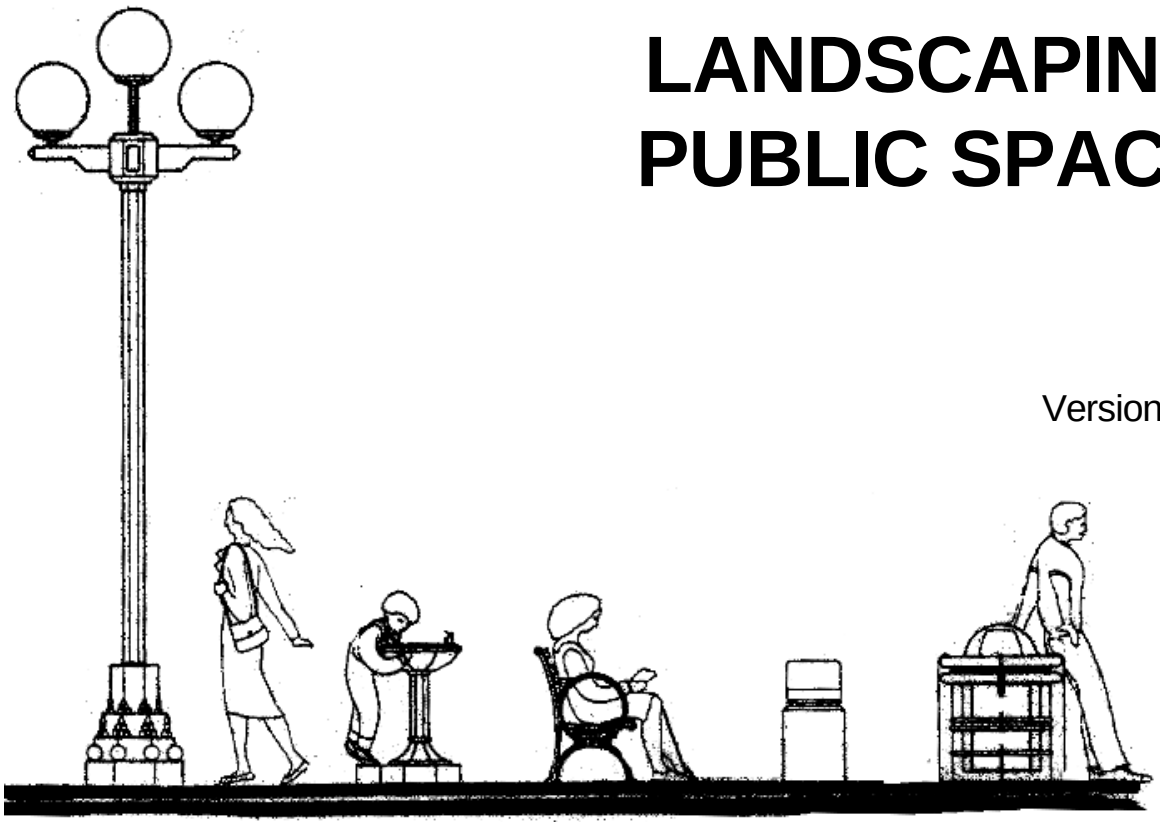
TWEED SHIRE COUNCIL

DEVELOPMENT DESIGN SPECIFICATION

D14

LANDSCAPING PUBLIC SPACE

Version 1.4



SPECIFICATION D14 – LANDSCAPING PUBLIC SPACE

CITATION
This document is named "Tweed Shire Council, Development Design Specification D14 – Landscaping Public Space"

ORIGIN OF DOCUMENT, COPYRIGHT
This document is based on an original drafted for Council by Don McAllister (2002).

VERSIONS, D14 LANDSCAPING OPEN SPACE

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original Version		1 July 2003	
1.2	Update standard drawings	D14.02 Appendix F (deleted)	13 August 2008	
1.3	Update in line with Landscape Procedures and Style Manual 2008 New Section "Retention and Protection of Existing Vegetation" Amend Tree Planting and Location criteria Clarify plant sizes New section "Roundabouts and Median Landscaping" Specify requirements for Landscape Concept Plan at DA stage and Landscape Plan for operational works stage of developments Review use of timber in board walks	D14 – Various Appendix C – Urban Street Tree Planting Appendix H – Landscape Procedures and Style Manual Appendix I – Supply and Installation of Landscape and Turf Irrigation Systems D14.08.3A D14.08.3C D14.08.4B & Appendix E D14.08.5 D14.10 Appendix B	23 July 2009	
1.4	Update Irrigation Specification Added missing plant common names in Appendix C	Appendix I – Irrigation Assets Specification Appendix C – Urban Street Tree Planting	17 January 2018	

DEVELOPMENT DESIGN SPECIFICATION D14

LANDSCAPING PUBLIC SPACE

GENERAL

D14.01 SCOPE

1. This specification sets out design standards for landscaping and embellishment of subdivision land either to be, or already dedicated to the public as

   - public open space
   - public reserve, or
   - public road.

   Note that D14 DOES NOT set design standards for <u>private</u> open space.

what kind of activities are covered?

2. Those landscape settings to be transferred to, or already in, public control i.e

   - Structured Open Space for organized sporting events and training
   - Casual Open Space for general recreational use
   - Public Road verges and other non-trafficked road spaces
   - Various Public Reserves / Council property to which the public has physical or visual access.

   These settings are further elaborated in D14.05

what land uses are the subject of D14?

D14.02 SOURCE DOCUMENTS and REFERENCES

what sources do these specifications rely on?

(a) Council Documents

Tweed Shire Open Space Infrastructure Policy 2002
Tweed Shire Scenic Landscape Evaluation – Brouer 1995
Tweed Vegetation Management Plan – Ecograph 1999
DCP No.2 “Site Access & Parking Code”
Public Art Policy 2001

(b) Australian Standards

AS/NZS 1158.3.1:1999 - *Road Lighting, Part 3.1: Pedestrian area (Category P) lighting - Performance and installation design requirements*.

AS 1742.10 - 1990 Manual of uniform traffic control devices - Pedestrian control and protection

AS 1742.9- 2000 Manual of uniform traffic control devices - Bicycle facilities

c) Other

AMCORD 95 and Practice Notes
Roadscape Guidelines - RTA NSW 1998
Supportive Environments for Physical Activity (SEPA) Guidelines for Local Govt. - National Heart Foundation 1999
Creating Active Communities, Physical Activity Guidelines for Local Councils - DLG NSW 2001
The Burra Charter - Australia ICOMOS – rev. 1999
The Natural Heritage Charter – AHC 1996
The Biodiversity Guide for NSW Local Government – NPWS 2002
Guidelines for Outdoor Recreation and Open Space, NSW Department of Planning 1992
Child-Friendly Environments – Planning NSW 1999
Sharing The Main Street - RTA NSW 2000

d) Standard Drawings that supply to this Section:

S.D.701 Tree & Shrub Planting Details
S.D.702 Standard Revegetation Details
S.D.703 Log Barrier Fencing
S.D.704 Bollard & Removable Rail Details
S.D.705 Tree Planting in Pavement Details
S.D.706 Bicycle Deflector Bar Details

e) Appendices to this Specification:

A - Installations by Setting
B - Schedule of Open Space Design Installations in Tweed Shire
C - Tree Species Selection Tables
D - Crime prevention Through Environmental Design (CPTED)
E - Planting Stock Specifications
F - Deleted
G - Grasses & Mulches
H - Landscape Procedures and Style Manual
I - Irrigation Work
J - Sportsfield Construction Guidelines

D14.03 OBJECTIVES, GENERAL PHILOSOPHY, APPROACH

Objectives

To ensure, to the extent possible through design, that the public realm components of lands transferred to Council in the course of subdivision are

what is Council trying to achieve?

- functional, and fit for designated role
- ecologically sustainable,
- affordable, and
- enjoyable.

To effect, where appropriate, the transformation of spaces into places through a quality landscape design process that realises the above four objectives in terms of positive physical, intellectual and emotional experiences for future users.

General Philosophy

The Tweed community has indicated in a number of forums that it places a high value on the quality, quantity and location of open space supplied with new subdivision releases. In particular, there have been expressions of historical dissatisfaction with the public open space outcomes of denser subdivision

why introduce this specification?

encouraged by the "Green Streets" and 'urban consolidation' versions of public policies prevailing in the late 20th century. It was said much parkland created in that decade did not really meet the needs of the communities it served in terms of **accessibility, convenience, relevance, furnishing and aesthetics.**

Irrespective of whether these claims are well-founded or not, they have raised a community expectation that loss of private open space in terms of the traditional "back yards', reduced building set-backs and public street widths, and higher percentages of medium density development ought to be compensated with generous, well-designed and well-furnished public open space tracts, properly embedded in the communities they are intended to serve.

This is the underlying goal of this specification.

General Approach

what logic underpins the framework of D14 specification requirements?

This specification is intended to refer to most kinds of open space within the public realm managed by Council and likely to be accessible to the public. This includes sporting fields, parks, reserves and that public road-space not proposed to be used by vehicles.

All open space design targets the five key values which underpin this specification. Their expression is derived from local government, state and federal law and policy, and Best Practice guidelines from the several professional disciplines involved in generating public open space. These values are elaborated in D.14.04 and will usually be invoked to resolve problems in instances when it seems this specification is otherwise inadequate.

Consistent with Council's adopted "Open Space Infrastructure Policy", public open space can be subdivided into a set of hierarchal categories called the "*Recreational Opportunity Spectrum"* (ROS System). This specification adopts ROS simply as the less cumbersome "*Open Space Settings*" since possible public land uses are not, in any case, limited merely to recreation. Note also that the precise area and location of subdivision land dedicated to these "*Open Space Settings*" is dealt with elsewhere in Tweed Shire Council DCP16, and is usually fixed well prior to considering the level of embellishment required by this design specification.

Having established which particular "Open Space Setting(s)" will apply to the subject parcel of land, a site analysis is undertaken. Any unique advantages, commitments, and constraints are identified. Incorporating these in the particular *Setting* allows the role(s) the place is expected to fulfil within the community to be clearly articulated, and so inform the subsequent design. Tables in the appendix to D14 list the mandatory inclusions of landscaping and embellishment for each "setting" of open space or road reserve. These provisions or "*installations*" MUST be included in the landscape design drawings. A comprehensive table describing the design requirements for all installation items likely to be encountered in Tweed Shire is also included in the appendices.

In addition to the mandatory *installations*, designers must also reflect on whether the identified role(s) of the site have been properly realised, how the identified unique advantages of the site may be exploited and how to incorporate other available human experience opportunities at the site – within the context of affordability, sustainability, and public safety. Possible additional non-mandatory *installations* are included in the Appendix A tables as well, as cues for their elective provision – as deemed appropriate. (Conclusions reached in these role analyses are expected to be explained in side notes on the cover sheet of the landscape detail drawing set.)

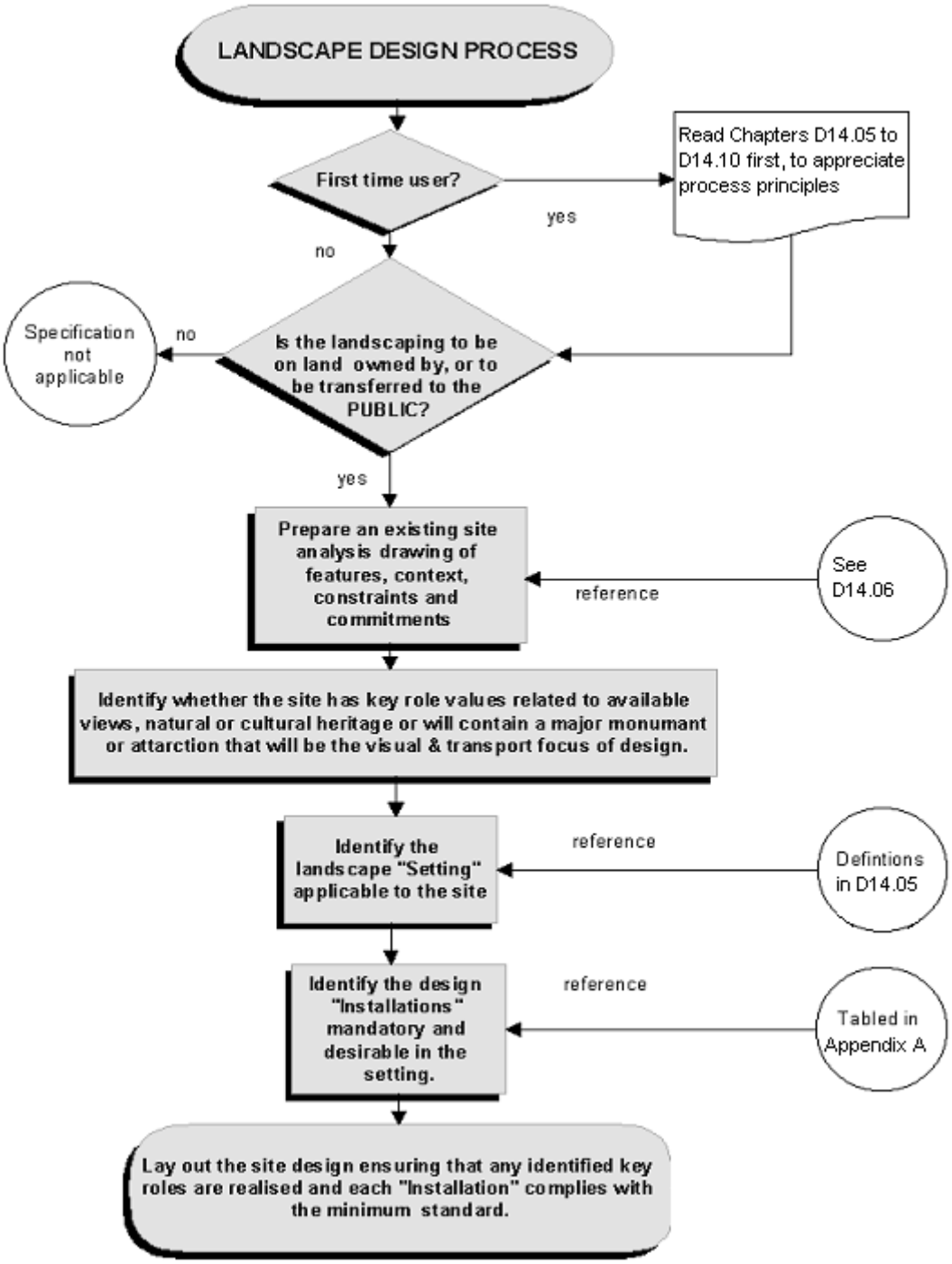
This normally completes the data collection phase.

Some aesthetic and practical guidelines are included in the specification to assist designers in then assembling the spatial elements of context, topography, and chosen installations into as legible and coherent a whole as possible. This effectively is the design.

There will be an expectation in the development control process that evidence of pursuit of this design approach will be explicit in the submitted documentation.

Where the estimated cost of embellishment installations exceeds the allowances in TSC S.94 Contribution Plan No.5 "Public Open Space" (for eligible sites covered by the plan) Council will consider financial or scope adjustments to ensure the costs of "in-kind" contributions do not exceed the provisions of the adopted Contributions Plan.

D14.03.1 HOW TO USE THIS SPECIFICATION



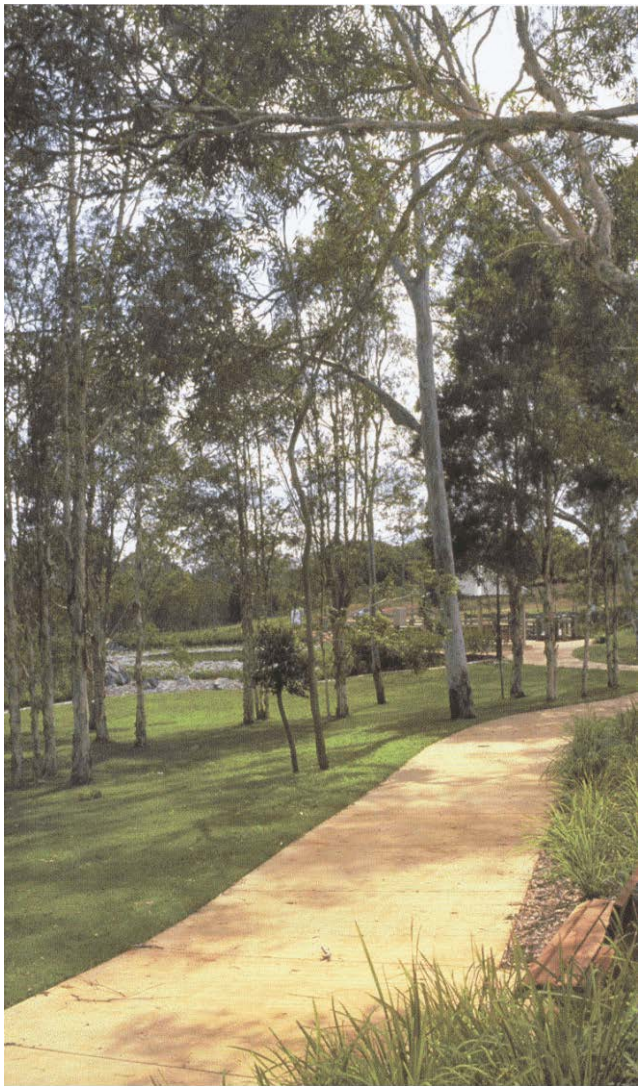
D14.04 LANDSCAPE VALUES

What values underpin this specification?

The perceived quality of public realm landscape outcomes is largely subject to the prevailing values of the community who will own and use those spaces.

This policy is framed around realising five such intrinsic landscape values:

- ***Functionality*** - effectiveness of the landscape product in performing the practical roles expected of it by the community
- ***Affordability*** - the whole-of-life asset cost to Council – finance and efficiency.
- ***Sustainability*** - the site contribution to protection of biodiversity, non-renewable resource usage, pollution control, and energy consumption.
- ***Experience*** - arousing the intended users' sensual & emotional response to the built and natural landscape (calming for **t**ranquillity or stimulating interest, incl. public art, architecture, aesthetics, sense of place (genius loci), vistas and enclosure**.**)
- ***Authenticity*** - recognising, protecting & interpreting the natural, indigenous & European cultural heritage of the site and its immediate context.



Is professional design assistance needed?

Note that the latter two values, despite being somewhat subjective, reflect what may well be the ESSENTIAL expectations of users of unstructured open space, and are therefore key planks of the design process. Realising these key values may invite a higher level of iterative and intuitive design knowledge than usually called for in engineering practice. Accordingly Council requires that professionals in a landscape discipline be the primary authors of landscape designs of casual open space involving discrete parcels in excess of one hectare.

Will there be circumstances not covered by D14?

In site circumstances where this specification is silent, Council will return to these key values to nominate an appropriate design framework.

D14.04.1 LANDSCAPE VALUES - *FUNCTIONALITY*

Functional Roles: Open space is both part of the wider movement network, and also a destination in itself, wherein various recreational activities and passive experiences may occur. These require infrastructure. It must therefore be adequately paved, serviced, drained, lit, signed, fenced, and furnished; and convey public utilities as necessary.

What basic infrastructure does public open space need?

D14.04.1A Movement Network Role

Design considerations for parkland and road verges must address movement and transport to and through a place, including (where relevant)

How will the place be accessed by the public and maintenance staff?

- Vehicular Access, Parking & Exclusion
- Public Transport; Passenger Shelters, Water transport terminuses
- Pedestrian Movement along Desire Lines, Legibility and Connectivity, Shade (Avenue Planting) and Lighting
- Bicycle Access, Storage & Mobility, and Network Connectivity
- Transport Network User Information – Orientation, Direction & Regulatory Signage, Timetables
- Disability Access
- Maintenance Access
- Safety (OH&S) and Security (Crime Prevention through Environmental Design – CPTED see Appendix D)

D14.04.1B Destination Role

The creation and furnishing of destination places includes

How will users' needs be catered for once they arrive in a place?

- Respite elements - seating, lawns, shade (natural & structural), drinking fountains, toilets, kiosks, lighting, refuse bins
- Congregation elements - places of formal & informal assembly, plazas, squares, greens, performance spaces, public art galleries, notice boards & poster pillars. Cafes & kiosks.
- Activity elements – formal sportsfields & change rooms, playgrounds & play areas, irrigation[✪], picnic facilities, BBQ's, showers, amphitheatres, rinks,

D14.04.1C Drainage Role

Storm Water passage, detention and retention

Can drainage be managed?

D14.04.1D Public Utility Role

Communication facilities and services corridors, Electro Magnetic Field buffering, water & sewer pumping & ventilation

How will services pass through the space?

[✪] *As part of its Agenda 21 program, Council will not support new town water irrigation systems in public places where vegetation is established primarily for cosmetic purposes.*

D14.04.2 LANDSCAPE VALUES - *AFFORDABILITY*

Asset management – maintenance, repairs, energy/utility servicing and depreciation costs – assessed annual average ownership cost. (Economic sustainability)

Risk Management – safety, public health and security costs

Can Council afford to take on the "asset"?

D14.04.3 LANDSCAPE VALUES - *SUSTAINABILITY*

Contributing Elements will include

- diverse native habitat protection & creation
- endemic / indigenous species planting
- energy & water resource demand minimisation
- priority to sustainable transport modes
- water-sensitive design; nutrient management, erosion & pollution control
- education and environmental interpretation
- priority to plantation timbers & low embodied energy building materials

Does the site design meet statutory requirements for Local Agenda 21 and Ecologically Sustainable Development?

D14.04.4 LANDSCAPE VALUES - *EXPERIENCE*

Design elements can create sensual & emotional responses, such as human comfort, delight, tranquillity or arousal. Examples include

- microclimate, windbreaks, cascades
- solar access, light & shade, colour, movement, reflection
- noise (avian fauna, wind, water, silence), solitude
- lakes, pools, weirs, fountains
- sightlines, viewsheds, vistas, visual access & penetration
- topography – enclosure and exposure
- playgrounds
- garden settings, floral display, fragrances, groves, mounds & rockeries
- social observation, encounter & interaction opportunities, prospect & refuge
- performance spaces; street theatre, lookouts
- public art – sculpture, mural, mosaic and architecture
- illumination, monuments & memorials
- development entry statements & identification signage

Will the design exploit the natural features of the site to best advantage?

Will the new place generate human comfort, delight, encounter, tranquillity, …

and so on?

D14.04.5 LANDSCAPE VALUES - *AUTHENTICITY*

Authenticity is maintained through acknowledging the setting context and recognizing, protecting and interpreting heritage (as well as generally eschewing faux finishes in new installations.) It is related to connecting to and learning from the known past as an informative element of the present. It may protect artefacts or sites of natural or cultural significance and invoke:

Does the design properly acknowledge and respect the uniqueness of the site and its context?

- existing landscape evaluation (site and context)
- natural heritage conservation & interpretation
- indigenous heritage conservation & interpretation
- architecture & European heritage conservation & interpretation

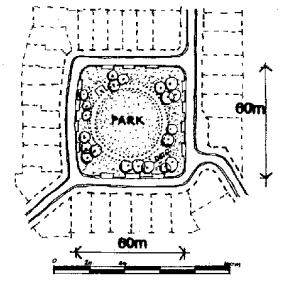
The Tweed Shire Scenic Landscape Evaluation – Brouwer 1995

Tweed Vegetation Management Plan – Ecograph 1999 the Burra Charter and the Natural Heritage Charter are the primary reference documents for decisions in this regard.

D14.05 LANDSCAPE SETTINGS

Landscape settings in Tweed Shire are detailed in AMCORD 95 (A1.3 to A1.5), in Council's adopted Open Space Policy and in DCP-A5, and are expanded further into the subcategories below to facilitate design.

What settings must be provided for?

LANDSCAPE SETTING		**Definition**
Structured Open Space (*example: Arkinstall Park, Oxley St TH South*)		Playing fields, sporting courts, and associated spectator & service areas, generally used for organized sport and training. Often complementary to nearby educational facilities. Minimum multi-purpose playing field dimensions are 170m x 210m, with the long axis deviating no more than 20^0 from true north.
Casual Open Space	Local Park (*example: Albatross Circuit, TH West*)	Small intimate space generally of 0.25 to 0.4 ha. located within 400m walking distance of its catchment, and used for children's play and adult supervision and respite. At least 50% of perimeter is street frontage. 
	Neighbourhood Park	Medium sized space of 1.0 to 1.5ha framed mainly (>75% of perimeter) by streets and having 90% of its catchment (about 600 tenements) within 800m safe walking distance. These parks are "shallow" enough for good passive surveillance yet allow potential for (predominantly 8 – 14 y.o.) play, exercise, picnics, casual meeting, strolling, quietude and respite.

LANDSCAPE SETTING		Definition
Casual Open Space	District Park (*example: Knox Park Murwillumbah*)	Parkland of >2.5ha. serving a collection of neighbourhoods and being no more than 1.5km walk from 90% of dwellings in the catchment. May contain the lower order park features plus bicycling networks, spaces for non-structured sport, social tennis, public art, places of public assembly and open space features such as hills, creeks ponds, and woodlands.
	Foreshore – Riparian	Linear open space bordering waterways providing bank protection, native species habitat, and public access to the foreshore.
	Foreshore – Maritime (*example: Faulks Park, Kingscliff*)	Open space abutting ocean beaches or estuary foreshores, with a high percentage of external recreational users including interstate day visitors. Usually regional in nature and a key element of the Tweed tourism industry.
Environmental Open Space (*example:*)		Protected areas of environmental or cultural heritage significance usually with limited public access.
Roadside		Public land between the road vehicle carriageway and private property.
Roundabout		The non-trafficked areas of traffic roundabout structures, normally inaccessible to pedestrians.
Median Strips & Channelisations		Road areas between vehicle movement carriageways, normally inaccessible to pedestrians.

D14.06 SITE ANALYSES FOR LANDSCAPING

Why conduct site analyses?

The success of an individual subdivision in achieving a distinct identity and "sense of place" is a function of how well the design relates to the specific site and its wider urban context. The "value-adding" flow on from considered analysis can directly benefit developers and future residents through better quality design.

A sufficiently detailed assessment of the site and its immediate surrounds facilitates planning and urban design decisions for the parkland component of subdivision. Site analysis enables:

- a cost effective and environmentally responsive design in respect of site features and constraints;
- natural and cultural assets on and around the site to be taken advantage of to build a positive sense of place and unique identity into the design; and
- design to be integrated with its immediate surrounds and provide compatible interfaces between the parkland site and neighbouring development.

The analyses below should be performed on the parkland open space sites and briefly documented somewhere in the design submission. They will for the most part be graphical.

D14.06.1 CONTEXT ANALYSIS

The purpose of context analysis is to ensure that new parkland is connected to and integrated with surrounding natural and developed areas, including planned and committed development for adjacent sites.

Context analysis should identify key features, opportunities and constraints presented by the periphery and backdrop of the site.

What is the relationship of the site to its surrounds?

D14.06.2 SITE FEATURE ANALYSIS

Addresses aspect, contours, drainage, views, solar access, wind exposure, passive surveillance, movement opportunities & barriers, existing natural & built features and public utilities. See also **D14.08.2B** for soil mapping where relevant.

What components of the site will be considered in design?

D14.06.3 SITE CONSTRAINTS ANALYSIS

Addresses:

What already limits the design options available?

Significant vegetation which should already be reserved as required by DCP16 – PC2.14 and any Vegetation Management Plans or Tree Preservation Orders applying to the site.

Drainage Paths and Water Quality Management Ponds which will be fairly inflexibly located by the master subdivision design and the topography. The un-revetted curtilage of wet watercourses will normally be unavailable for landscaping, except for stabilization or rejuvenation works.

Flood Susceptibility

Transport. Any physical movement barriers, or built or committed movement corridors.

Proximity. Incompatible land uses abutting the site.

D14.06.4 SITE ROLE ANALYSIS

Establish first whether there is a unique intrinsic role(s) for the particular site based on exploiting its particular views, natural and cultural heritage, or monuments and built attractions. Alternatively, some new roles may be invented to address a known local catchment demand or deficiency e.g. a neighbourhood skate-board rink.

What natural advantages can be exploited?

Depending on site size, one of these installations may then form one of the visual and movement network foci of the design structure plan, or alternatively just represent one experience within the ROS within the site.

What nascent community needs could be satisfied?

D14.07 INSTALLATIONS

What things does Council want placed in public open space in Tweed Shire?

Council expects each nominated open space landscape setting to include a minimum suite of installations of infrastructure, equipment, and buildings. The range of the possible installations that the specification draws on and their attributes are tabled in Appendix B. Tables in Appendix A then assign suites of these individual installations to particular settings – some being mandatory and some elective.

Designers should review the relevant installations table in Appendix A for their particular landscape setting and ensure that all mandatory inclusions have been provided in accordance with the design guidelines and standards for each one.

Other non-mandatory installations may be added from the setting list, at the discretion of the designer or Council, judged by their appropriateness to the site.

D14.08 LANDSCAPE DESIGN

What is "landscape design" about?

Urban landscape design practice is largely about modifying open space for temporary but repetitive colonisation by humans. This specification assembles landscape design from FOUR elements, which integrate to form the fabric of landscape content.

What comprises "landscape"?

- **terrain**
- **vegetative cover**
- **hardened surfaces, and**
- **furniture**

In addition to the relevant **Appendix B** installations associated with these elements, there are holistic considerations relating to the sensual experience and utility of the overall design, primarily the realisation of values outlined in **D14.04.**

Note that the information provided in this design specification is in the nature of a primer and can be used by non-landscape professionals to prepare drawings for minor works. It will however be inadequate for the design of major public spaces, where professional input will be necessary.

D14.08.1 LANDSCAPE DESIGN - TERRAIN

What does "terrain design" encompass?

D14.08.1A **<u>Definition</u>:** In this specification, **Terrain** design includes selecting appropriate settings from the ROS for the site, and adapting the existing landform to accommodate them. This may result in a mosaic of land use settings with necessary adjustments to finished surface levels, drainage and movement corridors, and public utilities.

Edges to the site and between any desirably segregated settings may be defined by paths, terraces, mounds, walls fences, drainage channels or vegetation. Or simply by the perception of geometric projection of some existing incomplete enclosures.

How will a

D14.08.1B **<u>Terrain Design</u>** will generally be approached iteratively along the lines

below.

terrain plan be generated in practice?

- Revisiting the site analyses for constraints & opportunities. Establishing the residual areas available for landscape modification.

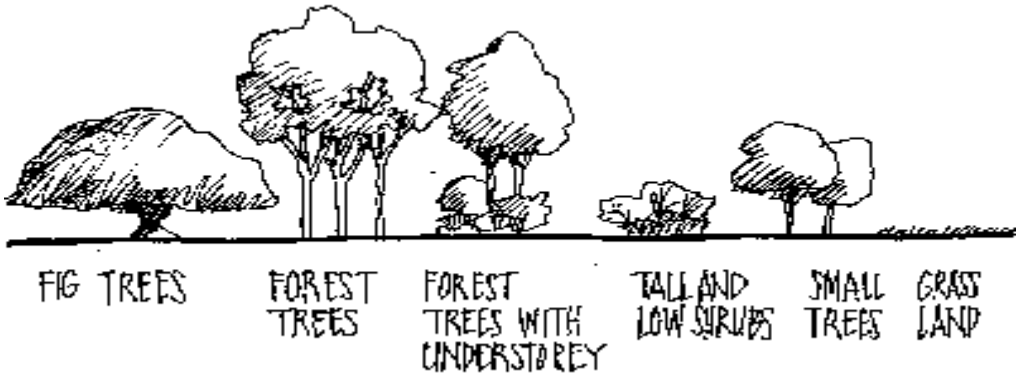
- Determining (using the Site Role Analysis in **D14.06.4**), whether 1 or more settings from the ROS will be on the site, and what uses might profitably be segregated from each other within each setting. Checking **Appendices A** and **B** for the large **installations** applicable to the chosen setting(s).

- Considering whether new or existing internal landmark(s) will become a node in the future movement network. Analysing desire lines for movement networks across the site and to possible nodes or attractions. Rationalising these into combined linkages to the greatest extent possible. Pursuing harmony of the movement network pattern with the finished contours; or adopting formal geometry and symmetry for paths at this stage if deemed locally appropriate. Checking that path axes are central to any landmarks, vistas, or local street projections where desirable, and that external connectivity is maintained.

- Treating the settings and sub-settings as "outdoor rooms", initially locating them in the residual areas clear of constraints and movement desire lines through the site. Selecting appropriate organic or structural "walls" and edges for the "rooms". Confirming that the larger of required installations can fit within the settings now available.

- Adjusting terrain levels to meet design requirements for settings and installations, grading paths, and nominating edge treatment details for notional enclosure of the segregated areas (see D14.08.1A above). After providing for new levelling, mounds and basins, checking that overall drainage will work. Preparing draft contour and landscape settings layout plans.

D14.08.2 LANDSCAPE DESIGN - VEGETATIVE COVER



D14.08.2A **Definitions.**

This design element includes topsoil, organic surface cover (mulches), grasses, shrubs, and trees, plus their spatial arrangement, and the visual and other sensory experiences they engender. (As a general rule, the installation of garden beds of annually flowering plants grown from seed, tubes or bulbs is not encouraged, due to high maintenance costs and susceptibility to theft. These are excluded.)

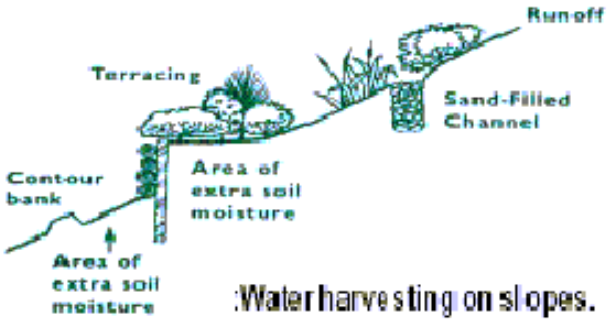
What Is included in "vegetative cover"?

D14.08.2B **Water Sensitive Design.**

Successful surface protection (and ecological sustainability) is enhanced by **water sensitive design**. The main principles for reducing water use are:

What is the ecologically sustainable approach to water needs of vegetation?

- o keep areas of exotic lawn to a minimum (lawns are generally water and fertiliser hungry); and utilise native grasses in lieu where possible
- o select appropriate native and exotic species in terms of their water and climatic needs (avoid water-loving trees and plants);
- o locate and group plants according to their water needs;
- o design any irrigation system to minimise water wastage;
- o conserve soil moisture by the use of mulches or groundcovers. (These are dealt with in the next section.)



:Water harvesting on slopes.

D14.08.2C **Soil**

Topsoil is the organic upper soil layer and will vary in depth from less than 50mm in hard rugged areas to over 200mm in alluvial areas. It can be pale, low-nutrient material which is favoured by many native species, or a dark nutrient-rich soil which is favoured agriculturally but which also encourages the growth of weeds at the expense of native species.

What is "topsoil"?

In natural areas, site topsoil usually has two major attributes:

1. Soil composition and nutrients which suit the exiting adaptation of endemic plant species.
2. Seed stock of endemic species.

As a result, it is important that soil and vegetation types be carefully mapped and recorded prior to soil stripping. This allows segregated stockpiling for later re-spreading and establishing appropriate planting.

When should topsoil be augmented?

On construction disturbed sites, specifiers should provide for topsoil to be stripped following the clearing of vegetation and stockpiled for re-use. Additional imported topsoil may be needed to establish vegetative cover on some hard or denuded sites.

"Super-absorbents" can be specified to be incorporated at the time of planting to improve moisture retention in the soil.

Top soil supply standards are specified in Development Construction Specification C273.04(a) and C273.17(1)

D14.08.2D **Mulch**

Why protect the ground?

Ground protection is important for erosion control, moisture retention, weed suppression, and landscape appearance. It also protects plant roots against temperature extremes.

Native foliage growth normally shields the ground and eventually drops its own litter – forming a natural organic mulch layer. Mulch can be self-accumulating through spent foliage and other natural litter from understorey plants. This natural function is one of the few methods of adding nutrient to relatively impoverished soils. However, disturbed or denuded sites without existing native vegetation will require imported mulch for establishment of a vegetative cover.

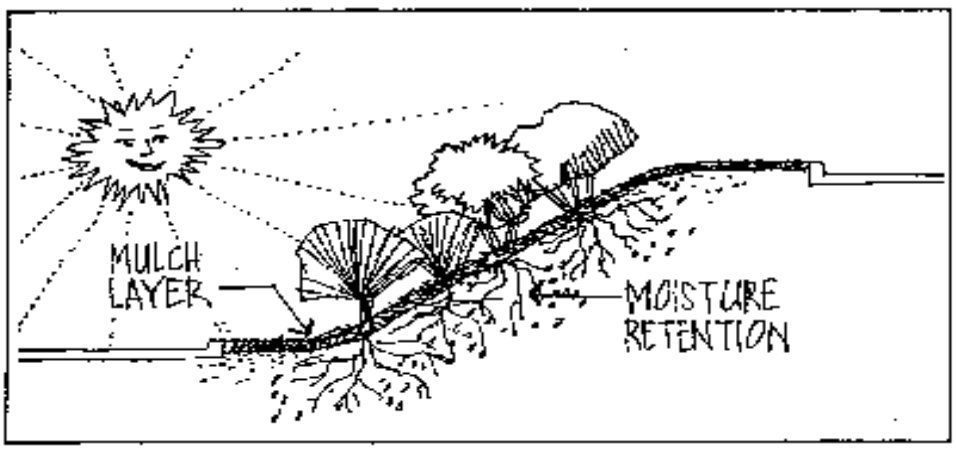
A mulched ground surface promotes foliage growth, reduces evaporation and helps roots become established by providing cool root runs. It prevents erosion, allows better water penetration and (if organic) encourages worms and microbial activity.

What should protect the ground surface during plant establishment?

Mulch is usually made up of organic materials such as woodchip, straw or leaf litter and can help replenish and retain nutrients. Chipped and flaked mulches include native hardwood chips and exotic woodchips, bark flakes, pine shavings and processed stem/leaf litter. The size of material varies according to processing technique. Tweed Council requires that if hardwood chip is used; the material must be derived from timber waste. Use of woodchip from trees harvested specifically for that purpose is not acceptable.

It is advisable to aim for around 75 mm of compressed mulch (begin with about 100 mm). Mulch should be kept away from the stems of plants to avoid collar rot, and moisture levels should be monitored by regularly scraping back mulch.

Additional information on mulches may be found in **Appendix G**



Mulches must be specified on the design drawings – including type, area, thickness and any binders or retention fabrics. Specifications and details of the placement process may be found in construction specification **Development Construction Specification C273 and AS4454**

D14.08.2E Grasses and Groundcover

Lawns

When are lawns appropriate?

Lawn areas suit sports fields, children's play areas and barbecues, but require large amounts of water and fertiliser to maintain them in good condition, and should be kept to a minimum. Consideration should be given to mixes of lawn with areas of paving or mulched garden beds of groundcover.

Lawn areas unable to be maintained using ride-on or gang mowers will not normally be approved. Designers should therefore ensure that grades, clearances, edge strips and access to proposed lawn areas are consistent with that goal.

Where lawn is approved Council expects that it will be soundly established prior to "off-maintenance" acceptance. In most cases this will be best achieved by turfing. Turf supply specifications are found in **Development Construction Specification C273.04(d), C273.05(f),** and **C273.07(c)(iii).**

There are also some excellent drought resistant lawn grasses available for use in sub-tropical coastal zones, but these are unlikely to be available as turf. Guidance should be sought from Council's Manager Recreation Services before buying drought resistant lawn seed. Consideration could also be given to using native grasses which have excellent drought tolerance and require little irrigation or fertiliser.

Groundcovers

When are groundcovers appropriate?

Dense groundcover plants protect the soil in the same way as mulch. Groundcovers can also be used on banks of steep slopes to stabilise them and prevent erosion. 'Green Manures' (eg peas, lupins, lucerne, buckwheat) can also be grown and slashed before flowers set to provide a valuable mulch layer to a garden or broad acre planting.

Ground cover mixes

Ground cover mixes offer a diversified blend which may comprise:

- grasses
- perennial herbs
- prostrate vines
- low shrubs.

The blend of species types should be complementary, allowing rapidly established grasses to help stabilise the ground and thereby assist establishment of other plants. Perennial herbs, or wildflowers, can add a carpet of colour to a sward of grass, as well as biological diversity, at the same time reducing possible weed invasion.

D14.08.3 LANDSCAPE DESIGN - TREES

D14.08.3A Existing Tree Preservation

How should existing trees be treated?

Some of the site constraints likely to be identified in the site analysis (see **D14.06.3**) are valuable stands of existing native vegetation to be preserved and possibly reinforced as a community.

Design Considerations & Actions:

- Identify existing species of trees. Plant additional trees of the same species to establish a colony with intertwining branches.
- Retain existing leaf litter around tree and place more mulch around planted trees. Sloping ground is protected by mulch from erosion and there's no grass to mow!
- Locate surface drains without dislocating tree roots: Consider the likely impact on trees of subsurface drains and basement construction.
- Simple mulched pathways through existing trees are pleasantly shady. Avoid undue compaction of the ground where the roots take in moisture.
- Construct an edging between lawn and mulch around trees to make mowing and weeding easier.
- Some trees have buttress roots visible above the ground. Leave them exposed when finishing ground levels and applying mulch. Make sure your survey plan shows the level of the ground at the base of existing trees so that earthworks can be planned around the trees.
- Treat tree wounds with a fungicidal dressing to prevent decay. Consult a tree surgeon if in doubt about how to lop or prune trees. Correct pruning avoids poor growth in later years.
- Plan constructed items such as fences around trees. Provide sufficient clearance of trunks to allow trees to grow normally.
- Avoid planting incompatible species or smothering vines at the base of trees to be preserved. Retain ground surface conditions favourable to growth of trees underneath the canopy.
- Allow for removal of noxious and environmental weeds from the site, and establishment of replacement native species.

Retention and Protection of Existing Vegetation

In order to retain any established landscape character, all trees located within existing road reserves shall be protected and retained unless approved otherwise by Council.

Significant trees located within the verge of new road reserves shall be protected wherever possible and where advised by Council. This may require the adoption of non-standard utility service alignments; therefore, designers are encouraged to discuss proposed solutions with Council.

Tree Preservation Orders exist with the shire and any trees to be removed must first be checked against the T.P.O. tree location list.

Council will impose penalties for any trees / vegetation removed without prior Council consent.

The canopy, trunk and root system of vegetation located within Preservation Areas must be retained and protected from disturbance.

- The minimum Tree Preservation Area (TPA) is calculated as a radius for the tree equal to ten times the Diameter Breast Height (DBH).

- Prior to the commencement of site earthworks the TPA is to be delineated with temporary fencing comprised as a minimum of star pickets at 5 metre centres with barrier mesh secured firmly. Fencing is to remain in place for the duration of the construction period.

- Site sheds, buildings, driveways, stockpiling, car parking or the cleaning or servicing of machinery is prohibited within the TPA.

- The soil level is not to be altered within the TPA.

- Where operational clearance is required for machinery operating in close proximity to trees, branch removal is undertaken with appropriate equipment and to AS 4373-Pruning of Amenity Trees.

- Trunks of trees are protected from bark bruising or bark removal by the installation of close proximity fences or trunk wrapping with material capable of providing a protection barrier such as timber battens or corrugated iron secured externally by twitched wire.

- Root systems at risk of compaction by machinery will be covered by a blanket of organic mulch 300 mm deep.

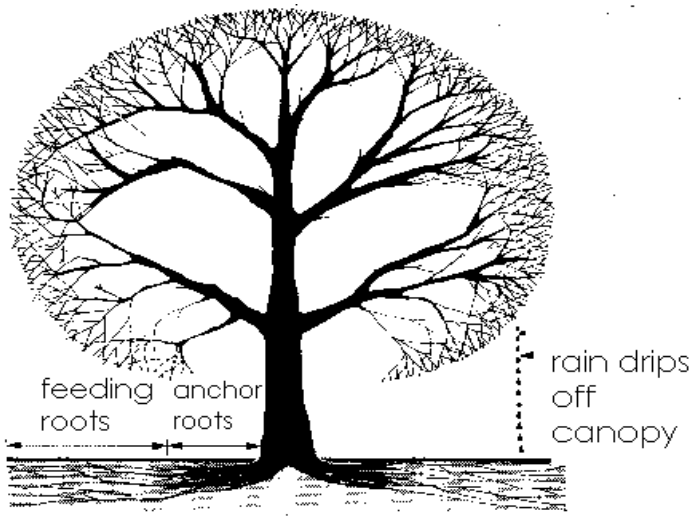
- Where significant disturbance is unavoidable within the TPA and excavation of a trench exposes roots within the TPA an appropriate root curtain is to be constructed immediately using Hessian, hay bales or mulch is then dampened and kept moist.

- All incidents of significant structural or physiological damage to vegetation intended for retention will require the technical services of a qualified arborist who will assess the tree for rectification or removal.

- If installation of services or footings cannot be avoided within/ or through the appropriate zone, arboriculturally sound practices are to be used e.g. coring or tunnel boring. Methods and practices are to be approved by Council's Parks, Reserves and Landscape Services Department prior to works commencing or continuing.

D14.08.3B Designing For Tree Roots

How should trees roots be allowed for?



TREE ROOTS

The roots of a tree will spread from 0.4 times to twice the height of a tree depending on soil moisture and oxygen levels, water table and the species of tree. In most cases, the important region for nutrient intake is within 4–5 m from the trunk of a mature tree.

Ground compaction and hard surfacing proposals must acknowledge trees' need for water and oxygen movement to the roots. Special sub-surface design requirements apply therefore to street trees. See **Appendix F** for **Street Tree Pit** design details.

Tree roots in themselves rarely cause structural damage to buildings. Damage can be caused, however, as a result of soil 'heave' (ie due to the absence of a source, such as a tree that formerly existed, to remove the water) or 'shrinkage' (ie due to extraction of water by trees). This is particularly the case in reactive soils. Tree roots can, however, cause structural difficulties when they create direct leverage against a structure.

D14.08.3C Tree Planting and Location.

Where should trees be planted?

The ultimate aim of planting trees is to provide an attractive streetscape or a park with character and charm whilst providing shade, and aiding in the reduction of heat and glare.

An individual character may be obtained by using one tree species per street or species grouping within a park. Within an established street setting, an assessment of the existing trees should be made, and the most prevalent, appropriate and healthy species chosen for verge planting.

1. Tree species shall be selected for their suitability to the site conditions (eg. small trees under power lines, drought resistance, soil suitability) and shall be in accordance with D14-Landscaping in Open Spaces Appendix A –Recommended Tree species Selection Tables.

2. To ensure consistency in growth rate and form all trees shall be no less than two (2) metres in height and shall be well established in their root and branch formation. A minimum 45 litre container is required. Within certain streetscapes, city CBDs or high density areas the tree size shall be a minimum 200lt.

3. The alignment of street trees shall be in accordance with TSC Standard Drawing SD006-Footpath and Utility Service location.

The alignment and placement of street trees measured from the tree at the estimated ultimate size shall be in accordance with the following:

- Greater than 4.0 metres from electricity or telecommunication poles or pillars
- Greater than 7.5 metres from streetlights to ensure effective street lighting
- Greater than 4.0 metre radius from high voltage transmission lines
- Greater than 2.0 metres from stormwater drainage pits
- Trees are to be planted in the front of properties at the centre of the lot, if no structures are present.
- Trees are to be placed a minimum of 600mm from the back of kerb
- Trees are to be placed a minimum of 3.0 metres from a driveway
- At intersections trees are to be placed a minimum of 10.0 metres back from the face of the kerb of the adjoining street
- Trees are to be located so as not to obstruct access to any services or signage
- Trees are to be located so as not to obstruct pedestrian or vehicular traffic, nor create traffic hazard or cause damage to existing trees
- Street Trees shall be planted in accordance with S.D.701.

See also **D14.08.4C** for grouping, and **D14.08.5** for verge planting

D14.08.3D Avenue Generation

How should avenues be planned?

To create avenues, the same tree species are planted as an equally spaced and uniformly aligned procession framing a road or path, displaying pleasing symmetry and occasionally focussing attention to a focal object on the view axis. Tree spacing for large maturing trees will be around 15m, and around 10m for medium trees. Where relevant, plantings will respect existing views from private property and not obscure important architectural lines in such properties. Designers should use opportunities to present tree lines as perceived extensions of architectural walls.

D14.08.4 LANDSCAPE DESIGN - PLANTING PRINCIPLES

D14.08.4A Plant Stock

What species should be planted?

- For trees, selection may be made from the tree species listed in **Appendix C.**
- Shrubs and tree species additional to the approved list will be considered if indigenous, of suitable habit, and lacking propensity to become an environmental weed. Desirably, approval should be obtained from the Manager Recreation Services in advance, or supporting arguments made in the Statement of Environmental Effects accompanying the Development Application.
- Designers should target species offering local native fauna food supply and habitat, and use locally propagated seed where possible.
- Existing native vegetation should be retained as a future seed source where possible.

D14.08.4B Plant Sizes

How should new plants be specified in design drawings?

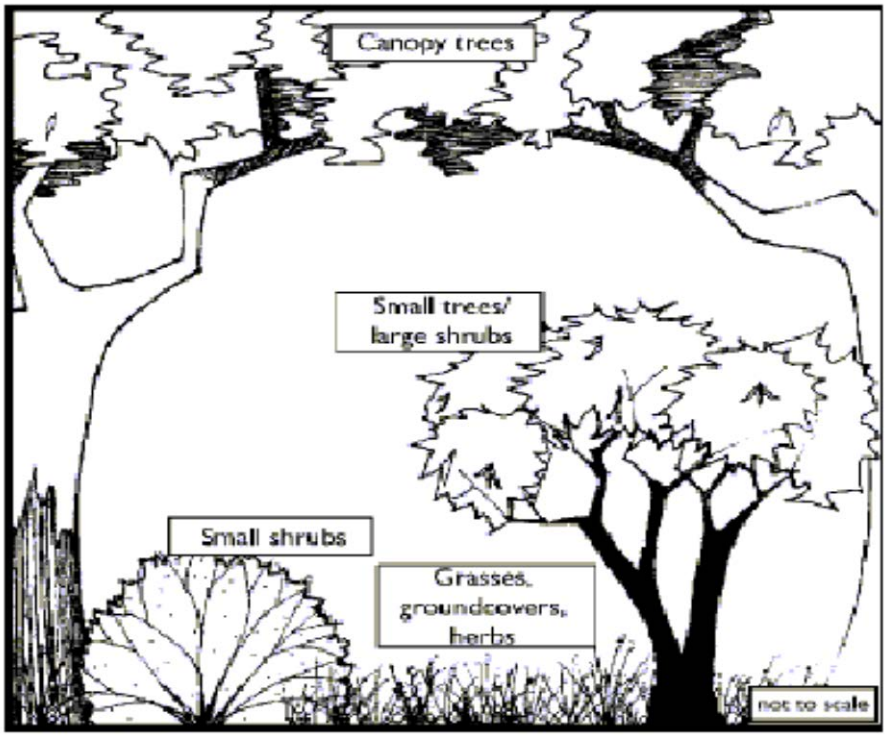
Details of commercial stock sizes can be found In **Appendix E** and **Development Design Specification C273 – Table C273.2.**

Normally street trees will be at least in 45 litre pots. Where proposing mass planting for broad-acre stabilisation of secured sites (i.e. ones reasonably protected against theft during the juvenile phase), smaller stock sizes can be contemplated.

Use of as advanced stock as possible not only assists the early usefulness of public space for the new community but also improves the land product presentation fo rmarketing purposes.

The sizes, species, location, and spacing should be scheduled in tables on the landscape drawing sheet.

D14.08.4C Combination Planting



When mixing plants of various sizes, traditional garden creation practice raises successive tiers of vegetation with height increasing the further the planting is from the movement (observer) corridor. This evokes a pleasant sense of intimacy, allows solar access to the smaller plants and enables users of the parkland to view easily the full range of species contained in the garden.

How are traditional gardens arranged?

For reasons of economy of maintenance and observance of **CPTED Principles** (Appendix D), few occasions will arise in other than botanical gardens for such dense and diverse gardens to be developed within Tweed Shire.

Are traditional gardens still appropriate for suburban public spaces?

However there may be occasional opportunities in larger parks to create dense groves of trees fringed by usable open space. Although attempts in this way to create isolated habitat opportunities will generally be futile, planted native tree and shrub communities may desirably be established as buffers to, or fauna movement corridors between, stands of existing environmental woodlands.

D14.08.4D Thematic planting

Plant themes or motifs may resemble, or draw upon, vegetation associations and structures of the natural environment.

When are theme plantings appropriate?

A motif becomes distinctive by its recognisable simplicity and repetition such as strands of single species at punctuated intervals along the roadway. There may be scope for several themes within complex sub-regions.

Plant motifs may reflect or announce the cultural environment by using a variety of shapes, colours and foliage characteristics. Plant groups of this type should be used to complement existing features, or be introduced along new roadways which emanate from an original setting, so as to maintain a sense of historical experience and cultural continuity.

Thematic planting opportunities will be rare in routine landscaping in Tweed Shire.

D14.08.5 LANDSCAPE DESIGN - ROADSIDE

What does council expect from roadside landscaping?

Road verges and medians contain the vertical relief elements of the public realm components of streetscape. The key goals of roadside landscaping are to

- enable sustainable transport modes (walking and cycling)
- maximise road safety (hazard/conflict reduction and visibility retention)
- provide **SEPA** (see D14.02.2 for details)
- provide **CPTED** (see Appendix D for details)
- improve the street micro-climate
- buffer residents from the visual and noise impacts of traffic
- contribute to the visual aesthetic of the street

Which trees, paths and furniture should be installed in the road verge?

Roadside landscape design will already be largely governed by the cross-section profiles nominated in TSC Development Design Specification D1 - Road Design – **Table D1.7**, which addresses these criteria in a two-dimensional frame.

This is complemented by

- the installation schedules in **Appendix A**,
- the installation specifications in **Appendix B,**
- the tree species selection list in **Appendix C**, and
- the tree planting guidelines in section **D14.08.4** above and **D14.08.10** below.

Only some minor elaboration is then needed as below:

Can small shrubs and flowers be planted on the footpath?

- Due to the confined space available and the need to preserve good visibility and good transverse access, footpath planting of plants other than grasses or trees with mature canopies greater than 1.8m is not supported. Shrubs, succulents and flowering annuals are more appropriately confined to adjoining private property.

How much room is needed for pedestrians and cyclists?

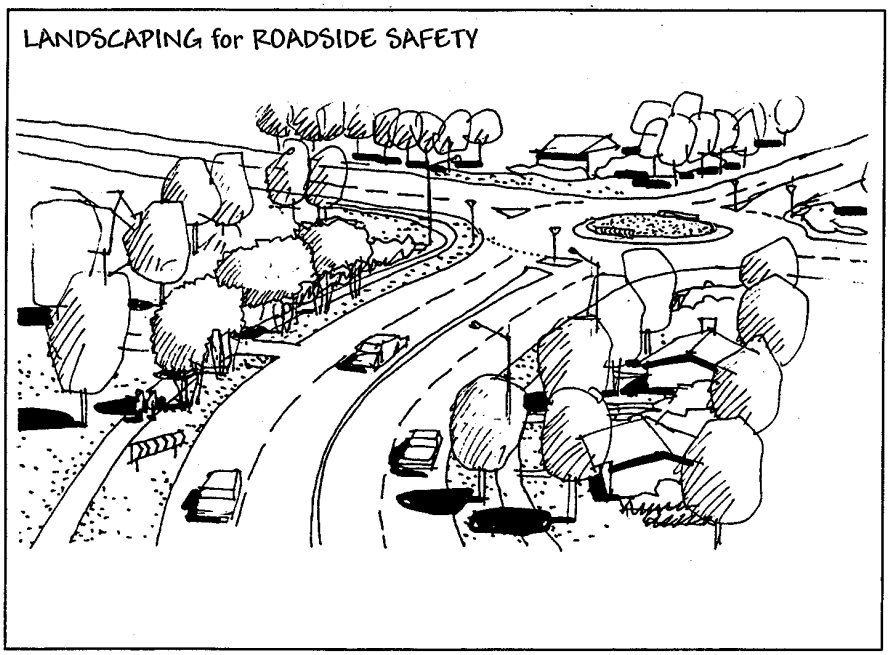
- Street furniture and tree placement must observe the movement envelope clearances from paths as required under **AS1742.9** and **AS1742.10** (see D14.02.2(b) for full citation.) Preferably such clearances should be achieved by prudent furniture placement rather than path deviation.

Can trees be planted in the road pavement?

- Where insufficient width is available on the footpath, Council will allow the planting of trees in the parking lane subject to satisfactory design detailing for road safety, utility protection and root control.

What is the main risk management issue on road verges?

- The single major public liability risk to Council's in public places is tripping and falling due to uneven footpath paving or footpath obstructions. Consequently a high standard of finish, stability and durability is expected from footpath and cycleway paving. Loose or unbound surface finishes in any material will not be accepted.



Roadside planting — good practice.

- *Frangible* tree species are planted on the road bend.*
- *Bushy shrubs are kept clear of locations where sight distance is important.*
- *Poles are set back from road's edge on bend and roundabout exit.*

*Note that the sketch has been simplified. Additional frangible trees could be planted on all approach and exit arms of roundabout, provided visibility is not compromised. * Frangible - Tree species which will shear off or collapse on impact*

ROADSCAPE GUIDELINES RTA NSW 1998

Roundabouts and Median Landscaping

Roundabout and median strip landscape design must have due regard for plant siting and maintenance requirements. Planting in roundabouts and medians are to be set back from the inside kerb edge as follows:

Roundabouts

- 0.0m - 1.0m setback - appropriate pavement material;
- 1.0m - >3.0m setback - shrubs / groundcovers only with a maximum mature unpruned height of 600mm above the road pavement (not top of kerb); and
- 3.0m - >3.0m setback - trees and shrubs / ground covers. Roundabouts of 6.0m in diameter in low speed zones of 50km/h or less, a small single trunked tree with a mature diameter of 100mm may be located in the centre of the roundabout, providing such achieves a clear trunk height at planting of 1.5m above the road pavement level.
- Turf is to be discouraged in roundabouts.
- Median Islands

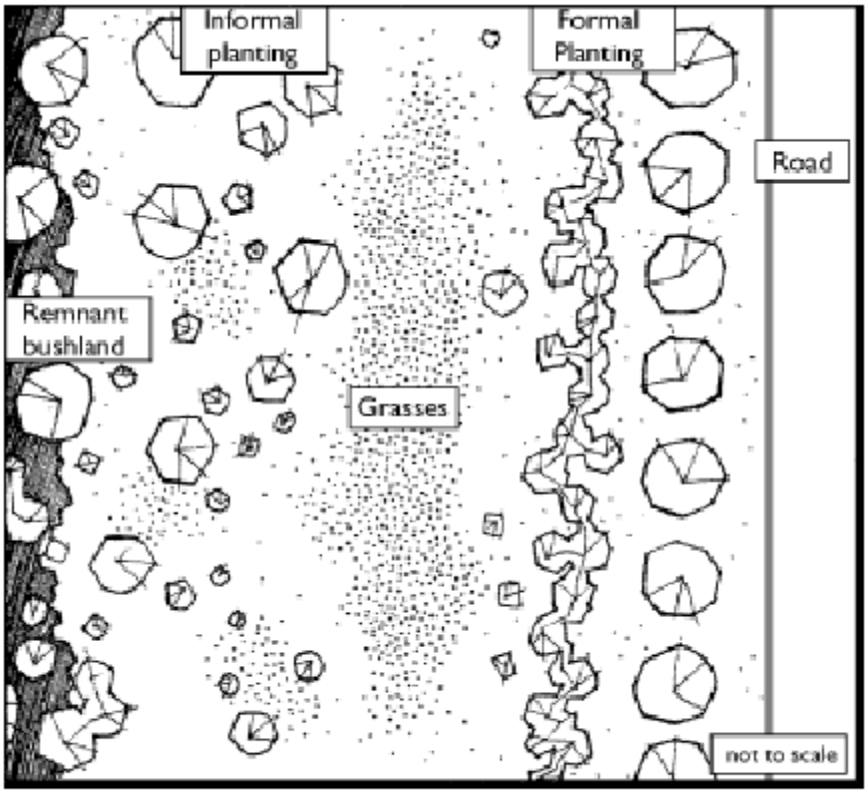
Median Islands

- 0.0m - 0.3m - appropriate pavement treatment.
- 0.0m - 1.0m setback - appropriate ground covers, 200mm high, with minimal pruning requirements
- - 1.5m setback - shrubs / ground covers only. Shrubs and ground covers to have a maximum maintained mature height of 900mm above the road pavement (not top of kerb);min. 1.5m setback - trees and shrubs / ground covers. Trees are to be primarily single trunked species. Tree species chosen will depend on the species spatial requirements and clearance from service elements and light poles; and
- Trees will generally not be planted in medians with an internal width less than 3.0m
- In median strips, three (3) metres or wider, trees may be located centrally or staggered provided such accords with traffic engineering visibility requirements. Tree species will be selected for appropriate canopy shape.
- Ends of median strips require special consideration and discussion with Council with regards to clear zones and safety requirements.
- Irrigation is to be placed in medians with subsoil drainage installed to adequately stop the ingress of water into the roadway. Irrigation shall be of such a design and quality of material and workmanship that the ingress of water into the pavement due to failure or damage is avoided.
- The root system of plants must not interfere with subsurface drainage.
- The design should minimise the requirements for maintenance.
- Interfaces between grass and areas of chip mulch are to be avoided. Where grass does interface with chip mulch, a concrete mowing strip of 300mm wide must be provided.
- Irrigation is to be placed in medians with subsoil drainage installed to adequately stop the ingress of water into the roadway. Irrigation shall be designed to prevent pavement failures by ingress of water.

The mature unpruned height of under plantings on road verges or in

roundabouts, medians and splitter islands is not to exceed 600mm above road surfaces. This height, however, may be reduced at the discretion of Council's traffic engineers and may vary from site to site.

Grass should be avoided for use in median landscapes.



Buffer zone combination planting

Occasional circumstances may arise where arterial and sub-arterial (distributor) roads adjoin tracts of open space or bushland which are to be buffered from traffic impacts and intrusion and the designer is also seeking a formal statement within the road environment.

This may be achieved by a transition using grasses and smaller intermediate trees.

Note that **CPTED** principles (Appendix D) must apply.

D14.08.6 LANDSCAPE DESIGN - HARD SURFACING

What road and path finishes are acceptable to Council?

Hard surfaces applied to parkland and urban streetscapes in Tweed Shire shall be constructed only of hot-rolled asphalt, concrete, or segmented concrete (or vitrified clay) pavers. Segmented pavers can only be used once approval has been granted by the Director of Engineering Services and must be laid a reinforced concrete sub-base as directed by Council. A 100x150mm concrete edge beam is required in all cases except full concrete slab construction.

Surface specifications and tolerances shall be the same as required for roads and paths by Development Design Specification D1, particularly **Clause D1.16** and **Table D1.9**.

D14.08.7 LANDSCAPE DESIGN - FURNITURE

Furniture options and minimum rates of supply in each **Setting** are included in "**Installations**" in **Appendix B.**

How should furniture be located?

Refer to Appendix H Landscape Procedures and Style Manual for furniture details and specifications.

Rather than random distribution and placement, designers should relate

furniture location either to the movement network, or to the visual and social foci that already exist or are created by design. The placement of furniture should demonstrate thoughtful consideration of the social and aesthetic values (revisit **D14.04**) that furniture is expected to realize for users:

e.g. ***respite seating*** *should be regularly provided adjacent to pedestrian paths, overlook play areas, allow for informal seated gatherings, and/or access pleasant views. Utilizing or creating suitable diurnal microclimate is critical. Seating may offer privacy but should nevertheless be very close to sightlines of passive surveillance. A sense of security is enhanced by naturally limiting access to the area immediately behind seating. In particular, seats should not back onto paths. Seat contact areas should dry rapidly after rain and discourage skateboards. Other furniture such as litter bins, lighting, and shelters may be logically grouped with seating.*

Similar sets of considerations based on meeting user needs and expectations through the value system in **D14.04** can readily be devised for the other furniture items scheduled in **Appendix B**. They will not all be canvassed here.

Designs will however be examined for intelligent placement and grouping of mandatory and elective landscape furniture.

D14.08.8 LANDSCAPE DESIGN - AESTHETICS – PERCEPTION & EXPERIENCE

Whilst this aspect is essentially the domain of professionals, some simple principles of design are offered below.

Are aesthetics all "relative", or are there common fundamentals?

Aesthetics Generally

Aesthetically pleasing forms are by definition visual and naturally rely on a degree of subjectivity. However there is a degree of commonality in most positive perceptions.

Elements of a pleasing aesthetic will often include

- Symmetry
- Smoothing
- Simplification of form
- Regularisation
- Decoration
- Symbolism (e.g. a lake shaped like a fish)
- Harmony (following natural & built forms already present on the site)
- Rhythm (regular repetition of a component)
- Referencing the context (acknowledging external scale, forms, and strong axes)
- Introduction of stimuli – public art, places of assembly, follies, focal monuments, water movement, reflections etc; compliant with the above and offering experiences such as surprise, delight, novelty, and mystery.

Observer Behaviour

Does user behaviour affect aesthetic experience?

The aesthetic experience will be obtained either as passive observation or active exploration. Ideally the design will provide opportunities for both.

View Control.

What roles do views play?

Four categories of visual opportunities may be possible:

- Visual outlook onto adjacent landscape/roadscape elements (retain, enhance, obscure or introduce views)
- Visual cues & sightlines along roadway (emphasizing road alignment & intersections – mainly for road safety reasons)
- Visual Containment along roadway (reducing headlight glare, and driver distraction by other traffic streams, or adjacent land use activities)
- Visual Character (providing a pleasant setting for parkland and road users)

Themes & Motifs

How can unique "character" be added?

Designers should attempt to develop and maintain a consistent palette of colours, design styles and materials throughout a site or setting. This tends to distinguish the recognisable character of a place.

Ugliness

How can existing engineering aesthetic deficiencies be remedied?

Inevitably there will be existing or introduced components of engineering infrastructure (and their associated security arrangements) in public spaces whose presence is beyond the control of designers. Sadly, their designs will often be crudely utilitarian, and indifferent to the setting.

These can only be dealt with by screening – either with vegetation or mounding. Transmission towers and the like will of course be unfixable. Occasionally new installations such a public toilets may be contrived to partially screen ugly public utility structures.

Aesthetic Design Standards

What aesthetic standards will be applied in Tweed Shire?

Apart from inviting attention to the above issues, no compliance criteria are imposed through this specification. However Council expects designs to recognise aesthetic enjoyment as a key aspect of the experiences to be obtained from public area landscaping, and reserves the right to require design revision on these grounds, or subsequently to require referral to professional landscape architects where manifest deficiencies cannot be satisfactorily resolved.

D14.09 AFFORDABILITY

What affordability standards will be applied in Tweed Shire?

To avoid the wasteful process of requiring management plans and asset management spreadsheets to establish the annual ownership costs of each site transferred to Council, it will be accepted that designs generally compliant with this specification are economically sustainable.

However Council's Manager Recreation Services reserves the right to require such data before accepting a new asset, where in his/her professional judgement the design deviates significantly from this specification and there is reasonable concern that ownership costs will be excessive.

D14.10 LANDSCAPE DESIGN DOCUMENTATION

Drawing Set

How should the finished design drawings be prepared and submitted?

AMCORD 95 Design Element 1.6 requires that submitted landscape plans for urban subdivision contain the following information:

A2.1

- the adjacent street reserves, carriageways, parking bays, footpaths, cycleway systems and street and park lighting;
- existing vegetation and proposed general character of tree planting and landscape treatment (including proposed species);
- existing rare or significant vegetation, natural habitats and features (eg creeks) which are retained, enhanced or otherwise affected.
- general arrangement of hard landscaping elements and major earth cuts, fills and mounding;
- indicative treatment of any multiple drainage systems and the urban edge, along with general information on fencing, access points and furniture;
- proposed recreation facilities.

AND A2.2

- provision for park lighting where appropriate in accordance with Australian Standards

The following drawings are the MINIMUM submission requirement in Tweed Shire

1. Site Plan & Site Analysis (see **D14.06**)
2. Layout Plan showing landscape settings chosen the site, FSL contours (see **D14.08.1**), paths, edges, surfacing, planting beds, hose cocks, buildings and furniture, generally in accord with **AMCORD 95** criteria above.
3. Planting Sheet showing existing vegetation retention plan, mulch and groundcover proposals, plus new coded planting schedule – location, species, sizes.& protective guards.

The drawing set should comply with the standard submission requirements in Tweed Shire Council, Development Design Specification **D13 - Engineering Drawings (Subdivisions)**" and be certified accordingly.

Development Construction Specification C273 should accompany contract documentation of the design drawings.

Landscape Concept Plan at Development Application Stage

At the Landscape Concept Plan Stage the plan should at least show:

- Plans should display title block with a north symbol, detailed legend, plan numbers, designer information, street name and lot description
- The recommended scale for a landscape plan is 1:100 or 1:200 with 1:500 for larger sites.
- Plans should detail boundaries, easements, fences, footpaths, gutter crossings, drainage and grassed areas. Services should be indicated on the plan and show at least, underground services (water, electricity, gas, telephone, sewer and stormwater).

- A Landscape Concept Plan should show any existing vegetation to be removed or to remain.
- The description and resolution of land use conflicts between the site and adjoining properties, e.g. screen/buffer planting with descriptive notes.
- Description of landscape works in general illustrating the proposed landscaping in a concept format.
- All proposed vegetation on the plan should be shown, including feature and shade tree locations etc. Plant species need only be indicative with a range of plants under such heading as groundcovers, clumping, shrubs, trees etc. No plant sizes or numbers need be submitted at this stage.
- Possible circulation routes, potential views out of the site, building to screen
- Where possible it is encouraged at this early stage that any remnant vegetation try and be saved, this offers immediate shade and feature trees to a new site.

Landscape Plan at Operational Works Stage

For Landscape Design approval at the Operational Works Stage the consultant is to submit at least the following information. A failure to do so may result in a stand up application process due to Request for more information being returned. Plans should be designed in accordance with previous approval responses and other relevant Operational Works Plans.

- Three copies of the Landscape Plan including any Working Drawings and associated Landscape Specifications, at A3 size if legible, or A1 for more legibility.
- The recommended scale for a landscape plan is 1:100 or 1:200 with 1:500 for larger sites.
- Plans should detail boundaries, easements, fences, footpaths, gutter crossings, drainage and grassed areas. Services should be indicated on the plan and show at least, underground services (water, electricity, gas, telephone, sewer and stormwater).
- The location of overhead wires.
- The plan should demonstrate that the proposed development complies with the minimum 'Landscaped Area' specified in the Planning Scheme.
- Proposed surface materials including, turf, pathways, patios, mulched garden beds, etc. are to be shown and specified.
- All structures including existing and proposed building footprints and building F.L's are to be shown.
- Other landscape structures such as pergolas, gazebos, entry statements etc, with detailed documentation of how they are to be constructed, materials, colours etc.
- Fencing and retaining walls details and specifications.
- A contour plan showing all existing levels and proposed new levels.
- Lighting if applicable.
- Site furniture and play equipment, including type and colour as specified in this document.
- Details of edging treatment
- Irrigation systems, including the location of the RPZ valve and the proposed location of the control box.
- Where the irrigation is to become part of Council's responsibility separate irrigation plans will need to be submitted for approvals by Council's Parks Department.

- Site drainage including any subsoil drainage and drainage pit locations.
- Any detailed dimensioning needed to achieve the finished landscape works. The need to scale of a drawing should not be necessary. There should be enough dimensioning information for the contractor to be able to build from the landscape drawings provided.

Planting Details

At the Operational Works Stage detailed Planting information must be provided. It should show the location and species name of the proposed plants in a key format that relates back to the Plant Schedule, the plant schedule should have at least the following information:

- Botanical and common name relating back to the key name given
- Number of plants to be used
- Size of plant container
- And most importantly the expected size of plant to be planted at the time of planting. This is to allow Council to make an informed decision on whether or not the plant is of an adequate size at the time of planting.

Refer below for a typical Planting Schedule set out.

PLANT SCHEDULE

KEY	SPECIES	No.	POT	Ht.
ARC ale	ARCHONTOPHOENIX alexandra	6	100lt	1500 clear trunk
COR sp	CORDYLINE sp	24	200	500
CUP ana	CUPANIOPSIS anacardioides	5	45lt	1800
LIR 'EG'	LIRIOPE 'Evergreen Giant'	14	140	250
OPH 'Var'	OPHIOPOGON 'Variegata'	24	140	200
PHI 'Xan'	PHILODENDRON 'Xanadu'	13	200	450

Note: Plans that are clear and detailed can be easily assessed and increase the efficiency of plan assessment by council. They also provide a tenderer with clear directions about the desired outcome. The designers name and contact details should be clearly marked on the landscape plan so the landscape assessment officer can make enquires directly.

APPENDIX A - INSTALLATIONS by SETTING.

The following tables indicate which of the above **Installations** should be provided in **the nine principal Settings**. check Appendix B for individual installation definitions & details.

TABLE A.1
Structured Open Space

Setting	Installation **(M)** = mandatory	Location	Supply Rate	Details
Playing fields and sporting courts	Bollards	O.5m from edge of un-kerbed or unfenced road or parking bay.	All locations where vehicle intrusion would cause damage or hazard	Hot Dipped Galvanised Steel or treated pine. Min ht 900.
	Bus Shelter **[M]**	Fronting public road	1 per site, with 1 seat per 5 internal carparks (See DCP2)	
	Change rooms M/F & showers **[M]**	centroidal to fields, adj. service road, in conjunction with kiosk, equipt. store, & public toilets where feasible	50m2 (50/50 M/F and 50/50 shwr / change split)	toilets incl. unisex disabled are OK.
	Concrete Gutter	Internal access pavement edge or field perimeter (subject to crossfall)	Required wherever table drain or swale would be un-mowable, subject to traffic, or erosion prone.	Min width 300. Culvert, bridge or ramp reqd. for ped path crossings.
	Cycle Racks **[M]**	Near change rooms and/or spectator seating.	see DCP2 – currently one bicycle stand per carpark space	See Austroads GTTEP – Bicycles.
	Drinking Fountains **[M]**	At path intersections; & assembly areas.	All points in off-field area are within 150 m of a DF.	Stainless steel. Requires 2m dia. hardstand & waste outfall (infiltration OK).
	Fencing – exclusion	Between Structured Open Space (SOS) & distributor or other busy road frontage. Playing field perimeter.	Wherever road carries > 3000vpd, or MRS determines access control to field is necessary.	Min 900mm high transparent paling or pool fencing.
	Fencing – safety	Between paths and water bodies, and paths and vertical drops.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Welded galv steel tube. 75min. Turnbuckle SS wire stringers.
	Floodlighting	periphery of field;	not usually req. at inception	by others; light-spill to be confined to site.
	Footpath **[M]**	On pedestrian desire lines between points of interest and assembly	All entry points carparks attractions and amenities to be interconnected. pref. width 2m. min.1.2m. Overhead or bollard lighting.	See D14.08.1B, "*CPTED*" in Appendix D and "*SEPA Guidelines"* in references.
	Grandstands and tiered seating	periphery of field, preferably facing east or south.	not req. at inception; although spectator mounds may be required.	by others
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.

Setting	Installation **(M**) = mandatory	Location	Supply Rate	Details
	Irrigation	Playing only.	When & where Tweed Shire Council Manager Recreation Services (MRS) determines field surfaces are unlikely to remain playable without water augmentation.	
	Kerbing (vertical face)	Road edges	Where vehicle access beyond edge should be denied. (See "Bollards")	Regular pram ramp access breaks required.
	Kiosk, café	Central, highly visible, in conjunction with other amenities. Adjacent to internal road.	Site definition in master plan only. Supply by others.	Should include paved drained & lit service area to any ext. counters.
	Parking bays (incl. 5% disabled) {**M**]	proximity of field(s) & amenities, normally single entry point from street	see DCP2 (1 bay per 5 spectators + players), OR playing fields: 20/field (min) team courts: 5/court tennis: 2/court	Avoid bitumen flush seal finishes. (See D14.08.6)
	Pavement (.) **[M]**	See "Roads" and "Footpaths"	-	(See D14.08.6)
	Pedestrian Ramps	If feasible, where pedestrian path grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance.
	Public telephones	Between &/or near amenities and bus shelter. High passive surveillance position.	One per site (subject to Telstra agreement)	See Appendix D - CPTED
	Public toilets {**M**]	close to principal entry road, high passive surveillance of entry doorways. See "*CPTED"*	1 per venue, size to be assessed to serve likely site utilisation	employ appropriate effluent disposal technologies for site
	Refuse bins **[M]**	Adjacent to amenities, carparking, seating and spectator areas; near path intersections & exits.. Only if collection vehicle access available.	MRS to nominate site-specific requirements, but in any case not fewer than 4 per hectare.	Design to limit litter size to 150mm & waste volume to $0.1m^3$.
	Roads	Between the external public road & the carparks, public amenities, and public utilities in the SOS..	Width & surface to meet adequate service requirements for the facilities.	Exclude private vehicles from service roads.
	Seats, seating. **[M]**	Field perimeter, facing field. Under trees where available. Create aisles if multiple bands installed.	20 persons per playing field; 4 persons per court. (Major spectator seating by others)	HDGal steel & aluminium preferred. Backrests desirable.
	Security lighting **[M]**	Building entrances and perimeters. Carparks where night use possible.	as req. See "*CPTED*" criteria.	ext. movement sensors for night-secured buildings. Use timers, movement or solar sensors.
	Signage – Identification **[M]**	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage – Information & Directional	At road & path intersections & focal points within the site.	as req by site facilities and context. (Maximise legibility to minimise signage)	

Setting	Installation **(M**) = mandatory	Location	Supply Rate	Details
	Sports fields, courts, rinks etc **[M]**	See sport Layout Guide	see DCP16 & s94 plan #5	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete, HD Galv Steel, or treated plantation hardwood
	Trees **[M]**	in spectator areas & canopy over footpaths / bikeways	minimum 25% mature canopy coverage to target areas.	summer shade, frame for recreational setting.

TABLE A.2

Casual Open Space – Local Park

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
local park	Avenue (of trees)	Framing spine or axial pathway, focussing on terminal landmark.	One/park, but only where strong movement desire line identified. Maintain symmetry of procession.	Single species selection for seasonal shade canopy, &/or display
	Bollards	O.5m from edge of un-kerbed or unfenced road or parking bay.	All locations where vehicle intrusion would cause damage or hazard	Hot Dipped Galvanised Steel or treated pine. Min ht 900.
	Drinking Fountains (**M**)	At path intersections or centrally	One.	Stainless steel. Requires 2m dia. hardstand & waste outfall (infiltration OK).
	Fencing – exclusion	Between park COS & distributor or other busy road frontage	Wherever road carries > 3000vpd	Min 900mm high transparent paling or pool fencing.
	Fencing – safety	Between paths and water bodies and paths and vertical drops. On all retaining walls higher than 1m.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Welded galv steel tube. 75min. SS Turnbuckle wire stringers.
	Footpath **[M]**	On pedestrian desire lines between park entry points, to play area or to points of interest and assembly.	All entry points carparks attractions and amenities to be interconnected. Overhead or bollard lighting (20m c-c), . Min footpath 1.2m, min bikeway 2.0m wide.	See Appendix D "*CPTED*" and "*SEPA Guidelines"* in references.
	Gardens	Adjacent to paths or boundary fencing.	Not exceeding 5% of gross site area. Requires advance approval from MRS.	Must have retic. water supply Perimeter conc. mowing strip reqd. also
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.
	Kerbing (vertical face)	Road edges	Where vehicle access beyond edge should be denied. (See also "Bollards")	Regular pram ramp access breaks required.
	Lighting	Paths	Enough on paths to enable visibility of next light en-route and reveal path between.	See CPTED
	Pavement (Paths & bikeways only.)	(see 'footpaths')	(see 'footpaths')	
	Roads	Nil internal, except public utilities service roads.	Nil private vehicles. Dual service road use as footpath bikeway where feasible.	Reinf. concrete or asphalt.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Pedestrian Ramps	If feasible, where pedestrian grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance. May require handrails.
	Playground (usually in conjunction with shade structure) **[M]**	Level ground, passive surveillance present, & visible from street. Adjacent to footpath & observation seating.	One per park. Minimum three pieces. Observation seating & litter bins adjacent.	
	Pram Ramps **[M]**	All intersections of paths / bikeways & kerbs.	As req.	
	Public Art	Prominent, preferably visible from street.	Not normally introduced, but acceptable in unique locations.	Liaise with Council's Cultural Policy officer.
	Refuse bins **[M]**	Adjacent to seating and play areas; near path intersections & exits.. Only if collection vehicle access available.	MRS to nominate site-specific requirements, but in any case not fewer than 4 per hectare.	Design to limit litter size to 150mm & waste volume to 0.1m^3.
	Retaining Walls	Terrace edges, drainage headwalls	As required.	Concrete or masonry only.
	Kabana Rotunda,	Near play equipment	Not encouraged.	Include seating for observation & conversation.
	Seats, seating **[M]**.	Facing points of interest – e.g. views, playgrounds, places of pedestrian passage, public art, water bodies. Try for summer shade, winter sun. Some vantage or elevation. See Section D14.08.7	Seating for 10 persons per ha. Absol. min seating 5 persons.	HDGal steel & aluminium preferred. Treated hardwood slats and backrests allowed. Do not place seats in centre of open place, or with path directly behind, or lower than adj. path.
	Shade Structure (tension membrane structure)	Over play equipment.	1 per playground	
	Signage – Identification **[M]**	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage – Information & Directional	At road & path intersections & focal points within the site, as logic dictates.	as req by site facilities and context. (Maximise legibility to minimise signage)	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete or treated plantation hardwood
	Tactile Markers	At traffic conflict points or severe grade changes	As req. – usually only in high traffic volume locations.	
	Tree Guard **[M]**	Around immature trees	1 per tree	

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Trees **[M]**	Clustered in groves or copses – species grading down in height from core. Canopy over footpaths / bikeways	25% mature canopy coverage to site.	summer shade, try to avoid blocking security surveillance sight lines.
	Turf (lawns)	On level to gently sloping ground between paths & tree planting or verges. As informal play or contemplation areas.	As req. See D14.08.2E	ground must be shaped & edged to permit broad -mowing capability.

TABLE A.3

Casual Open Space – Neighbourhood Park

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
neighbourhood park	Avenue (of trees)	Framing spine or axial pathway, focussing on terminal landmark.	One/park, but only where strong movement desire line identified. Maintain symmetry of procession.	Single species selection for seasonal shade canopy, display
	Barbecue	In proximity to picnic table(s).	As req.	Paved path req. between tables & BBQ
	Bollards	O.5m from edge of un-kerbed or unfenced road or parking bay.	All locations where vehicle intrusion would cause damage or hazard	Hot Dipped Galvanised Steel or treated pine. Min ht 900.
	Concrete Gutter	Internal pavement edge	Required wherever table drain or swale would be un-mowable, is subject to traffic, or is erosion prone.	Min width 300. Culvert, bridge or ramp reqd. for ped path crossings.
	Cycle Racks	Generally not reqd.	see DCP2	See Austroads GTTEP – Bicycles.
	Dog Faeces Station	Adjacent to path. Centrally or at main entrance. Must have service vehicle access	One	Requires approval of DECS
	Drinking Fountains **[M]**	At path intersections or centrally	One (min.)	Stainless steel. Requires 2m dia. hardstand & waste outfall (infiltration OK).
	Features - towers, obelisks, statues, monuments memorials	Usually as a node at pathway or visual foci, and associated with axial symmetry.	Elective, but rarely more than 1.	Must be low operating cost & mntnce
	Fencing – exclusion **[M]**	Between COS & distributor or other busy road frontage.	Wherever road carries > 3000vpd	Min 900mm high transparent paling or pool fencing.
	Fencing – safety **[M]**	Between paths and water bodies and paths and vertical drops.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Welded galv steel tube. 75min. Turnbuckle wire stringers.
	Footpath **[M]**	On pedestrian desire lines between points of interest and assembly	All entry points carparks attractions and amenities to be interconnected. pref. width 2m. min.1.2m. Overhead or bollard lighting.	See "*CPTED*" and "*SEPA Guidelines"* in references.
	Fountains & pools	Areas of high visual access.	Elective	Demonstrated low energy & maintenance costs required for acceptance.
	Gardens	Adjacent to movement corridors.	See D14.08.4 for limited application options.	Edges must be strongly defined.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.
	Irrigation	Not encouraged at any location, unless temporary during establishment.		Must be automatic if approved.
	Kerbing (vertical face)	Road edges	Where vehicle access beyond edge should be denied. (See "Bollards")	Regular pram ramp access breaks required.
	Lighting **[M]**	Along movement corridors, at toilets, bus stops, and places of assembly.		
	Notice boards & poster pillars	Adjacent to (or as) a park node. At entrances.	Elective, as appropriate.	
	Parking bays (incl. 5% disabled) {**M**]	Periphery.	see DCP2,	Avoid bitumen flush seal finishes.
	Pavement (.) **[M]**	See "Roads" and "Footpaths"	-	-
	Pedestrian Ramps **[M]**	If feasible, where pedestrian path grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance.
	Picnic table	Primarily in coastal or rural parks.	As necessary.	Consider micro-climate, access, refuse disposal, and proximity to amenities
	Playground **[M]** (usually in conjunction with shade structure)	In setting of high passive surveillance.	One.	Provide safe-fall surface finish.
	Plazas, squares, greens. performance spaces, amphitheatres	As a node, at or adjacent to, path foci.	Elective. (Can assign area in master plan for future installation.)	
	Public Art	Adjacent to movement corridors.	Elective.	High durability & vandal resistance necessary. Liaise with Council's Cultural Policy officer.
	Public telephones	Between &/or near amenities and bus shelter. High passive surveillance position.	One per site (subject to Telstra agreement)	

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Public toilets	Close to principal framing road, high passive surveillance of entry doorways. See "*CPTED*"	Optional, not more than 1 per site, size to be assessed to serve likely site utilisation	employ appropriate effluent disposal technologies for site
	Refuse bins **[M]**	Adjacent to amenities, carparking, seating and observation areas; near path intersections & exits.. Only if collection vehicle access available.	MRS to nominate site-specific requirements, but in any case not fewer than 4 per hectare.	Design to limit litter size to 150mm & waste volume to $0.1m^3$.
	Roads	Nil internal, except for access stubs to carparks and public utilities service roads.	Nil private vehicles. Dual service road use as footpath bikeway where feasible.	Reinf. concrete or asphalt. Security chain or bollard entry control.
	Rotunda, Kabana Picnic shelter	Over picnic tables where suitable micro-climate not naturally available.		
	Seats, seating **[M]**.	Facing points of interest – e.g. views, playgrounds, places of pedestrian passage, public art, water bodies. Try for summer shade, winter sun. Some vantage or elevation. See Section D14.08.7	Seating for 10 persons per ha. Absol min seating 10 persons.	HDGal steel & aluminium preferred. Treated hardwood slats and backrests allowed. Do not place seats in centre of open place, or with path directly behind, or lower than adj. path.
	Shade Structure (tension membrane structure)	Over playgrounds	Wherever natural shade absent.	
	Signage – Identification (**M**)	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage – Information & Directional (**M**)	At road & path intersections & focal points within the site.	as req by site facilities and context. (Maximise legibility to minimise signage)	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete or treated plantation hardwood
	Tactile Markers for visually impaired.	At traffic conflict points or severe grade changes	As req. – usually only in high traffic volume locations.	
	Trees **[M]**	Clustered in groves or copses – species grading down in height from core. Canopy over footpaths / bikeways	25% mature canopy coverage to site.	summer shade, try to avoid blocking security surveillance sight lines.
	Tree Guard **[M]**	Around immature trees	1 per tree	

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Turf (lawns)	On level to gently sloping ground between paths & tree planting or verges. As informal play or contemplation areas.	As req. See D14.08.2E	ground must be shaped & edged to permit broad -mowing capability.

TABLE A.4
Casual Open Space – District Park

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
district park	Avenue (of trees)	Framing spine or axial pathway, focussing on terminal landmark.	One/park, but only where strong movement desire line identified. Maintain axial symmetry of procession.	Single species selection for seasonal shade canopy, display
	Barbecue	In proximity to picnic table(s).	As req.	Paved path req. between tables & BBQ
	Bollards	O.5m from edge of un-kerbed or unfenced road or parking bay.	All locations where vehicle intrusion would cause damage or hazard	Hot Dipped Galvanised Steel or treated pine. Min ht 900.
	Concrete Gutter	Internal pavement edge	Required wherever table drain or swale would be un-mowable, is subject to traffic, or is erosion prone.	Min width 300. Culvert, bridge or ramp reqd. for ped path crossings.
	Cycle Racks (**M**)	At any places of public assembly.	see DCP2	See Austroads GTTEP – Bicycles.
	Dog Faeces Station (**M**)	Adjacent to path. Centrally or at main entrance. Must have service vehicle access.	One per 5 hectares.	Requires approval of DECS
	Drinking Fountains (**M**)	At path intersections or centrally	One per 2 hectares	Stainless steel. Requires 2m dia. hardstand & waste outfall (infiltration OK).
	Features - towers, obelisks, statues, monuments memorials	Usually as a node at pathway or visual foci, and associated with axial symmetry.	Elective, but rarely more than 1.	Must be low operating cost & mntnce
	Fencing - exclusion	Between COS & distributor or other busy road frontage	Wherever road carries > 3000vpd	Min 900mm high transparent paling or pool fencing.
	Fencing – safety (**M**)	Between paths and water bodies and paths and vertical drops.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Welded galv steel tube. 75min. Turnbuckle wire stringers.
	Footpath (**M**)	On pedestrian desire lines between points of interest and assembly	All entry points carparks attractions and amenities to be interconnected. pref. width 2m. min.1.2m. Overhead or bollard lighting required.	See "*CPTED*" and "Lighting" plus "*SEPA Guidelines"* in references.
	Fountains & pools	Areas of high visual access.	Elective	Demonstrated low energy & maintenance costs required for acceptance.
	Gardens	Adjacent to movement corridors.	See D14.08.4 for limited application options.	Edges must be strongly defined.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.
	Irrigation	Nil	Nil	
	Kerbing	Road edges	Where vehicle access beyond edge should be denied. (See "Bollards")	Regular pram ramp access breaks required.
	Lighting (**M**)	Along movement corridors, at toilets, bus stops, and places of assembly.	As req.	
	Notice boards & poster pillars	Adjacent to (or as) a park node. At entrances.	Elective	
	Parking Bays (**M**)	proximity to amenities, off single entry point from street	See DCP2, but in any case not less than 3 per hectare.	Avoid bitumen flush seal finishes.
	Pavement (Roads and Paths.) (**M**)	See "Roads" and "Footpaths"	-	-
	Pedestrian Ramps (**M**)	If feasible, where pedestrian grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance.
	Picnic table	Primarily in coastal or rural parks.	As necessary.	Consider micro-climate, access, refuse disposal, and proximity to amenities
	Playground (usually in conjunction with shade structure) (**M**)	In setting of high passive surveillance.	One	Provide safe-fall surface finish, and direction signs if not externally legible.
	Plazas, squares, greens. performance spaces, amphitheatres	At or adjacent to, path foci.	Elective. (Can assign area in master plan for future installation.)	
	Pram ramps (**M**)	ALL intersections of footpaths/bikeways with kerbs.	As req.	
	Public Art (**M**)	Adjacent to movement corridors.	One commissioned installation, with a largest dimension of at least 1m.	High durability & vandal resistance necessary. Liaise with Council's Cultural Policy officer.
	Public telephones (**M**)	Between &/or near amenities and bus shelter. High passive surveillance position.	One per site (subject to Telstra agreement)	

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Public toilets (**M**)	Close to principal entry road, high passive surveillance of entry doorways. See "*CPTED*"	1 per site, size to be assessed to serve likely site utilisation	employ appropriate effluent disposal technologies for site
	Roads	Normally nil internal, except for access stubs to carparks and public utilities service roads.	Normally nil for private vehicles. Dual service road use as footpath/bikeway where feasible.	Reinf. concrete or asphalt. Security chain or bollard entry control.
	Refuse bins (**M**)	Adjacent to amenities, carparking, seating path intersections & exits.. Only if collection vehicle access available.	MRS to nominate site-specific requirements, but in any case not fewer than 4 per hectare.	Design to limit litter size to 150mm & waste volume to 0.1m^3.
	Rotunda, Kabana Picnic shelter	Over picnic tables where natural micro-climate too harsh.		
	Seats, seating (**M**)	Facing points of interest – e.g. views, playgrounds, places of pedestrian passage, public art, water bodies. Try for summer shade, winter sun. Some vantage or elevation. See Section D14.08.7	Seating for 10 persons per ha.	HDGal steel & aluminium preferred. Treated hardwood slats and backrests allowed. Do not place seats in centre of open place, or with path directly behind, or lower than adj. path.
	Shade Structure (tension membrane structure) (**M**)	Playgrounds.	Wherever natural shade absent.	
	Signage - Identification (**M**)	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage - Information & Directional (**M**)	At road & path intersections & focal points within the site.	as req by site facilities and context. (Maximise legibility to minimise signage)	
	Skateboard bowl		Not required, but site may be identified in master plan.	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete or treated plantation hardwood
	Tactile Markers	At ped/vehicle traffic conflict points or severe grade changes	As req. – usually only in high traffic volume locations.	
	Trees **[M]**	Clustered in groves or copses – species grading down in height from core. Canopy over footpaths / bikeways	25% mature canopy coverage to site.	summer shade, try to avoid blocking security surveillance sight lines.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Turf (lawns)	On level to gently sloping ground between paths & tree planting or verges. As informal play or contemplation areas.	As req. See D14.08.2E	ground must be shaped & edged to permit broad -mowing capability.

TableA.5
Environmental Open Space Foreshore - Riparian

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
natural areas	Exclusion fencing	perimeter	Wherever introduced feral animals must be excluded or native animals enclosed. Also where vegetation restoration areas must be protected.	See Management Plan for site.
	Information & interpretation signage	Adjacent to entrance and significant natural heritage items.	As req.	
	Parking Bays	In proximity to any amenities, off single entry point from street At access road terminus.	See DCP2, but in any case not less than 1 per hectare.	
	Paths (new)	In lowest value habitat or framing & defining edge of highest value. Along, & gaining access to foreshores. From parking bays.	As approved by MRS and any other responsible agencies, consistent with ESD principles.	May be shaped & drained natural ground, unsealed pavement, or asphalt/concrete-depending on traffic.
	Roads	Nil internal, except for access stubs to carparks and public utilities service roads.	Nil private vehicles. Dual service road use as footpath/bikeway where feasible.	Security chain or bollard entry control.

Table A.6
Foreshore - Riparian

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
riparian	Footpath	top of bank, as local ped desire line or link in overall ped network	as req.	See "*SEPA Guidelines"* in references. Meander to minimize native vegn. disturbance
	Boardwalk (with handrail if over 1m above NS or over water)	where path unable to be drained, or requiring significant retaining walls		exploit opportunities for heritage interpretation
	Trees	path canopy	to complement natural vegn.	
	Seating	observation: facing path &/or stream, respite: facing inward on boardwalk viewing platforms		(see "casual open space" for complementary spaces adj. stream banks)
	Public toilets	Close to principal entry road, high passive surveillance of entry doorways. See "*CPTED*"	1 per site, size to be assessed to serve likely site utilisation	employ appropriate effluent disposal technologies for site
	Picnic table	Primarily in coastal or rural parks.	As necessary.	Consider micro-climate, access, refuse disposal, and proximity to amenities

Table A.7
Foreshore – Maritime

Note: Most foreshores covered by adopted Plans of Management (under LGA 1993 and Crown Lands Act) which will prevail over any requirements of this specification.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
maritime	Avenue (of trees)	Framing axial pathway to beach, focussing on terminal landmark(s).	One/park, but only where strong movement desire line identified. Maintain symmetry of procession.	Single salt-tolerant species selection for seasonal shade canopy, display
	Barbecue	In proximity to picnic table(s).	One per formal foreshore access point, or one per 400m of foreshore – whichever is the lesser..	Paved path req. between tables & BBQ
	Boardwalk	On pedestrian desire lines in inter-tidal zones or sensitive saline wetlands where paths would be detrimental.	As req.	Maintain transverse access for fauna & frontage residents.
	Bollards	O.5m from edge of un-kerbed or unfenced road or parking bay.	All locations where vehicle intrusion would cause damage or hazard	Hot Dipped Galvanised Steel, aluminium or treated pine. Min ht 900. Chains may be added.
	Concrete Gutter	Internal pavement edge	Required wherever table drain or swale would be un-mowable, is subject to traffic, or is erosion prone.	Min width 300. Culvert, bridge or ramp reqd. for ped path crossings.
	Cycle Racks (**M**)	At every formal foreshore entry point with assoc. road or cycleway access.	see DCP2. Minimum 4 cycle capacity per installation.	See Austroads GTTEP – Bicycles.
	Dog Faeces Station	Adjacent to path. Centrally or at main entrance. Must have service vehicle access.	One per 500m of foreshore..	Requires approval of DECS
	Drinking Fountains (**M**)	At path intersections, or between carparks and foreshore.	At every formal foreshore entry point with vehicle access & parking.	Stainless steel. Requires 2m dia. hardstand & waste outfall (infiltration OK).
	Fencing – exclusion	Between COS & distributor or other busy road frontage	Wherever road carries > 3000vpd	Min 900mm high transparent paling or pool fencing.
	Fencing – safety	Between paths and water bodies and paths and vertical drops.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Welded galv steel tube. 75min. Turnbuckle wire stringers.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
maritime	Footpath (**M**)	On pedestrian desire lines between points of interest and assembly	To connect all foreshore entry points carparks attractions and amenities. pref. width 2m. min.1.2m. Overhead or bollard lighting required.	See "*CPTED*" and "Lighting" and "*SEPA Guidelines"* in references.
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.
	irrigation[✪]	nil	nil	
	Kerbing	Road edges	Where vehicle access beyond edge should be denied. (See "Bollards")	Regular pram ramp access breaks required. Special attention needed to kerb drainage outfalls.
	Kiosk, café	Central, highly visible, in conjunction with other amenities. Utilising vantage & views. Adjacent to road.	Site definition only. Supply by others. But may be in master-plan.	Should include paved drained & lit service area to any ext. counters. May need dedicated carparking.
	Lighting – security & visibility (**M**)	Along movement corridors, at toilets, bus stops, eating areas and places of assembly.	As req.	See *CPTED* principles.
	Lighting – display aesthetics	Nil.		
	Notice boards & poster pillars	Nil		
	Open public showers & footwash	Between carparks and foreshore beaches suitable for bathing..	At every formal foreshore entry point with vehicle access & parking.	Subject to water supply availability and likelihood of demand
	Parking Bays (**M**)	Between access roads and foreshore beaches suitable for bathing.	200 spaces per kilometre of foreshore (incl. on-street)	
	Pavement (Roads and Paths.) (**M**)	Access to carparks,	As req. for access by the public, and mntnce vehicles	See s.94 Plan No. 22
	Pedestrian Ramps	If feasible, where pedestrian grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance.
	Picnic table (**M**)	Adjacent to path network, in proximity to carpark	As necessary.	Consider micro-climate, access, refuse disposal, and proximity to amenities

[✪] *As part of its Agenda 21 program, Council will not support new town water irrigation systems in public places where vegetation is established primarily for cosmetic purposes.*

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Playground (usually in conjunction with shade structure)	In setting of high passive surveillance.	One	Provide safe-fall surface finish, and direction signs if not externally legible.
	Plazas, squares, greens. performance spaces, amphitheatres	At or adjacent to, path foci.	Elective. (Can assign area in master plan for future installation.)	
	Public telephones (**M**)	Between &/or near amenities and bus shelter. High passive surveillance position.	One per site (subject to Telstra agreement)	
	Public toilets	Close to carpark entry road, high passive surveillance of entry doorways. See "*CPTED*"	1 per km of foreshore, size to be assessed to serve likely site utilisation	employ appropriate effluent disposal technologies for site
	Refuse bins (**M**)	Adjacent to amenities, carparking, eating areas, seating, path intersections & exits..	MRS to nominate site-specific requirements, but in any case not fewer than every 200m of foreshore. (Only if collection service & vehicle access available.)	Design to limit litter size to 150mm & waste volume to $0.1m^3$.
	Roads	Normally nil internal, except for access stubs to carparks and public utilities service roads.	Normally nil for private vehicles. Dual service road use as footpath/bikeway where feasible.	Reinf. concrete or asphalt. Security chain or bollard entry control.
	Rotunda, Kabana	Over picnic tables where natural micro-climate too harsh.		
	Seats, seating. (**M**)	Facing points of interest – e.g. views, playgrounds, places of pedestrian passage, public art, water bodies. Try for summer shade, winter sun. Some vantage or elevation. See Section D14.08.7 DDA compliant access to view seating important.	Seating for 50 persons per foreshore km, but only if previous column sites available.	HDGal steel & aluminium preferred. Treated hardwood slats and backrests allowed. Do not place seats in centre of open place, or with path directly behind, or lower than adj. path.
	Signage – Identification	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage – Information & Directional (**M**)	At road & path intersections & focal points within the site.	as req by site facilities and context. (Maximise legibility to minimise signage)	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete or treated plantation hardwood

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Tactile Markers	At ped/vehicle traffic conflict points or severe grade changes	As req. – usually only in high traffic volume locations.	
	Tree Guard (**M**)	All new juvenile tree plantings.	1 per tree.	
	Trees **[M]**	Canopy over footpaths / bikeways. Shade for informal picnic areas & seats. Dune stabilisation	25% mature canopy coverage to site.	summer shade, try to avoid blocking security surveillance sight lines.
	Turf (lawns)	On level to gently sloping ground between paths & tree planting or verges. As informal play or picnic areas.	As req. See D14.08.2E	ground must be shaped & edged to permit broad -mowing capability.

Table A.8
Roads - Roadside

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
Roadside	Bollards (**M**)	O.5m behind layback, flush kerb or edge of un-kerbed or unfenced road or parking bay. All locations where vehicle intrusion would cause damage or hazard	1.5m c/c where verge / footpath otherwise accessible to motor traffic.	Hot Dipped Galvanised Steel or treated pine. Min ht 900. (Verge planting may substitute.)
	Bus Shelter	Between footpath & road boundary	At approx. 800m. spacing on designated in-bound bus routes, where catchment exceeds 500 persons or serving sports fields, schools, shops hospitals etc.	See TSC Manager Roads and Stormwater for latest std. reqs.
	Fencing – safety	Between paths and roundabouts, paths and water bodies and paths and vertical drops.	Between paths and water bodies deeper than 600mm at one metre from path edge, and between paths and drops steeper than 45^{o} and > 1m. high.	Generally pool fencing style.
	Footpath **[M]**	On all local and collector road verges. where separate dedicated pathway not provided.	Minimum 1 paved 1.2m footpath per road reserve.	See "*CPTED*" and "*SEPA Guidelines"* in references.
	Handrails **[M]**	In conjunction with steps or ramps.	All instances.	Welded galv steel tube. 75min.
	Kerbing (vertical face) (**M**)	Road edges	Where vehicle access beyond edge should be denied. (See "Bollards")	Regular pram ramp access breaks required.
	Irrigation	Nil allowed.		
	Lighting	Behind kerb	see DCP16	
	Parking bays (incl. 5% disabled) {**M**]	between footpath and carriageway	see DCP2,	Avoid bitumen flush seal finishes.
	Paths (**M**)		see DCP16	
	Pedestrian Ramps	If feasible, where pedestrian grades would otherwise exceed 7%, or steps are installed.	As necessary.	DDA & BCA compliance.
	Pram Ramp {**M**]	At all road/footpath intersections.	All instances.	DDA Austroads & TSC Stds apply.
	Signage – Identification	All Street frontages & off-street bikeway entry points	1 per frontage or bikeway,	Park name plus any usage restrictions.
	Signage – Information & Directional	At road & path intersections	as req by site and context. (Maximise legibility to minimise signage)	
	Steps / Stairs	Where direct pedestrian access is desirable but grades exceed 10%.	As required.	Non-slip Concrete, with handrails.

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
	Tactile Markers (**M**)	Intersection of paved footpaths with road carriageways & ped crossings.	Adjacent to all roads carrying >6000vpd and in proximity to all retail premises.	See RTA "Policy For The Placement Of Tactile Indicators At Kerb Ramps" 2002 and AS1428.4 1992
	Trees **[M]**	in verge zone, canopy over footpaths / bikeways	25% mature canopy coverage.	summer shade
	Tree Grate	around trees planted in fully paved footpaths	1 per tree	
	Tree Guard (**M**)	All new juvenile tree plantings.	1 per tree.	
	Tree Root Guard **[M]**	Where within 1m of road pavement	1 per tree	
	Verges (grass)	see definition		

Table A.9
Roads - Roundabouts

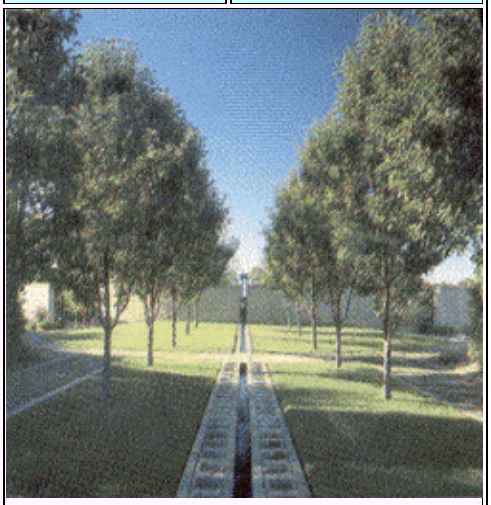
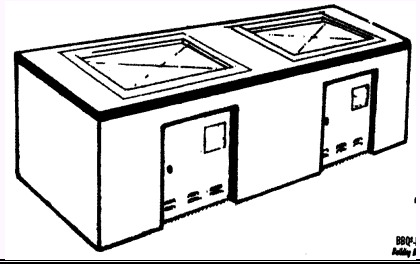
Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
Roundabout	Features – towers, obelisks, statues, clocks, monuments memorials	central		Content should not attract pedestrians to access roundabout
	fountains & pools	central	not normally supported	
	Garden	central	low maintenance gardens only.	
	Irrigation		special approval reqd.	check with MRS
	Lighting	central or peripheral		check with Director of Engineering Services.
	Trees	central	nil, unless site diameter exceeds 10m.	large feature trees to be used. Special planting details reqd.
	Tree Root Guard **[M]**	behind inner kerb	1 per tree.	

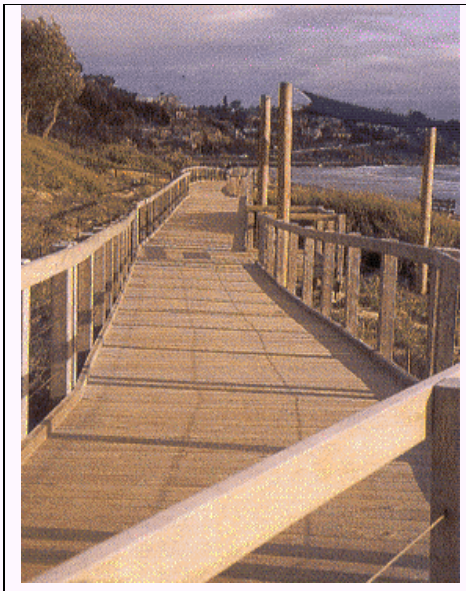
Table A.10
Medians, Channelisations

Setting	Installation (**M**) = mandatory	Location	Supply Rate	Details
Median Strips & Channelisations	Ground cover	Medians, islands		
	Lawn	Medians, islands		
	Shrubs	Medians, where appropriate whilst maintaining traffic visibility		
	Trees	Medians, where appropriate whilst maintaining traffic visibility	Min spacing 25m	Median width should be >70% of mature canopy

APPENDIX B - SCHEDULE of OPEN SPACE DESIGN INSTALLATIONS in TWEED SHIRE

A useful comprehensive reference for obtaining commercial design details and sourcing of many of the landscape products and services below may be found at www.outdoordesign.com.au. Note that Council does not necessarily endorse any of the products or enterprises listed at that site.

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
1	Avenue (of trees)	Aesthetic symmetry (as a procession), spatial definition, legibility, surveillance, shade, microclimate, axis of focal emphasis.	Endemic (preferably) or exotic shade/deciduous tree planting		
2	Barbecue	outdoor recreation – primarily in foreshore open space settings. Install in kabana shelter in conjunction with adj. water tap & refuse bins.	timer controlled 3-phase electric power, SS or aluminium hot plates. Include movement and solar sensor lighting.		

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
3	Boardwalk	Pedestrian & limited cycle access through wetlands or over the inter-tidal zone. Ecological education. Used where paths would have un-acceptable environmental impact.	Recycled Plastic, aluminium or stainless steel decking and balustrades OK. Concrete footings. Timber okay for sub-structure, alternatives preferred for decking.		
4	Bollards	Prevent asset damage or safety hazard caused by vehicle entry. Define edges without impeding pedestrian or disabled access. Provide low-level illumination.	Min height 700mm Min dia 150mm Corrosion & weather resistant. Min 450x150 flush concrete collar. Steel bollards to be Hot Dipped Galvanised prior to powder coating.		
5	Bus Shelter	Public Transport terminus & user amenity	Designs that dignify users, offer low maintenance, provide arrival visibility, passive surveillance, genuine comfort & versatile shelter.		
6	Change rooms	ablutions & dressing of organized sport players	Low maintenance vandal resistant finishes. High security. Solar water heating. Architecture sympathetic to the neighbourhood vernacular.		
7	Concrete Gutter	Convey drainage. Prevent asset damage by erosion. Define pavement edges.	Use only when grass swale would be inadequate.		

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
8	Cycle Racks	Visitor Cycle storage	Simplicity, security, convenience. Not required in parks unless primary attraction nearby is not bicycle accessible – e.g. surf beach		
9	Dog Faeces Station	Collect companion animal waste	Pollution reduction, nutrient reduction, encouragement of recreational walking.	Normally consisting of signage, waste bag supply, and refuse deposit bin.	
10	Drinking Fountains	Refreshment	Durability, low maintenance hygiene, corrosion and vandal resistance.		
11	Earthworks	Re-profiling the ground surface for landscape reasons other than access or site drainage. e.g. mounds for framing, screening, enclosure or spectator viewing, conversation pits, terraced gardens.	Mowable (<25% slope); manifestly purposive.		
12	Features – towers, obelisks, statues, clocks, monuments memorials	Visual Focus of formal landscape axes, identity.	Low maintenance, low non-renewable energy consumption.		
13	Fencing – exclusion	Prevent asset damage by entry of vehicles or persons (See also “Bollards”.) Distinguish uses within public spaces.	High visibility, 50% min transparency, low mnatnce, low embodied energy materials. Height range 0.7 –1.2m		Pool fencing. Chain wire fencing.
14	Fencing – safety	Separate peds & cyclists from hazards. Confine infant play.	As above		Pool fencing. Picket fencing. Tubular steel & wire turnbuckle fencing.
15	Footpath	Ped & Cycle Transport, trip hazard reduction, erosion control.	Supportive of self powered transport,	Austroads	

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
16	fountains & pools	Provide micro-climate, ambience, aesthetics, environmental WQ management	low non-renewable energy consumption., low weed harvesting & desilting requirements, passive safety features.		
17	Gardens	Aesthetic delight, ambience, native plant education, nectar supply, maintenance of biodiversity. Spatial definition.	Low maintenance, low water demand, low NPK requirement. Avoid rockeries etc requiring hand weeding and trimming.	See *www.floraforfauna.com.au* for native habitat compatibility.	
18	Grandstands and tiered seating	Spectator seating for structured sporting events. Normally required only in regional parks.	Steel and concrete structures with low maintenance finishes.		
19	Handrails	Assist users of steps/stairs and footbridges. Edge treatment where paths abut pedestrian hazards.	Unpainted aluminium High Density Galv. or stainless Steel.		
20	irrigation✪	automatic watering of sports fields, lawns and gardens	Not approved for purely cosmetic roles.		
21	Kabana, Rotunda,	Shelter, primarily in foreshore settings. May have seating, tables or BBQ.	Low maintenance, vandal resistant low embodied energy materials, plantation timbers. Slab footing Served by footpath. .	TSC SD	
22	Kerbing	Prevent asset damage and pedestrian risk by undesirable entry of vehicles. Define edges.	Use grass swale drains in lieu whenever choice available.		
23	Kiosk, café	refreshment, respite commerce, assembly, observation	High durability, security, and vandal resistance.	(see DCP-2 for parking reqs.)	

✪ *As part of its Agenda 21 program, Council will not support new town water irrigation systems in public places where vegetation is established primarily for cosmetic purposes.*

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
24	Lighting – security & visibility	Security, transport visibility (navigation), night sport,	Demand triggered, low energy luminaries. Controlled light spill. (note adverse impact of seashore lighting on turtle hatching areas.).	(see AS/NZS 1158.3.1:1999 – "Road Lighting", Part 3.1 for parkland and footpath technical standards.)	
25	Lighting – display aesthetics	Not accepted in public parkland if Ccl. maintained.	Nil. (Concessions may be considered fir solar powered lighting.)		
26	Notice boards & poster pillars	Communication, community issues & events, timetables, warnings.	Durable weather-proof or re-usable.		
27	Open public showers & footwash	Sluicing seawater from bathers, (ocean & estuary foreshore parks)	Vandal resistant SS fittings, sprung or timer taps, infiltration drainage.	Community Issues & Events Communication	
28	Parking Bays	Visitor Car Storage	Pervious surfaces	DCP-2 Parking Code	
29	Pavement (Roads and Paths.)	Transport – wheeled modes & pedestrians of all abilities. Smooth durable all-weather surfaces. Mobility & access to private property & open space installations.	Public health emphasis & priority to sustainable modes – walking & cycling. Restricted to concrete and asphalt pavements (no unsealed surfaces or unbonded paver systems)	See D1, D2, & D9 in this series.	

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
30	Pedestrian Ramps	Gentle paths connecting pavements or buildings having grade differences that would otherwise inhibit direct access for the disabled.	See “pavements”	Federal DDA & BCA apply.	
31	Picnic table	outdoor recreation – primarily foreshore open space settings	Treated plantation timber (preferred), aluminium or stainless steel. Concrete frames also acceptable. RC Slab footing.	TSC SD	
32	Playground (usually in conjunction with shade structure)	physical recreation equipment for preschool children	Solar stabilized plastics, aluminium, SS, treated dressed plantation timbers, ‘soft-fall’ surfaces under equipment.		
33	Plazas, squares, greens. performance spaces, amphitheatres	Public assembly, congregation – formal or informal	Low maintenance durable surfaces. Spectator opportunity. Proximity of toilets. Access to water supply, power, & lighting, as relevant to space type.		
34	Pram Ramp	Kerb-footpath intersection for disabled persons, and non-motorised wheeled vehicles	Supportive of self-powered transport, and access equity.	TSC SD and Austroads	
35	Public Art	Delight.	Durability Security.		
36	Public telephones	Security, convenience.	Associate with transport or places of assembly.	Telstra jurisdiction.	

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
37	Public toilets	hygiene & convenience	As for “change rooms”. Focal, well lit, high passive surveillance location. Paved access.		
38	Refuse bins	hygiene & litter control	Separate recycling bins near food outlets.		
39	Retaining Walls	Terracing to improve parkland accessibility, drainage revetment	Low maintenance, durable materials (e.g. concrete, masonry, or treated timber if <0.6m high)		
40	Root Guard	Tree root invasion control barrier			
41	Seats, seating.	Respite, Observation (prospect), casual assembly.	Low maintenance, low embodied energy materials, plantation timbers. Maximise natural opportunities (e.g. mounds, terraces etc.) Address relationships to paths & views		
42	Shade Structure (tension membrane structure)	U-V protection for playground users.	Fire & UV resistant. Access via ladder only.		
43	Signage – Identification	Place Naming	Durable materials.		
44	Signage – Information & Directional	Transport & Site Orientation, Heritage & Nature Interpretation & Education	Durability	Austroads & AS	
45	Skateboard bowl	Specialized unstructured sport for youth (Not a normal installation in new parks.)	Non-motorized self-powered travel. Child health.		
46	Sports fields, courts, rinks etc	organized team sport, training & exercise.	Low embodied energy, low maintenance materials. Public health.		

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
47	Steps / Stairs	Connect pavements where grade differences exceed disabled abilities. (See "Ramps")	(See "Ramps")		
48	Tactile Markers	Raised or Textured path edge treatments to assist orientation for the visually impaired		RTA "Policy For The Placement Of Tactile Indicators At Kerb Ramps" 2002 and AS1428.4 1992	
49	Tree Grate	Perforated flush metal or plastic frame around trunk at ground level, to allow air & water entry if root system is under impervious pavement.	Durability		
50	Tree Guard	Vandal barrier for juvenile plants.	Robustness, reusability.		
51	Trees	Sun shelter, greenhouse gas reducer, fauna habitat & food supply, microclimate moderator, aesthetic feature.	Indigenous, endemic species are more likely to survive, more likely to provide native habitat, and contribute to landscape authenticity.	see approved species list in Table D9-5	
52	Turf (lawns)	Light traffic pedestrian surface, playing field, passive rec. surface, aesthetic feature. Water-borne pollutant filter & detention device, erosion control greenhouse gas reducer, microclimate moderator,	Layout design to support broad-acre mowing. Use native grasses in high water demand settings.		Tyagarah Turf Supplies

NO.	INSTALLATION	ROLE/ PURPOSE / DESCRIPTION	SUSTAINABLE ATTRIBUTES	STANDARDS & OTHER DESIGN RESOURCES	ACCEPTABLE COMMERCIAL SOLUTIONS
53	Verges	The unpaved road area(s) between the back of the kerb (or table drain) and private property.	Low maintenance ground cover, turf, native grasses, or canopy trees. (shrubs normally unacceptable.) Car access denied, unless special paved provision.		

APPENDIX C - TREE SPECIES SELECTION TABLES

The lists in this section have been developed generally within the following guidelines:

- Park species: native indigenous – preferably endemic
- Street tree species: both indigenous and exotic – hardy, and meeting street user needs
- Easy propagation (probable nursery availability) and 'low care' tolerant
- Robustness, display, canopy, fast growth, native fauna food & habitat creation
- Exhibiting little future invasive weed potential

Select tree species suitable to their particular climatic zones –

1. **Coastal within 2km of the ocean**
2. **Hilly / Mountainous**
3. **Floodplain**
4. **Urban Street**
5. **Park/Open Space**
6. **Endangered or Vulnerable Tree Species**

MANDATORY * Provide at least one example of endangered species from Table 6 in every parkland site greater than 0.4ha. Erect permanent interpretive plaque (may contain developer's name) in proximity.

1. COASTAL ZONE TREES

Plants marked (a) can be grown close to the ocean and can shield those marked (b) and (c) from wind and salt.

	Common Name	Botanical Name	
1	Coastal Wattle	*Acacia longifolia subsp. sophorae*	a
2	Coast Banksia	*Banksia integrifolia*	b
3	Horsetail She-Oak	*Casuarina equisetifolia subsp. incana*	a
4	Tuckeroo	*Cupaniopsis anacadioides*	b
5	Pink Bloodwood	*Corymbia intermedia*	c
6	Carbeen	*Eucalyptus tessellaris*	c
7	Macaranga	*Macaranga tanarius*	c
8	Screw Pine	*Pandanus tectorius*	a
9	Riberry	*Syzygium leuhmannii*	c
10	Brushbox	*Lophostemon confertus*	c
11	Blue Lilly Pilly	*Syzygium oleosum*	b
12	Wallum Banksia	*Banksia aemula*	c
13	Black Sheoak	***Allocasuarina littoralis***	c
14	Cottonwood	*Hibiscus tiliaceus*	b

2. NON-COASTAL SLOPES & HILLS

	Common Name	Botanical Name
1	Red Ash	*Alphitonia excelsa*
2	Brown Kurrajong	*Commersonia bartramia*
3	Blackbutt	*Eucalyptus pilularis*
4	Silky Oak	*Grevillea robusta*
5	Foambark Tree	*Jagera pseudorhus*
6	Sweet Pittosporum	*Pittosporum undulatum*
7	Riberry	*Syzygium leuhmannii*
8	Weeping Bottlebrush	*Callistemon Viminalis*
9	White Bottlebrush	*Callistemon Salignus*
10	Brush Box	*Tristania Conferta*
11	Red Cedar	*Toona Australis*

3. FLOODPLAIN

	Common Name	Botanical Name
1	Hoop Pine	*Araucaria cunninghamii*
2	Bangalow Palm	*Archontophoenix cunninghamiana*
3	Weeping Bottlebrush	*Callistemon viminalis*
4	Swamp Mahogany	*Eucalyptus robusta*
5	White Fig	*Ficus virens*
6	River Oak	*Casuarina Cunninghamiana*
7	Forest Oak	*Casuarina Turolosa*
8	Swamp Turpentine	*Lophostemon suaveolens*
9	Snow-in-summer	*Melaleuca Linarifolia*
10	Paper Bark	*Melaleuca quinquenervia*

4. URBAN STREET

Botanical Name	Common Name	H x W	Under Powerlines
Acmena hemilampra	Blush Satinash	8 x 3	
Acmena smithii	Lilly Pilly	10 x 6	
Acronychia imperforata	Coastal Aspen	9 x 4	
Agonis flexuosa	Weeping Peppermint	14 x 10	
Alloxylon flammeum	Tree Warratah	8 x 4	
Alphitonia excelsa	Red Ash	15x 8	
Arytera divaricata	Coogera	10 x 6	
Backhousia citriodora	Lemon Scented Myrtle	8 x 3	
Banksia integrifolia	Coast Banksia	15 x 4	
Buckinghamia celcissima	Ivory Curl Tree	8 x 4	
Callistemon 'Dawson River'	Weeping Bottlebrush	6 x 4	Y
Cupaniopsis anacardioides	Tuckeroo	10 x 4	
Diploglottis campbellii	Small Leaved Tamarind	15 x 4	
Flindrsia australis	Crows Ash	30 x 4	
Harpullia pendula	Tulipwood	8 x 4	
Jagera pseudorhus	Foambark Tree	10 x 3	
Lepiderema pulchella	Fine Leaved tuckeroo	8 x 3	
Lophostemon confertus	Brush Box	15 x 4	
Randia fitzalanii	Native Gardenia	8 x 3	
Syzygium australe 'Dwarf'	Dwarf Lillypilly	5 x 3	Y
Tristania laurina 'Luscious'	Water Gum	7-12m tall	
Waterhousia floribunda	Weeping Lillypilly	15 x 6	
Xanthostemon chrysanthus	Golden Penda	10 x 4	

5. PARK/OPEN SPACE

Botanical Name	Common Name	H x W
Alphitonia excelsa	Red Ash	20+
Araucaria cunninghamii	Hoop Pine	30+
Araucaria heterophylla	Norfolk Is Pine	30+
Brachychiton acerifolius	Flame Tree	15+
Delonix regia	Poinciana	12 x 10
Ficus rubiginosa	Port Jackson Fig	15 x 10
Jacaranda mimosifolia	Jacaranda	15 x 10
Melaleuca linariifolia	Snow in Summer	10 x 4
Melaleuca quinquenervia	Broadleaf paperbark	20+
Melicope elleryana	Euodia	15+
Stenocarpus sinuatus	Firewheel Tree	25+

6. ENDANGERED or VULNERABLE TREE SPECIES indigenous to the Tweed.

	Common Name	Botanical Name	
1	Axebreaker	*Geijera paniculata*	E
2	Ball Nut	*Floydia praealta*	V
3	Brush (or Cigar) Cassia	*Cassia brewsteri* var. *marksiana*	E
4	Crystal Creek Walnut	*Endiandra floydii*	E
5	Davidson's Plum	*Davidsonia pruriens* var. *jerseyana*	E
6	Coolamon (or Durobby)	*Syzygium moorei*	V
7	Fine Leafed Tuckeroo	*Lepiderema pulchella*	V
8	Green-leaved Rose Walnut	*Endiandra muelleri* subsp. *bracteata*	E
9	Hairy Quandong	*Elaeocarpus williamsianus*	E
10	Heart-leaved Bonewood	*Bosistoa selwynii*	V
11	Marblewood	*Acacia Bakeri*	V
12	Onion Cedar	*Owenia cepiodora*	V
13	Queensland Xylosma	*Xylosma terrae-reginae*	E
14	Red Boppel Nut	*Hicksbeachia pinnatifolia*	V
15	Red Lilly Pilly or Smooth Barked Rose Apple	*Syzygium hodgkinsoniae*	V
16	Red-fruited Ebony	*Diospyros mabacea*	E
17	Rough-shelled Bush Nut	*Macadamia tetraphylla*	V
18	Rusty Plum	*Amorphospermum whitei*	V
19	Rusty Rose Walnut	*Endiandra hayesii*	V
20	Scented Acronychia	*Acronychia littoralis*	E
21	Small-leaved Tamarind	*Diploglottis campbellii*	E
22	Smooth Davidson's Plum	*Davidsonia* sp. A; Mullumbimby-Currumbin Ck	E
23	Southern (or Oxley River) Fontainea	*Fontainea australis*	V
24	Southern Ochrosia	*Ochrosia moorei*	E
25	Stinking Cryptocarya	*Cryptocarya foetida*	V
26	Sweet Myrtle	*Austromyrtus fragrantissima*	E
27	White Laceflower	*Archidendron hendersonii*	V
28	White Yiel Yiel	*Grevillea hilliana*	E
29	Yellow Satinheart	*Bosistoa transversa*	V

Source NPWS 2002

notes:

- Trees may be cross-selected from tables where local micro-climate permits.
- Non-listed species will be considered if they meet selection guidelines above.
- Plant parkland trees in groups to assist with mutual protection and community development.
- Select species to provide visual layering in larger parklands – increasing mature bulk outward from pedestrian paths & clearings.
- Protect infiltration & aeration in root zones from impervious sealing by wheel compaction or paving, and protect surrounding soils from erosion. Protect existing trees & ground surface profile within 4m of base.
- Depress surrounds of juvenile plantings for water retention.
- Report on **soil** suitability & permeability for particular species. Import if necessary.
- Select for safety - branches over playgrounds, picnic areas etc., and visual penetration for approaching traffic & passive security surveillance. Where power lines exist, locate clear or select small species.

APPENDIX D - CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

EXTRACT:
AMCORD 95 **Practice Note PND 17** - Guidelines

Scope

The need to design for community safety in neighbourhoods and other urban areas has been increasing over the past decade. Although crime statistics are of growing community concern, research suggests that fear of crime affects people more than the actual risk to their safety. In turn, this perceived risk tends to limit the mobility of the more vulnerable, including women, children and the elderly. Where actual criminal activity is prevalent there is evidence to suggest that much of this is opportunistic and can be influenced by reducing the opportunities for unobserved crime and ease of escape.

Matters Addressed

Two issues, in particular, that can be addressed through urban design are:

- Increasing the public's sense of safety when using streets and other public spaces which, in turn, may lead to increasing public use and safety in numbers;
- Discouraging the potential for crime, including breaking into buildings and damaging property through a combination of obvious security measures and other more subtle deterrents.

Designing for safe environments should be an integral part of the initial design process, whether for single dwellings, a medium-density housing project, shopping centres, infill land divisions or entire neighbourhoods.

Surveillance

Casual surveillance from private homes or public streets is often a most effective means of deterring antisocial behaviour. There are a number of techniques available.

Lighting

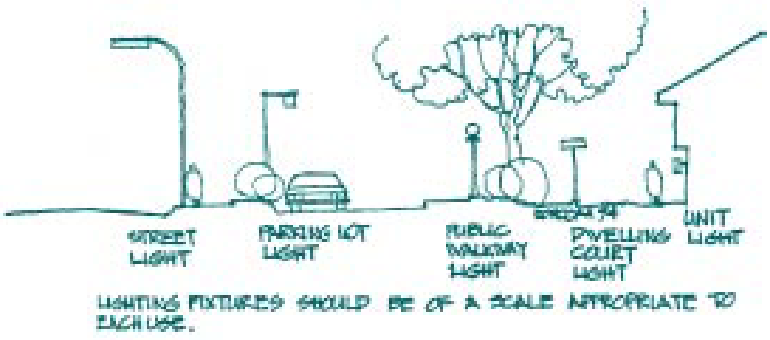


Figure 1: Select lighting appropriate to conditions and requirements.

The veil of darkness can hide and encourage inappropriate or criminal behaviour. The provision of lighting both on private property and in public spaces can be an effective deterrent. Artificial lighting has the disadvantages of ongoing costs and possible vandalism. However, solar and low wattage technology have made lighting an efficient investment in relation to total benefits.

Toughened glass lamps or shields may be required in higher-risk areas and are essential where human-scale lighting is used in public areas. Achieving continuous lighting of public spaces in low-density areas is not always feasible. In these circumstances it may be more appropriate to identify popular routes along which lighting is concentrated. To be effective 'safe routes' should include other measures such as signage, opportunities for casual surveillance, clear sight lines, appropriate paving, accompanying night-time patrols by police, straight routes, and appropriate landscaping.

Other considerations when designing for lighting are:

- Achieve consistency of lighting to reduce contrast between shadows and illuminated areas.
- Ensure lighting is directed towards pedestrian pathways and public spaces rather than on the road or into the windows of housing. The design of lighting must also take into account the mature height of landscaping and other potential impediments.
- Ensure adequate lighting of common areas such as corridors, entrances, laundries, lifts, stairwells and parking areas.
- Locate bright lights in heavily used spaces, but ensure that they do not create a 'wall of darkness' nor create glare for pedestrians and motorists.

Appropriate Land-Use Mix

Encouraging a range of complementary land-use activities, which extends the duration and level of intensity of public activity in particular areas is one of the more effective means of discouraging antisocial behaviour. This will increase the possibility of casual surveillance during the day and night, and increase the feeling of 'safety in numbers'. Some factors to consider are:

- Reinforce activity generators along an 'active' edge of centres, along pedestrian paths in large parks, or on the boundary of large developments such as universities or exhibition grounds.
- Encourage night-time activities within public parks (eg tennis, netball, basketball, group night walks) with suitable lighting.

Landscaping

The landscaping of parks, streets, public and private car parks and private property should take account of opportunities for informal surveillance by drivers, pedestrians and residents. Accordingly landscaping schemes should consider these principles:

- Avoid vegetation which conceals paths or building entrances or which is close to windows. The use of plant with repelling characteristics such as thorns, spikes or nettles may be a useful deterrent to gaining access to ground-floor windows or other areas that need to be protected.
- Provide low to medium shrub planting with a height no greater than 1.5 m and/or taller clear-stemmed trees. This allows sight lines for motorists to be retained, as well as encouraging informal surveillance of potential car vandalism and theft. Dense planting in corners and behind high walls should be avoided.
- The mature height and spread of landscaping should be considered in order to preserve the sight lines of pedestrian and cyclist pathways.

Public Telephones, Toilets, Street Furniture and Bus Shelters

The location, design and material selection of public facilities such as telephones and toilets can go some of the way to preventing deliberate vandalism. Some measures which should be considered include:

- Locate public toilets at well-illuminated park entrances or close to commercial areas where they are more visible to casual surveillance by passers-by. Facilities should be well-lit with vandal-proof lighting, be clear of landscaping which might obscure sight lines from roads, paths and houses, and have pedestrian paths concentrated in the vicinity.
- Street furniture should be selected for its quality of workmanship and materials to ensure long-term durability. A high-quality finish which contributes in a positive way to a pleasant streetscape may have an effect on reducing vandalism.

- The design should vary depending on location and circumstances. However, preference should be given to robust materials which do not have components that can be easily removed.
- There should be clear visibility of bus stops and train stations with well-maintained and lit shelters that allow direct views to and from the public street.
- Provide passenger information of routes and timetables at each bus stop and train station.
- Avoid locating bus stops adjacent to vacant land, lanes, car parks or buildings set back from the street.
- Telephones and public toilets should be located close to well-utilised areas which are open into the night (eg restaurants, local centres).
- Provide effective signage in suitable locations to direct pedestrians to various facilities.

Pedestrian and Cycle Routes

- Focus pedestrian movement after dark along a few, well-used and observable entry and exit routes.
- Ensure that those routes are the most direct and logical routes between commonly visited locations.
- Provide comfortable places to sit and socialise adjacent to building entrances.
- Provide separate areas for teenagers to sit or socialise so that territorial conflicts do not occur. Ensure however, that these 'territories' do not violate the security of dwellings or other buildings, or compromise the safety of pedestrians or cyclists.
- Provide adequate, vandal-proof lighting which does not cast dark shadows.
- Minimise the likelihood of a potentially intimidating group (ie young men or teenagers) taking over some space en route by locating facilities for them elsewhere. For example, if the route older people must take from their homes to shops or the bank passes through a schoolyard or playground dominated by young people, consider re-aligning the path or allocating units to older people in less vulnerable locations.
- Provide clearly marked 'exit' points to an area of high pedestrian or vehicular traffic every 500 m along recreational bicycle and pedestrian paths.
- Provide bicycle parking which can be informally surveyed from streets and buildings or by parking attendants.
- Pedestrian and cyclist paths should be well-lit and signed, and should avoid underpasses and dense clusters of trees next to the path and at stop points such as road crossings.
- Avoid the necessity for grade separation along pedestrian and cyclist paths, or provide safe, alternative, and clearly marked at-grade crossing points.

Public Open Space and Public Spaces

- Provide seats on the perimeter of the park or other space for use by people with mobility problems or concerns about security and to encourage viewing into the space.
- Ensure that the path system and overall layout allows pedestrians to observe an area of potential social contact before entering it.
- Ensure that open space, community buildings and other structures are capable of casual surveillance from he activity rooms of adjacent dwellings.
- Ensure that open space is attractive to legitimate users so that heavy use will discourage antisocial activities.
- Ensure that open space and paths are well-lit and has good sight lines for easy surveillance.
- Public toilets should be provided in all neighbourhood and larger parks. The buildings should be designed to maximise safety including being well-lit, with no recessed entries, and using steel instead of porcelain fixtures.
- Locate larger parks within easy walking distance to public transport systems (200 m walk preferred).
- Accommodate shortcuts through public spaces and ensure that there are several clearly visible escape routes.
- Encourage people to stop and linger by incorporating dense furnishing, attractive focal elements and defined edges.
- Accommodate heavy use and minimise vandalism without 'hardening' the design.
- Design public spaces for year-round use.

- Ensure that no boundaries render the public space visually or functionally inaccessible to passers-by.
- Consider visual and functional transitions between the public space and adjacent buildings.
- Design and Development Practice Note PND 17 AMCORD
- Encourage ground-level uses in buildings which can contribute to the enlivening of the public space (eg cafes with comfortable outdoor seating, rather than offices or blank walls).
- Design subspaces so that a person sitting there alone will not feel uncomfortable or unsafe.
- Design public space as part of the central area's pedestrian and cycle circulation systems, linked to safe neighbourhood pedestrian and cycle paths.
- Locate public space along direct routes in front of building entries and ground-level uses.
- Consider the eventual height and mass of mature vegetation with regard to shade, views and maintenance.
- In terms of public art, consider both the maintenance and ecological costs of various designs and operating systems.
- Display names and addresses of all buildings clearly on walls in high-contrast letters in well-lit positions and ensure that building entrances are easily identified.
- Consider providing a clear, well-lit, glass-enclosed map of the central area, showing 'you are here', names of nearby streets, public transport stops, taxi ranks, safe pedestrian night routes, cycle paths etc.
- Ensure that there will be adequate staff to maintain the public space and environs.
- Develop management policies that encourage extended hours of usage through special events and involve the community in planning and managing festivals, exhibitions, concerts and performances.

Vandalism

- Specify materials that withstand normal hard use and can easily be replaced.
- Use standard-sized panels, light globes, panes, fittings etc to facilitate speedy replacement.
- Avoid obvious 'problem' materials which encourage willful damage. These include:
  - soft-textured wall finishes which can be easily scratched or damaged (especially in entry or access ways);
  - large, long areas of light-coloured wall finishes susceptible to spray-paint graffiti;
  - light-coloured wall finishes next to planting beds (or any but paved surfaces) where rainfall or irrigation is likely to cause unsightly staining;
  - glass (especially full-length glass) in vulnerable positions, particularly along much-used public access routes;
  - tiles or glass below the height of ground-level windowsills;
  - external copper and lead piping, which are vulnerable to theft;
  - painted metal or wood posts or fences in public spaces;
  - flimsy panelling or lightly constructed wood fencing in public areas;
  - loose pebbles or rocks in landscaping. Especially avoid 'tan bark' as it never lasts, stains paving and brickwork, and is a significant hazard for older people or people with disabilities.
- Use textured or 'fluted' surfaces, paint walls different colours, or plant vines to cover large wall spaces to avoid graffiti.
- Replace all defective lights regularly, as a result of systematic reviews of lighting performance.

Methods to Vandal-Proof Fence Panels.

To avoid vandalism of fence panels, either of the following methods of securing the panels must be used;

1. Use one-way stainless crews so that the panels cannot be removed once installed, or
2. Use Allen Key screws with the holes filled in with epoxy, or
3. Use stainless sleet rivets that are more difficult to drill out.

APPENDIX E - PLANTING STOCK SPECIFICATIONS

(See also Development Design Specification **C273.09 Table C273.2-Plant Stock)**

Container sizes

Nurseries provide a range of container-grown plant sizes and generally include:

- *"Gro-Tube" or "Forestry Tube"* (75mm x 100mm & 50mm x 75mm containers resp.) Being the smallest available commercial units, they must be "hardened off' for direct planting and carefully planted, protected and maintained during the first 12 months. Acacia and Eucalypt growth can produce a plant of stronger root and stem growth, equal in size to that of an "advanced" size planting.
- *"Ground Covers":* (140mm pot size)
- *"Semi Advanced" size* (200mm pot size) This is a container of more than five litres capacity. It is often used for supplying shrubs.
- *"Advanced" size* (45 litre) This is a container of at least forty-five litres capacity available for a wide range of plants, but mostly trees
- *Super Advanced" size* (100 litres and upwards) These are for large trees grown for some years in containers and planted out for immediate effect. Because they are large they are less vulnerable to trampling and vandalism and are suitable for pedestrian traffic areas or for creating an immediate visual result at selected locations. Species suitable in this size include deciduous trees and palms which are more expensive and available in a range of sizes up to 2m to 3m in height with a thin canopy. They are not comparable in size to mature trees.

Plants which have been grown in containers have a very limited root system when they are planted out and require regular supplies of water to encourage root growth which eventually spreads to provide support and moisture. Deep ripping of soils before planting can assist in moisture penetration.

Much of the cost for containerised planting lies in its preparation, planting and maintenance. Site planning should allow for the overall cost to be considerably more than the mere plant cost.

APPENDIX F - STREET TREE PIT DESIGN DETAILS

DELETED (REFER S.D.705)

APPENDIX G - GRASSES & MULCHES

(See also Development Design Specification **C273.09(d))**

Surface protection – **Chips and Waste .** These may need to be specified on the design drawings. Specifications and details of the placement process may be found in construction specification **Development Construction Specification C273 and AS4454**.

Woodchip

Woodchip mulch placed over exposed areas provides surface protection that reduces erosion. Slopes and heavily-trafficked areas can be further stabilised by using mesh. A range of materials is available for use as surface protection blankets, and includes jute mesh, jute blankets, coconut fibre, pine shavings and wool. If these materials are sandwiched between polypropylene mesh or other inorganic fibres, it is essential that all components are biodegradable.

The use of fine polypropylene mesh or similar should not be used near sedimentation ponds or water bodies, as small animals such as lizards can be trapped in the mesh. These materials can also be collected by birds for nesting and present a further hazard if they are digested by fledglings. Where bushfire is a potential threat, use larger size woodchips not fine or fibrous woodchip.

Pine chip/pine bark

Pine bark produces an acidic soil reaction which is an advantage with alkaline soils. Newspaper mulch or other similar material can also be used under the pine chip, bark or other mulches.

Lawn clippings

Specify only well composted lawn clippings. Fresh clippings tend to repel water as they dry and deplete the soil of available nitrogen as they decompose. Symptoms of nitrogen deficiency are yellow leaves with green veins.

Almond shells

These are excellent on paths for reducing weeds. However, almond shell mulch which contains high level of almond hull should not be used on garden beds as they produce an alkaline substance when they decompose. Almond mulch, which has more than 90% of almond shell, is recommended for gardens.

Pea Straw

Pea straw is an excellent, relatively cheap organic mulch which eventually decomposes and adds organic material to the upper layer of soil. If mixed with lucerne it will also contribute some of the nitrogen needs for plant growth.

Ground cover mixes

Ground cover mixes offer a diversified blend which may comprise:

- grasses
- perennial herbs
- prostrate vines
- low shrubs.

This blend of species types should be complementary, allowing rapidly established grasses to help stabilise the ground and thereby assist establishment of other plants. Perennial herbs, or wildflowers, can add a carpet of colour to a sward of grass, as well as biological diversity, at the same time reducing possible weed invasion. Common herbs include Native Daisies (Brachycome spp.), Flannel Flowers (Actinotus spp.) and others.

Prostrate vines may serve a purpose similar to perennial herbs, with the additional benefit of helping to bind oils rapidly and trap sediments. Typical vines suitable for some harsh conditions include Snake Vine (Hibbertia scandens) and Dusty Coral Pea (Kennedia rubicunda). Low shrubs up to O.5m to 1.0m high can add further diversity without significantly altering the effect of a low lying mat of ground cover. Typical low shrubs include Tea Tree (Leptospermum juniperinum) and Paperbark (Melaleuca thymifolia). The selection of plant species depends ultimately on climate and soil conditions of the locality.

Specialist consultation may be needed.

Use of grasses along sub-arterials (not pedestrian routes)

Grassing has a specific application along roadways, and the indiscriminate planting of exotic grasses should no longer be used as a short-term, low-cost solution. Such grasses require long-term maintenance, which is expensive and not energy efficient.

They should only be used where a clear justification can be shown for not using massed shrubs. The latter are preferable because they can provide wildlife habitats, spatial enclosure, view control and character enhancement.

The main use of grasses along the roadway includes the following:

- narrow medians, where shrub planting or paving is impractical, usually 1.5m to 3m wide
- roadside verge, where emergency access and slipway are allowed, usually 1.5m beyond the shoulder
- batter stabilisation turfing may be useful where fast surface protection is required against flash stream flows
- temporary crop cover is usually sown or batters before shrub establishment
- ground cover mixes comprising grasses, flowering herbs, prostrate vines and low shrubs
- wetland "grasses" for recolonisation of channels and other waterways.

Native grasses

Native grasses are preferred wherever possible in parks and along roadways because they contribute to local habitats and have become significantly depleted as a natural resource. Native perennial grasses have many useful qualities, such as:

- being an essential component of any natural roadside area and the Australian landscape
- low maintenance which does not require mowing
- providing a cover to faunal habitat
- being able to withstand the effects of fire, drought and weed competition.

The non-invasive and "clumped" growth habit of native grasses provides space for the germination of native tree and shrub species.

For existing natural grassland areas, consideration should be given to exploiting the benefits of Australian native grasses especially the tufted Kangaroo, Wallaby, Poa Grasses, the strap leaves and rushes (*Lomandra*) which form dense swards of tussocked grass cover when properly established. Native grasses such as Kangaroo Grass, Wallaby Grass and Microlaena are available for direct seeding. Native grasses can also be established by sowing plugs of established plants in viro-cells using specially designed planting machines. Also, water plants such as edges, rushes and similar can be established in drainage lines and stormwater ponds.

These types of grasses do not require rich nutrients for growth, have a fundamental role in the re-establishment of a native plant community and do not compete against the establishment of other native plants. They contribute to corridor habitats for wildlife. Selection of these should be appropriate to different sub-regional climates and soil conditions.

Expert advice is advisable for successful native grass seeding.

Problem grasses

Problem grasses along roadways include tall growing exotic grasses, especially rhizomatous (or runner rowing) grasses which spread easily.

Kikuyu grass (*Pennisetum clandestinum*) should be avoided. It requires regular slashing, is difficult to eradicate, invades natural bush land, and when unkempt chokes young plantings or seeded recolonisation. Its bright colour also contrasts poorly against native vegetation.

Rhodes Grass (*Chloris gayana*) is also undesirable where future native planting may be established. This rapidly colonising grass chokes new plantings and depletes the ground of soil nutrients. It is difficult to eradicate along roadways and should be avoided.

Other problem grasses on roadsides include Paspalum, African Love Grass and Phalaris.

Research on Cumberland Plains native grasses shows that native grasses which produce runners may provide replacement species for the introduced grasses.

Weed repellent grasses

Weed repellent swards of native grasses, ferns and allied plants can be established by planting or seeding. These grasses and allied substitutes are important for weed control, as the alternative, invasive exotic grasses or weeds require costly maintenance routines to control growth. Typical swards include Strap-Leaf (*Lomandra spp.)* and Blady Grass (*Imperata cylindrica*), appropriately selected to suit local conditions.

APPENDIX H – LANDSCAPE PROCEDURES AND STYLE MANUAL

Link to Landscape Procedures and Style Manual

APPENDIX I – IRRIGATION ASSETS SPECIFICATION

Link to Irrigation Assets Specification

APPENDIX J – SPORTSFIELD CONSTRUCTION GUIDELINES

Link to Sportsfield Construction Guidelines