



Melia azerderach

Magnolia grandiflora

STREET TREE MASTER PLAN

OBJECTIVES

» to establish a hierarchy of landscape and verge treatments within the urban structure.

» to enhance the visual character of the development.

» to form street characters and reinforce the neighbourhood transect.

» the creation of environmental microclimates specific to location, hierarchy and built form.

» consideration of IWCMP and WSUD strategies.

» retention of existing trees where possible.

GOOGONG AVENUE

» This is the main connector street linking all five neighbourhoods. It comprises (3) characters; these are urban, neighbourhood and park / edge. WSUD bioretention elements to be incorporated where feasible, passive irrigation elements to be incorporated throughout.

» Key species: Plane Tree (Platanus orientalis).

» Verges and median / swales: 100% exotic (Platanus orientalis).

ARTERIAL / ENTRY STREET

» Secondary connector linking entry gateway, town centre and Googong Common. Key species to be determined.

» Verges and median / swales: as above.

TOWN CENTRE (1), NEIGHBOURHOOD CENTRES (4)

» Shelter / Shade vegetation - with colour / flower / scent.

» Key species: Exotic, one species per centre for individual character development.

ENTRY GATEWAYS (6)

Feature planting to establish a visual identity and orientation for the site. Species to complement arts and signage elements.

» Key species: Liquidambar

LOCAL STREETS

Three types are proposed:

1. 100% Exotic:

» Key entry streets and connectors to Googong Avenue

» Display village

» Local streets (higher order).

2. 50/50% Exotic/ Native

» Local streets (lower order)

» Park edge streets

» Edges to Googong Dam Road.

3. 20/80% Exotic / Native to 100% Native

» Open space and common edge streets.

NEIGHBOURHOOD AND LOCAL PARKS

» Generally native with exotic species at key areas such as entries, BBQ seating or art elements.

APZ ZONES

» 100% Native designed to meet APZ requirements.

DRAINAGE + ENVIRONMENTAL CONSERVATION ZONE

» 100% Native.

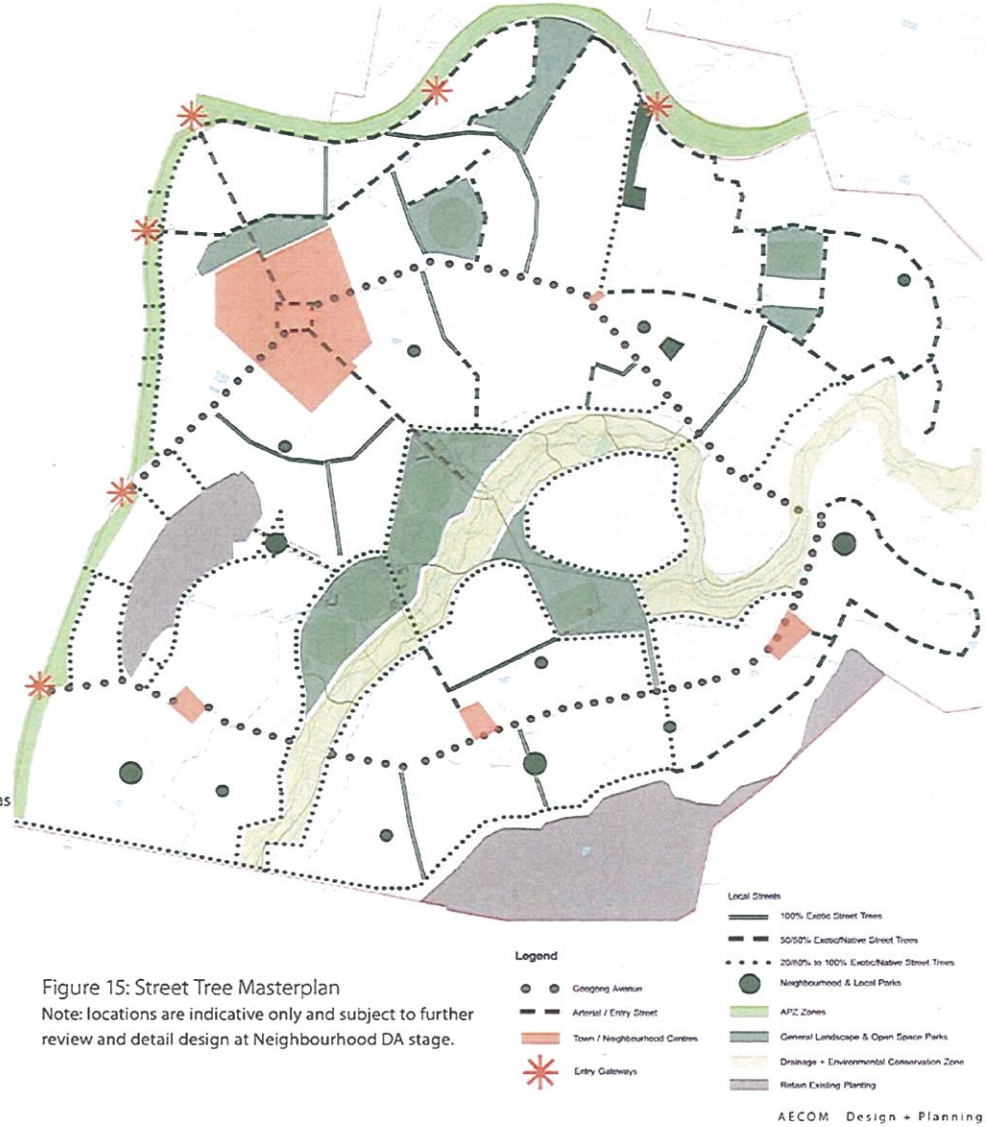


Figure 15: Street Tree Masterplan
Note: locations are indicative only and subject to further review and detail design at Neighbourhood DA stage.

Streetscape

STREETSCAPE OBJECTIVES AND PRINCIPLES

Streets are more than just places for cars and movement. They provide pedestrian and bicycle routes, they assist with the legibility, identity and character of a place and they provide spaces for daily encounters between residents and neighbours.

Careful consideration of circulation and access within any built environment can heavily influence a users experience of function and place. Ease of movement and access is critical to their usability and desirability however, it is the character of a boulevard, a sidewalk and the landscape that create the 'sense of place'.

OBJECTIVES

» Establish the hierarchy of circulation treatments – arterial boulevards / avenues, collector roads, local streets and laneways within the urban structure.

» Design roads and streets that respond to the local context creating a distinctive identity for Googong, with an individual neighbourhood character, that evokes a 'sense of place'.

» Provide movement choices that allow people to walk, cycle, and use public transport rather than vehicular movement only.

» Create safe routes for all.

» Retain existing trees and geological formations where possible when locating streets.

» Create environmental micro climates for the comfort of residents.

PRINCIPLES

» Enhance visual character, identity, surveillance and guardianship.

» Utilise streetscape verges where practical for integrated stormwater management incorporating WSUD principles.

» Utilise streetscape elements (lighting, signage, structures & planting) to provide physical comfort and definition to the circulation system.

» Street character elements should work at multiple scales to help identify district and neighbourhood identity.

» Provide detail grading and retaining systems that allow for levels associated with existing trees and geological formations to be retained where practical.

» All lighting to conform to relevant Australian standards.

» Plants should be chosen with regard to water use/ requirements (low). Turf species recognised to require minimal watering should be specified where possible.

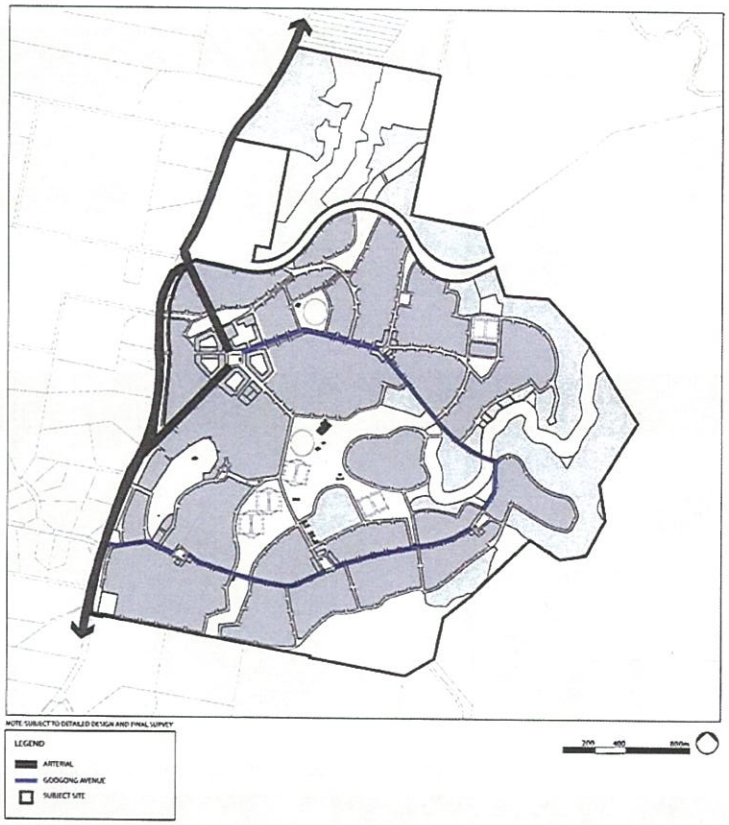


Figure 16: Googong Township Street Network Plan
(source: RobertsDay, 2009)

Indicative main street/urban character imagery

Indicative connector/neighbourhood character imagery

STREET SECTIONS

GOOGONG AVENUE

Googong Avenue is the main 'connector' street running through the development linking all five neighbourhoods.

» A three tiered street hierarchy is proposed. This includes:

  – 1. Urban Character/Main Street Character.

  – 2. 'Neighbourhood' Character

  – 3. Park / Edge Character

» Avenue planting is proposed to either side of the street (Platanus *orientalis*, Plane Tree). This element will remain consistent while verge treatments, materiality, street reservation widths and function reflect the development character through which the avenue passes.

» Verges and median / central swales, where present and where grades allow, may incorporate WSUD biofiltration beds.

» Tree spacings will decrease to build intensity on the approach to the town centre and neighbourhood centres.

» Avenue trees to kerb lines should remain parallel and formal while median tree plantings may respond to character zones with tree groupings and random spacings.

» Paths will be provided to either side of the street over its entire length.

CONNECTOR STREET

These streets run from site entries connecting through to Googong Avenue and Neighbourhood Centres.

» parallel and formal tree plantings with even spacing of 15-20m;

» large scale tree selection (15-20m height);

» exotic or native species (per street);

» consistent character and palette across character precinct;

» bosque's (exotic & native) at threshold & entry points; and

» path for both pedestrians and cyclists to one side of street (on amenity side of street).

LOCAL STREET

These streets form the majority of the street network throughout the development.

The following defines:

» parallel tree plantings;

» typical spacing 15m;

» medium height tree plantings (10-20m);

» a combination of native and deciduous trees

» flexible character per street group; and

» simple groundcover / understorey.

Figure 17: Googong Avenue - 'Neighbourhood' Character

Figure 18: Connector Street Section

Figure 19: Local Street Section

WSUD and Water Management

Water sensitive urban design (WSUD) is an approach to the planning and design of urban environments that supports healthy ecosystems, lifestyles and livelihoods through smart water management.

It offers an alternative to the traditional conveyance approach to stormwater management and aims to mitigate environmental impacts particularly on water quantity, water quality and receiving waterways, within urban areas. Thus WSUD incorporates holistic management measures that take into account urban planning and design, social and environmental amenity of the urban landscape and stormwater management which are integrated with stormwater conveyance by reducing peak flows, protection of natural systems and water quality, stormwater reuse and water conserving landscaping.

The WSUD elements proposed at Googong address stormwater quality, waterway stability and vegetation irrigation. Bioretention systems will be used to treat stormwater to best practice standards. Detention areas and stormwater harvesting will be used to limit post- development changes in flow rate and flow duration for the protection of receiving environments. This is critical for the protection of the terrestrial and aquatic environments of the Montgomery Creek and the hamlets tributaries north of the site, particularly in limiting the impacts of urban development on channel bed and bank erosion.

Some specific WSUD objectives are to:

» minimise impacts on existing natural features and ecological processes
» minimise impacts on natural hydrologic behaviour of catchments
» protect water quality of surface and ground waters
» minimise demand on the reticulated water supply
» improve the quality of and minimise polluted water discharges to the natural environment
» incorporate collection treatment and/or reuse of runoff, including roofwater and other stormwater
» reduce run-off and peak flows from urban development
» re-use treated effluent and minimise wastewater generation
» increase social amenity in urban areas through multi-purpose greenspace, landscaping and integrating water into the landscape to enhance visual, social, cultural and ecological values
» add value while minimising development costs (e.g. drainage infrastructure costs)

STORMWATER QUALITY

Stormwater quality will be addressed through bioretention systems at the urban / open space interface. Where grade, cost or available treatment area is limited, wetlands or bioretention systems can be integrated with end of catchment detention areas.

Landscaped areas will be configured to optimise passive irrigation (allowing for breaks in kerbs, appropriate set down of the planted surface, paths graded to drain to landscaped areas, scour protection at the edge of the landscaped bed).

Indicative wetland

Indicative detention within the urban context

Typical median swale

Indicative street median bioretention treatment

DETENTION

Changes to the natural catchment hydrology resulting from urbanisation will be managed through flood detention and high flow attenuation. Attenuating peak flows and the duration of high flow discharges mitigates the erosive effects of high flow events particularly on the bed and banks of watercourses and associated vegetation. The open space strategy incorporates areas that have both ecological and hydrologic function within the landscape whilst providing amenity and serving an aesthetic function. Detention systems will be predominantly integrated within open space areas. Detention includes management of 1 in 1 year ARI peak flows and flow duration targets for waterway protection as well as providng 1 in 100 year ARI flood protection.

Attenuating urban runoff discharged to the lower section of Montgomery Creek is important to preserve the potential geological deposits associated with dark terraced sediments that have been observed on the banks. Alternative detention strategies may be required in the urban area draining to this section of Montgomery Creek as grades are steep and there are very few public open spaces therefore limited opportunities to integrate detention.

RECYCLED WATER & THE INTEGRATED WATER CYCLE MANAGEMENT PLAN (IWCMP)

Googong's proposed IWCMP aims to target greater than 60% saving in potable water use and up to 80% recycling of waste water.

Recycled water will be used for the irrigation of sports fields and key public open spaces.

WSUD OPTIONS IN STREETSCAPES

A series of WSUD options can be integrated into Googong streetscapes (primarily Googong Avenue and some connectors and park edge streets) to ensure that adopted elements are functional in their design, are low maintenance and meet requirements in terms of aesthetics and feasibility.

These options may function as bioretention systems or provide for passive irrigation only.

Options will be configured along streets in accordance to its hierarchy, vegetation, desired design outcomes, street levels, relation with aligning lots, maintainance and feasibility. Detailed WSUD strategies will be established for each neighbourhood with streetscape options agreed during the Stage DA's.

Typical WSUD options that may be integrated within major streetscapes include:

» Where lots are elevated above street level, surcharge water from the downpipe (collecting lot runoff and overflow from rainwater tanks) may be redirected to passively irrigate verge areas.

» Where back of lots drainage is required, flow may be directed to a large rain garden at the end of the block.

» Verge blisters with planting at intersections.

» Planting beds at centre of streets to capture street runoff.

» Castellated or flush kerbs installed at edge roads to open spaces allowing street runoff through to planting.

» Indented Parking Bays in an urban context to allow street runoff to planting beds.

WSUD median and verge Imagery

Appendix - Open Space Masterplan

Appendix - Open Space Masterplan

Note

Note: Works are indicative only and subject to further review at neighbourhood D.A. stages.