



0001c Design Checklist - Landscape and Open Space

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00 Design principles

0.01 Main considerations

It is a requirement to undertake the [00 PLANNING AND DESIGN/ 0001R - DESIGN REFERENCE](#) and [GLOSSARY OF TERMS](#) information into all aspects of design, detailing and delivery when developing the content here within. Clear demonstration of adherence to these requirements is part of the services and will be called upon at key points in the project and during at the discretion of the Department of Education (DoE).

0.02 Landscape Planning and Design

Landscape Planning and Design encompasses all elements in a development proposal, including:

- to provide a rational solution to site specific factors,
- to facilitate site development and management.

The overall landscape conceptual design with defined landscape zones is to be developed by the Landscape Architect in conjunction with the Project Design Team.

Detailed landscape design involves fine resolution of hard and soft elements.

- Soft Works relates to the planting component in a landscape design, including soil preparation
- Hard Works applies to playgrounds, pedestrian pavements, steps, low retaining walls and external furniture etc.

Detailed design development of other hard works such as bulk earthworks, retaining walls higher than 1m, vehicular pavements or site services are to be undertaken by appropriate professions such as Civil and Structural Engineers in co-ordination with the Landscape Architect.

The information contained in this Document is intended to provide guidance for the design of school landscape in New South Wales.

The school landscape has unique requirements that must be addressed at the design stage. The external environment of the school must form a beneficial, long-term asset to the school community, and potentially to the wider community. Understanding the issues affecting the design of the school landscape and suggesting possible ways to resolve

them is critical. The information provides opportunities to maximise the potential of the school landscape for environmental benefit, student learning and community engagement.

This guide applies to every school development in NSW, whether refurbishment or a new facility, and to all stages of the development of a new facility including;

- Master planning,
- Concept design,
- Schematic design,
- Detailed Design,
- Construction and Maintenance.

Potential Benefits of the School Landscape

An attractive and safe landscape projects a positive image of a school and encourages parents, students and the community to have pride and interest in their school, and to have a strong sense of ownership and community.

Spatial Definition

The landscape can be used to define spaces and activities such as areas of movement, play and out of bounds areas. The landscape treatment reflects the areas used and assists in guiding the use and behaviour patterns of students.

Climate Control

Appropriate landscape treatment contributes to a comfortable micro-climate both within buildings and in external areas. Examples include shading of building facades, external shade, and wind break planting.

Social Benefits

The landscape design, in particular planting, can have a positive psychological effect on the behaviour of students. The landscape can support a variety of activities by providing a range of settings that allow students to engage and interact with each other.

Learning

The landscape can add to, and support the school curriculum, by integrating with outdoor learning spaces and facilities, to reflect an increasing acceptance of the benefits of outdoor learning including developed imagination and social interaction, opportunity for expanded environmental knowledge and engagement, team building, planning, play and fun.

0.03 Landscape Planning Elements

Incidental Items and Fixtures include:

- Flagpoles, signs, seating and fencing as well as drinking fountains. Additional non-standard fixtures may need to be incorporated such as play structures, bell, bicycle rack/rails and cricket nets.
- Service elements which may affect site landscape planning include gas meters, regulators or bulk storage, Power (electrical kiosk); septic tank and transpiration/absorption area (non-sewered areas); water meter, fire booster assemblies and hydrants; site lighting/security lighting; telephone and stormwater infrastructure.
- Planting elements include retained vegetation, grassed areas, trees in grass, trees in paved areas and mass planting.
- Demountable learning facilities may be required to carry peak enrolment.

Site facilities in Schools generally comprise of:

- Assembly Area
- Games Court for PE and other activities
- Games/ Playing
- Batting Practice Nets
- Ancillary Paved Pedestrian Areas (access, paved areas and bus zone).
- Agricultural Field Area (High School)
- Open Space
- Pedestrian access paths, ramps, steps and covered ways.
- Vehicular Circulation.

0.04 School Landscape Design Principles

The following outlines the four main design principles that apply to every school, and in every zone of the school:

- Healthy and safe
- A sense of place
- Sustainable
- Low maintenance

In all instances, these need to be balanced with other design requirements including the site-specific brief, stakeholder/authority requirements and budgetary constraints.

0.05 A Healthy and Safe Landscape

Safe Materials

Aims

- Create a safe school environment using materials that will not cause harm to students, teachers or visitors.

Safety and security are key considerations for the school landscape. The principles of safe design must be carried through all aspects of the design development.

Areas addressed in this section include:

- Safe materials
- Security
- Shade
- Safe and equal access
- Harmful or irritant plants
- Bushfire management
- Health

Strategies

- All products used in the school landscape must be safe. Particular consideration must be given to the specific end user groups. Further consideration must be given to construction/ installation processes, in terms of their potential for exposure to unsafe products, particularly on occupied premises (works at existing schools).
- All products must be tested and certified to ensure that they comply with relevant Australian Standards and applicable health and safety guidelines.
- Refer to the relevant Australian Standards, Kidsafe, and/or the National Industrial Chemicals Notification and Assessment Scheme for further information.

Security

Aims

- Maximise safety and security and facilitate surveillance of students by maintaining sight lines and minimising opportunities for hiding.

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- Consider the safety and security of the school grounds when locating planting to screen, expose or filter views.
 - Consider planting locations in relation to security lighting and after hours use areas.

Strategies

Understand and address the requirements of the school and local council, in relation to visual access (sight lines) and privacy. This may include openness for supervision, screening for privacy, aesthetics or safety, restricted access and physical screening. Views into the site from nearby residential properties and roads may be desirable to allow informal neighbourhood supervision. Choose appropriate plant species to fulfil requirements.

Shade

Aims

- Exposure to UV rays is a principal cause of skin damage and long-term adverse health impacts. Immature skin is particularly vulnerable to damage. Provision of adequate shade in the school landscape is therefore paramount.
- Provide adequate areas of shade where students can eat, play and work outside while being protected from the sun's harmful rays. Especially provide summer shade to seating and eating areas.

Strategies

- Locate trees and planting to provide shade for classrooms and staff areas. Afternoon shade in the summer months is particularly vital.
- Design the external environment so that at least 50% of seating is shaded by trees or building elements.
- Choose tree species that are effective in providing shade, such as broad dense canopy trees. Ensure that appropriate trees are selected to suit the conditions including high pedestrian traffic (root compaction), location in pavements and the like. Refer to the School Plant Palette for examples of appropriate species.
- Ensure that a degree of shade is provided in external areas throughout the year, especially in hot or dry climates.
- Consider the growth rate and size of trees when planting for shade including the potential need for interim design solutions such as shade sails or structures.
- Select appropriate species and locations for shade trees to minimise the potential damage of pavements, structures and buildings by the root system. Use structural

soil to increase the volume of soil available for tree growth and root control barriers where appropriate to protect adjoining pavements.

- Where applicable, ensure solar panels are not obscured by plants as they mature.
- Provide architectural shade (shade structures, covered areas, verandas, as per the EFSG and project brief) to cater for shade requirements in new schools. This will provide instant shade while trees mature.
- Refer to organisations such as Kidsafe, Australian Standards and the Cancer Council for relevant recommendations and guidelines regarding the provision of shade.

Safe and Equal Access

Aims

- Provide safe access to all key facilities including outdoor (learning and main play) spaces for people of all abilities.

Strategies

- Provide equal access to all key facilities within the school grounds. Refer to the Building Regulations (BCA) and Access sections of this Design Guide.

Harmful or irritant plants

Aims

- Minimise the potential for harm arising from the selection of plant material in the school landscape.

Strategies

- Plants known to be toxic, and especially those known to be toxic in small quantities, must not be used in the school landscape.

Health

Aims

- Design the school landscape to support the healthy development of children through the provision of spaces that encourage physical activity and social interaction.

Strategies

- Provide play areas which facilitate opportunities to develop fine and gross motor skills and encourage students to be physically active.

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- Where the provision of play equipment is included in the landscape brief, ensure play equipment and facilities are varied and appropriate to age and abilities, offering an appropriate physical and learning challenge.
 - Where fixed play equipment is provided, a variety of equipment must be considered to meet the needs of different age groups (such as K-2, Y3-6, Y7-9, Y10-12). This will reduce the potential for conflict between different age groups and avoid the potential for frustration with equipment that challenges too little or too much, which may lead to disruptive or destructive behaviour.
 - Play equipment should be chosen and designed in accordance with relevant Australian Standards (AS) 4685 and AS 4422, Educational Facility Standards and Guidelines (EFSG) Design Principles and [‘Playing Safe: Guidelines for the installation and maintenance of playground equipment in NSW government schools’](#), published by the NSW Department of Education.

Sense of Place

This section provides the design principles to guide the creation of a sense of place within the school environment.

Specific areas addressed by the principles are:

- The local context
- Landscape character
- The educational landscape

Local Context

Aims

- Integrate with the landscape and architectural context so that the school becomes part of the community.
- Contribute to the street character and amenity.
- Provide definition to a variety of inviting and usable spaces.

Strategies

- Where possible, provide street tree planting that continues the street planting theme, to achieve a consistent outcome along the street. Provide a unique identity for the school by using distinct mix of plant species that complement the school surrounds. Refer to the School Plant Palette for suggested species and to the local Council to determine if a street tree master plan is in place to ensure continuity to surrounding streets.

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- Anchor the school in its built environment context by referencing local plants, building materials, rhythms, textures and colours in the landscape design.
 - Consult with the Architect and design team to achieve cohesive landscape spaces between buildings and siting of buildings to respect existing landscapes.

Landscape Character

Aims

- Integrate existing established vegetation into the landscape design to enhance the visual character and amenity of the school.
- Provide a distinctive and attractive environment. The repetitive nature of school architecture can lead to a level of homogeneity irrespective of location. The landscape provides an opportunity to individualise schools and provide a memorable landscape setting.
- As much as practical, retain existing trees and habitat, for inclusion in the school landscape. They are key elements to a specific local character and provide important shade to external areas.

Strategies

- Retain and protect existing trees. They are landmarks and often provide gathering points within the school. They also help reduce the perceived scale of new buildings
- Avoid disturbance to and construction within the root zone of existing retained trees. The root zone generally extends beyond the drip line of the crown. Disturbance to the root system can be caused by compaction due to stockpiling materials, parking of vehicles, cutting or exposure of roots and changes in ground level, including placement of fill in excess of 100mm. Refer to AS 4970-2009 Protection of Trees on Development Sites.
- When work in the vicinity of an existing tree cannot be avoided, an arborist will need to be engaged to provide expert advice on how to best manage the tree (throughout the construction and in the long term), to ensure long-term tree health and viability, as well as student safety. This includes an assessment of possible changes to their environment (soil levels, water table and root disturbance). Reports produced by the Arborist must be provided to the contractor and be kept on site throughout the construction as a reference document.
- Implement a regular program of tree management and maintenance practices based on the advice of the Arborist. Where disturbance to the root zone cannot be avoided altogether, seek advice from the Arborist as to what works can be undertaken within the Structural Root Zone. As a guide the Structural Root Zone can be measured as (SRZ = 5 x DBH (Diameter of trunk at Breast Height)). Avoid earthworks within the

Tree Protection Zone (TPZ = 10 x DBH) surrounding retained trees, unless recommended otherwise by the site arborist.

- Use advanced specimens selectively for aesthetics and early effect. This will need to be balanced with budgets and potential longer establishment periods.
- Use smaller stock in areas that do not require an instant landscape. Young, small plants generally establish quickly and are more likely to thrive. They more readily adapt to local conditions and grow quickly to result in a healthy, vigorous landscape.
- Investigate planting types, sizes and techniques that support the successful establishment of the school landscape for example protective fencing and surrounds to avoid damage from students and pests such as rabbits.
- Identify opportunities for custom solutions to site specific issues, to distinguish the school from other schools.
- Give preference to endemic (locally native) species or use other native or exotic species that suit the local climatic and rainfall conditions, as well as the specific site conditions.

0.06 Educational Landscape

Aims

- Provide curriculum opportunities for education through the creation of appropriate spaces for outdoor learning.
- Provide a landscape that is stimulating and provides aesthetic benefits and enjoyment for the senses: sight, sound, touch and smell.
- Foster an awareness of sustainable food production and positively influence the food choices of students.
- Provide opportunities to learn about natural systems through the provision of areas for environmental education.
- Provide opportunities for play in unstructured, and unprescribed natural settings.

Strategies

- Develop the landscape design so that outdoor rooms of varying character, form and size are provided. These facilitate formal and informal outdoor learning opportunities and be able to accommodate a variety of tasks and group or individual learning. The landscape must not be seen as purely aesthetic, but as an extension of the learning spaces that have been provided in the classroom.
- Provide kitchen, herb, fruit or vegetable gardens as an opportunity for students to connect and engage with the cycle and process of growing food. They allow

students to participate in growing, harvesting and preparing of fresh food, fostering an understanding of food production as well as natural processes generally.

Consider the location of gardens relative to other facilities such as kitchens, water access, tool sheds, composting areas and vehicular access.

- Set aside areas for environmental education. These could be either existing areas on site, or newly established. Suitable areas include creeks/ponds/wetlands, groves of trees, embankments and rockeries. Use species, and combinations of species, that provide examples of natural systems and processes. Refer to the School Plant Palette via Related Resources for plant species that are suitable for attracting birds, butterflies and other wildlife.
- Consider establishing a weather station with basic environmental measurements that can be regularly monitored for example temperature, rain gauge, wind direction and barometer.
- Provide opportunities for imaginative play and the chance to explore, discover and connect with nature. This can increase awareness of natural systems and the environment. Integrate natural elements such as stone boulders, fallen logs and areas of mulch, gravel or sand, to provide stimulating free play areas
- Include plants that stimulate the sense of touch through the selection of plants with varying leaf forms, bark and flower texture. An example is the contrast between the smooth trunk of Scribbly Gum - *Eucalyptus haemastoma* and the rough fissured bark of Red Iron Bark - *Eucalyptus sideroxylon*. These two tree trunks also provide contrasting colours.
- Include plants and combinations of plants that stimulate sight through contrasting colours. For example, large beds of mass planting of varying colours contrasting with the trunks of trees and the seasonal presence of large bright flowers.
- Allow for the experience of different sounds by using plants with a variety of leaf forms and attract a variety of birds. Tree foliage can have distinctive sound effects in the wind e.g. *Casuarina*. Consider providing complementary elements such as wind chimes.
- Use aromatic plants in appropriate, strategic locations to provide a range of different fragrances in the landscape. Refer to plant palette for fragrant plants.
- Consider the provision of sensory gardens as an opportunity to develop the senses: touch, sight, taste, smell and sound. These garden spaces also provide opportunity for a variety of surface finishes, such as gravels, rocks, timber and exposed aggregate concretes. Also consider wind chimes, mirrors and wind sculptures that will stimulate the senses. Such gardens also provide attractive passive or 'break-out' spaces for quieter children. Consider seating areas within these garden areas.

0.07 Sustainable Landscapes

Thermal Comfort

Aims

- Maximise thermal comfort and energy efficiency through integrated architectural and landscape design
- Maximise thermal comfort within buildings.

Strategies

- In warm climates, utilise courtyards as cooling zones. Consider the use of shade structures and water.
- Locate suitable windbreak species where required to ameliorate prevailing cold winter winds.
- Select species and locate trees to allow sufficient winter solar access to buildings and external spaces in winter.
- Consider the location of trees and planting to provide shade for classrooms and staff areas in summer months. Shade to walls and opaque surfaces can be effective in cooling classrooms as well as shade to transparent and glass surfaces.
- Maximise shade and thermal comfort in mid-February.

Water Management

Aims

- The school landscape must be integrated with the stormwater design.
- Incorporate Water Sensitive Urban Design (WSUD) principles in consultation with a Civil Engineer as a part of the site wide drainage strategy.
- The school landscape must minimise additional irrigation requirements.

Strategies

- Reduce site run-off and peak flows of water downstream through on-site detention measures and by minimising impervious areas where possible. Contact local authorities for guidelines and requirements. Work with the Civil Engineers to meet requirements for on-site detention and investigate opportunities to increase rain/stormwater percolation into the site to recharge water tables.
- Utilise planted swales and on-site detention basins to capture, store and treat runoff and overland flow.

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- Where possible, plant swales and boggy areas with species that have high evapo-transpiration rates and are known for their filtering abilities. Co-ordinate with Civil/Stormwater Engineers to ensure appropriate flow rates are maintained. E.g. *Juncus* spp, *Isolepis* spp, *Carex fascicularis*.
 - Select and locate species to suit site conditions such as water-tolerant plants in boggy areas or drought tolerant plants on ridges or free-draining sandy soil.
 - Utilise porous paving and split kerbs where possible to reduce the speed and volume of overland flow and to assist in the re-charging of groundwater tables.
 - Collaborate with Hydraulic Engineers to identify non-potable sources of water for use in garden bed irrigation. Work with the engineers to identify the most appropriate locations for infrastructure, including water tanks, pumps and the like.

Re-use and recycle

Aims

- Re-use 'surplus' natural, weed-free and safe site materials in the design, where possible.

Strategies

- Chip site vegetation to use as mulch where possible (do not use weed species as mulch).
- Re-use site soil for planting and to create landform where possible. If required, treat site soil prior to planting to ensure it is weed and contaminant free.
- Where habitat creation is an objective, consideration must be given to creating natural substrate characteristics rather than an even spread of homogenous imported soil.
- Use surplus rock as a feature, play or infill material if appropriate.

0.08 Low Maintenance Landscapes

The principles for an easily maintained landscape aim to ensure that ongoing labour and upkeep costs associated with maintenance or repair work are kept as low as possible.

Specific areas addressed by these principles are:

- Pedestrian Movement and Wear and tear
- Pests
- Integration with service design
- Maintenance
- Potential for Damage

Pedestrian Movement and Wear and Tear

Aims

- Reduce the potential for unsightly, worn or eroded areas by designing to cater for desire lines and by providing appropriate hard-wearing surfaces of sufficient width to cater for the expected number of students using each area
- Provide for generous width of pavements in high use areas.

Strategies

- Address desire lines during the design development process and locate hard-wearing surfaces accordingly.
- Provide a hierarchy of surfaces with each surface material suited to the level and concentration of student use and associated potential for wear and tear and erosion. Turf is suitable for low use areas or where use is spread over a wide area. Materials such as concrete, asphalt, unit paving or soft fall surfaces are required in high use areas or where student access is restricted to narrow, small spaces.
- Address transitions between surfaces. In spill out zones and narrow connections consider the most suitable transition from hard paving to grass.
- Consider path intersections and change in directions with adequate transitions to avoid short cutting and wear and tear of adjoining soft landscape areas.
- In selecting materials consider slope, flow and movement of water across the land.

Pests

Aims

- Minimise the risk attack from pests through appropriate materials use and installation techniques
- Provide ease of visual inspection to allow for early detection of possible pests

Strategies

- Keep dense vegetation clear of building edges to improve ventilation and chances of termite detection.
- If the risk of termite infection is high or where otherwise required, use termite resistant materials and details known to assist in the prevention of termite attack. Timber must be naturally termite resistant or treated in a way recognised as giving termite resistance.

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- Note that the use of certain methods of treatment such as Copper Chrome Arsenate (CCA) treated timber is no longer appropriate in the school landscape, due to potential adverse health effects.
 - The Australian Pesticides and Veterinary Medicines Authority (APVMA) has placed restrictions on the use of CCA treated timbers and states:
 - CCA timber cannot be used in garden furniture, picnic tables, exterior seating, children's play equipment, patio and domestic decking and handrails.
 - The detailed instructions for timber treatment operations, waste management and disposal and protection of the environment are met
 - Test existing retained trees for termite activity and implement appropriate treatment if required.
 - Carefully select plants that are not prone to attracting insect and pests.
 - Install pest barriers to aide establishment of planting i.e. temporary fencing or plastic plat surrounds to limit damage from rabbits and other vermin.

Integration with services design

Aims

- Integrate landscape design with the design of services infrastructure.

Strategies

- Collaborate with services engineers to ensure services are located in areas that do not prevent the establishment of an attractive school landscape, in particular the provision of shade trees. Conversely, the landscape design must not hinder access to services for maintenance.
- Where possible, gas and electricity meters and street connections must be integrated with features such as school signage or walls, or disguised from prominent access points and public views, through the use of planting or other means.
- Service covers must abut hard edges and / or be incorporated into paved areas. Drainage pits in or near planting beds can easily become obstructed with mulch and plant material, creating maintenance problems and overflow/flooding situations.
- The design of landscape planting and structures must consider the requirements and limitations of (service) easements.

Maintenance

Aims

- Design the school landscape to require minimal maintenance generally. Higher maintenance requirements may be appropriate in public areas such as the entrance and assembly zones.

Strategies

- Turf species must be carefully selected and located. Investigate different types of turf to suit specific locations e.g. shade tolerant on southern sides of buildings, slow growing in boundary and out of bounds areas, hardy in active areas. Ensure that turf areas are of a size and slope that are easily accessible for maintenance.
- Design turf surfaces in large simple areas, minimising sharp corners and fragmentation by services and paving.
- Design turf areas to allow for management of turf for “rest” periods on a rotation bases, this may be helped by having easily distinguishable zones. Consider the use of synthetic grass materials in high use zones, shaded areas and other spaces where the growth of natural turf is problematic.
- Garden beds must be designed to add form and colour, define spaces and desire lines and to provide shade. Garden beds must not be used to simply fill narrow or awkward spaces, or tapering corners, due to the high maintenance requirements and associated costs.
- Design garden beds that are simple in shape, and of sufficient area to allow for mature established plants.
- Ensure garden beds are appropriately edged to allow for ease of maintenance for mowing / trimming of adjoining grass areas
- Beds that are raised or isolated from the ground water are prone to drying out and must preferably be minimised or provided with irrigation where possible.
- Bed widths of less than one metre must be avoided due to the risk of drying out and plant failure.
- Ensure that garden beds do not obstruct desire lines.
- Space plants so that the soil is covered and shaded by the end of the establishment period. This utilises the natural tendency of plants to out compete one another for ground space and light. By the same principle, weed removal after the establishment phase must be followed by immediate infill planting where required.
- Space trees to allow for ease of access between trees for ride on mower, push mower or slasher in order to avoid accidental damage.

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- Use plants that provide a natural mulch or weed suppressant in areas of low use. Install plants in sufficient numbers (density of spacing) that will ensure full coverage of garden areas avoiding empty patches where weeds may establish.
 - Select and locate plants to ensure that they will not overhang paths or obstruct passageways.
 - Consider the maintenance implications of trees in grass. Mowing or edge trimming around the trunks can cause ring barking or infestation by pests and diseases which can affect the health and structural safety of the tree.
 - Avoid creating wear zones from children regularly seeking shade. This can cause the grass or tree to fail, as the ground surface becomes compacted. Potential solutions are mulch around tree trunks and provision of adequate alternative shade throughout the school grounds.
 - Seating or garden beds around trees are a means to avoid excess wear and compaction around the root zone.
 - Consider the need for tree protection to prevent the risk of damage or vandalism until trees are established. Examples are the use of tree guards, low height fencing or planting around trees and garden areas.
 - Work with the hydraulic/ storm water engineers to ensure that overland flow of water is not impeded.

Potential for Damage

Aims

- The school landscape must not cause damage or exacerbate maintenance problems to school buildings or neighbouring property.

Strategies

- Carefully select tree species to ensure that the mature form and habit are suited to their location and will not cause costly long-term damage to buildings, walls, pavements or other structures.
- Consider the potential adverse impacts of species on their surroundings. Ensure appropriate setbacks from school buildings, services, roads and neighbouring properties. Problems include unwanted screening, overshadowing, leaf fall blocking gutters and pits, and fruit drop staining pavement.
- Select and locate plants to ensure that they will not overhang paths or obstruct passageways.
- Use root barriers to services where appropriate to prevent root invasion.

0.09 Landscape Softworks

The planting strategy for any school must comprise grassed surfaces with trees outside the building precinct, paved surfaces with trees inside the building precinct and a minimum of mass planted beds. The whole scheme must require only simple maintenance appropriate to available resources.

Existing Vegetation

Refer to relevant school type [DESIGN COMPONENTS/OPEN SPACE](#)

- The educational value of nature areas and conservation areas in schools has been well recognised, but their establishment and maintenance has met with varying degrees of success. The establishment of School Environmental Areas (SEA) have been advocated under the DoE "Greening of Schools Program", and packages (including DoE's "Hands on Learnsapes" CD) have been issued to schools to assist them in developing their own "Learnsapes".
- Policy is to retain existing trees and tree stands, both native and exotic, plus the understorey native vegetation where practicable. Existing trees can usually be retained and maintained subject to their age, condition and effects of site development upon water supply, drainage, soil compaction and disturbances/partial removal of the root system generally. Assessment of trees to be retained must be undertaken in consultation with a suitably qualified Arborist to assess suitability for plant retention / removal.
- The ground survey data reliability /order of accuracy must be considered. The relevant Australian Standard only guarantees contour accuracy to half a contour interval, although spot levels are considerably more accurate. Where tree retention looks to be questionable, the situation must be reassessed early in the construction phase to eliminate the cost of tree removal when buildings are complete.
- Indigenous Australian species, particularly Eucalyptus spp., have evolved over time to survive inhospitable/hostile conditions. Under stress, these trees will sometimes sacrifice a limb to ensure the survival of the whole tree. As a result, retained mature trees may contain dangerous dead branches which can snap off in high winds: all retained vegetation must be inspected and reassessed and any necessary tree surgery carried out by an arborist/tree surgeon as part of the construction contract.
- Retention of understorey vegetation depends very much on the motivation and attitude of senior school staff. Understorey vegetation, perhaps due to poor design integration, is sometimes seen as:
 - Providing secluded areas which are difficult to supervise

- Acting as rubbish traps
- Harbours vermin
- Being of a “poorer” quality than adjacent newly laid turf
- Presenting a bush fire hazard

It can however be:

- Used effectively to define spaces
- Attract native birdlife
- Provide instant maturity
- Areas of retained vegetation are more fragile than turfed areas and will not survive unrestricted access. Except where the understorey is extremely dense, nature/conservation areas only succeed when fenced off to control access. The effect of fencing is two-fold:
 - Restricted access enables the area to flourish, thereby maintaining or even improving its original quality and diversity; and
 - The delineation of the area gives it a special “cachet”, projecting the image that the school is the custodian of a valuable resource.
- Protect areas of retained vegetation during the construction period by fencing to eliminate compaction by construction plant, equipment and vehicles as well as the storage of materials within the tree root zone. Fencing must be placed beyond the drip line of trees
- Where an area is to be retained to represent the whole pre-existing plant community, it must also be fenced.

Grassed Areas

Refer to relevant school type [DESIGN COMPONENTS/OPEN SPACE](#)

- Maximum grade for residual open areas is 1:4 or 25 % with a preferred grade of 1:8 / 12.5 % or flatter (ie. walking grade to allow for informal use).
- Gradient range for free play areas is 1:30 or 3.3 % to 1:60 1.66 % (note that where gradients are flatter than 1:40 or 2.5%, sub-soil drainage must be considered for most soils).
- Maximum gradient recommended for playing fields 1:60 or 1.6 %, demands sub-soil drainage.

Turfing

Turfing is the preferred technique for installation of grass because:

- **Speed of establishment.** The use of grassed external areas is essential for a school to function adequately; landscape softworks are usually installed just prior to occupation.
- **To sprig or seed** is impractical because of the length of time required to establish a useable grassed surface; except in relatively flat, low-use areas of a school site, not affected by last minute service installations or required for builders' access, equipment, sheds or materials storage.
- **The soil surface** is vulnerable to weed invasion and erosion with all grassing techniques other than turfing. An on-going maintenance problem could be created.
- **Seeding** must never be considered when the specified species is Kikuyu. Grass produced from Kikuyu seed is more upright in form than is desirable for a dense turf sward; however, Kikuyu seed may be included in seed mixes.
- **Free Play Areas** must be turfed rather than seeded, and existing rough grass must not be used unless inspected and recommended by a Landscape Technical Specialist.
- **Consider the use of alternatives** to turfing in non-play areas e.g. Woodland areas.
- **Consider the use of synthetic grass** in areas where the conditions are unsuitable for turfing.
- Turf Species Selection:
 - Kikuyu (*Pennisetum clandestinum*): has vigorous growth habit under most conditions but can also be a weed, which needs strong control. Suited to active areas.
 - Couch (several species): It requires suitable climate and soil conditions. It can also be a weed with fine pollens, which are a major source of allergens.
 - Buffalo (Soft Leaf Shademaster, Sir Walter, Palmetto, ST 85, ST 91, ST 26 Austine)- shade tolerant requiring less mowing than Couch or Kikuyu.
 - The Contractor or Turf Supplier is to provide Certification of grass type.
 - Commercial soil testing laboratories make it possible to specify precise sub-soil and soil treatments and to establish the most appropriate species selection for a particular site. Utilisation of this technology must improve the general standard of grassed areas in schools as dependence on artificial fertilising is reduced.

Maintenance of Grassed Areas

- **Include** watering, mowing, trimming, weeding, as well as fertilising and aeration.
- **Aeration** by coring or slicing must be carried out at least once a year to combat the compaction resulting from intensive use during the school year. Undertake this activity during school holiday periods

- **Regular maintenance** is essential to retain a healthy sward, capable of withstanding normal use.
- **Consider the use of different mowing regimes** to reduce costs.
- **Consider rest periods for** turf areas and rotation of areas during term time particularly in harmer months to avoid wear and tear and complete loss of turf cover

Tree Planting

Generally: tree planting improves the visual and physical amenity of a school with minimal interruption to functional flows and relationships.

- **Locate trees** at least 3.0m from any roof gutter - where soils are highly reactive to soil moisture levels, this distance may need to be increased (check adjacent development for any signs of cracking, etc.).
- **Trees in grass** must be > 1.2m from adjacent paving, (although a wider separation would reduce damage from roots) and 1.5m minimum from other trees, to facilitate mowing.
- **Trees in paving** are usually limited to the building precinct:
 - Unit paving allowance of 2.0 x 2.0m may be installed around the base of the tree to maximise site availability and minimise soil compaction.
 - In this situation, eliminate compost from the soil mixture to minimise differential settlement.
- **Root barrier** to be installed to minimum 500 mm depth using flexible polyplastic product. A 'gap graded' 'structural soil' mix is to be used in this location to allow an increase in the volume of soil provided for trees to root and minimise the incidence and severity of pavement damage due to root movement. Incorporate drainage at the bottom of the structural soil and connect to the stormwater system.
 - The selected stock must be advanced and tree guards provided, because of the high level of activity in these areas.
 - Ties must never be attached to the tree guards.
 - Installation of a watering system to distribute water, nutrients and oxygen evenly around the root ball will encourage deep root growth to avoid damaging the paving. Root directors may also be appropriate.
- **Trees can contribute** more to spaces between buildings than mass planted beds, by controlling the sun, providing a sense of scale, spatial definition, and the high aesthetic value of ever-changing shadow pattern on pavement.
 - **Distance between roof overhangs** is to be greater than 6.0m where possible, to allow for tree planting.
 - **Selection of tree species** must consider the size of the space plus climatic and soil factors.

-
- **Sub-soil drainage** is required to all trees in paving with pipe brought to surface (and capped) to allow for hand watering to subsurface

Site planting must:

- Create a strong visual framework
- Define major functional units on the site and integrate the whole while acknowledging the pre-development patterns of vegetation
- Accommodate modified conditions on site resulting from development
- Consider wind protection and excessive overshadowing of playing fields, plus the more obvious amenity of summer shade
- Help define movement and circulation

Site planting techniques must:

- Consider existing soil conditions
- Avoid excessively deep excavation
- Brake up sub-grades to prevent “welling” around tree roots
- In very heavy soils, consider graded drip lines and/or soil mounding to enhance plant performance

Local native species must be used wherever they can effectively fulfil the design requirements. The order of preference for selection of species must be:

(1). Local habitat zone. (2). NSW (3). Australian (4) Exotic

Refer to the local Council for advice on plant species that are suited to local conditions (Native and Exotic species) and cross check to avoid potentially harmful varieties.

Where Australian native species are to be used:

- Modify fertiliser selection to suit
- In rural areas, rabbit protection may be necessary
- Use the smallest stock practicable

In the past, forestry tubes have been avoided because their small size rendered them vulnerable to accidental damage: now that the “Tuley Tube” is locally available, forestry tubes could be viable.

Mass Planted Areas

Generally, keep mass planted areas to a minimum, located in highly visible areas to encourage maintenance and minimise misuse/abuse. It must not be considered as a “make-up” surface treatment in confined areas, too narrow for trees or easy mowing access. - the cost of properly prepared and planted beds approximates that of paving, (excluding further maintenance) and is therefore a “luxury” item to be used for a functional purpose.

- **Mass planting** such as shrubs and climbers, which could conceal signs of termite activity, must be kept clear of building edges. Low ground covers requiring minimum watering may be considered.
- **Maximum slope** is **1:3** for mass planted banks - surface run-off must be diverted around the top and bottom of the bank to reduce the risk of erosion or bank collapse.
- **Selected plant species** must be long-lived, hardy and able to withstand long periods of neglect - for this reason, plant species must be selected on a site specific and performance basis, with native shrubs being used with discretion.
- **The planting preparation** where mass planted areas occur in paved areas, must finish flush with adjacent paving to take advantage of inadvertent watering maintenance when paving is being hosed down.
- **In car parking areas**, a kerb edge is essential to prevent contamination from oil, grease and petrol washed off the road surface.

Hazardous Trees/ Plants

When selecting tree and plant species for specific locations on school sites, the following must be considered:

- **Trees that may shed large branches** when under environmental stress must not be planted in school play or assembly areas, adjacent to buildings or in car parks. (Eucalyptus ssp. River Red Gum (camaldulensis), Lemon Scented Gum (citriodora), Spotted Gum (maculata), Mannifera (mannifera ssp.), Red Spotted Gum (maculosa), Mountain Ash (regnans), Candlebark Gum (rubida), Manna Gumm (viminalis), Coral Tree (Erythina ssp).
 - If a specimen of a species prone to limb drop exists as a mature tree on site, carefully consider its location relative to the proposed future use of the surrounding area. Review the design and species and assess the suitability for retention, with a view to minimising the potential risk.
 - Consult a qualified arborist to review existing trees assessing the risk to provide management guidelines and measures to reduce stress and potential limb drop.

- **Trees or Shrubs that may cause injury** must not be positioned within assembly areas, adjacent to games courts and along circulation routes. The use of shrubs or trees that have thorns or prickly foliage, produce large fruit or cones are discouraged
- **Trees with aggressive root systems** must not be used as they can damage walls, paving or drainage pipes. I.e. Figs & Rubber Trees (Ficus Sp.), Poplars (Populus Sp.), willows (Salix Sp.), Camphor Laurel (Cinnamomum Camphora), Coral Trees (Erythrina), Black Locust (Robinia Pseudoacacia).
- **Avoid planting species where they will drop leaves to block roof gutters.** (Casuarina ssp., deciduous trees and climbers).
- **To minimise the risk of termite infestation** in buildings, improve the chances of termite detection by ensuring planting will not obscure the building edges, inhibit sub-floor ventilation for elevated floors and watering systems do not create damp conditions conducive to termites.
- **Avoid poisonous or high allergy risk plant species.** Refer to recommended planting lists as published by Kidsafe® and the NSW Asthma Foundation.
 - Plants known to be toxic, and especially those known to be toxic in small quantities, must not be used in the school landscape. Common toxic plants include:

Table 01: Commonly known toxic plant species

Common Name	Botanic Name
Angels Trumpet	Brugmansia x candida
Arum Lilies	Zantedeschia aethiopica
Castor Oil Plant	Ricinus communis
Crepe Jasmine	Tabernaemontana divaricata
Daphne	Daphne mezereum
Deadly Nightshade	Atropa belladonna
English Yew	Taxus baccata
Hemlock	Conium maculatum
Lily of the Valley	Convallaria majalis
Native Loquat	Eriobotrya japonica
Oleander	Nerum oleander
Poinsettia	Euphorbia pulcherrima
Rhus	Toxicodendron succedaneum
Rosary Bean	Abrus precatorius

Common Name	Botanic Name
Golden Chain Tree	Laburnum anagyroides
Yellow Oleander	Thevetia ssp.
White Cedar	Melia azeradarach var. australasica

Note: This list is not exhaustive. It is the responsibility of the designer to ensure that selected plant species are not known to be toxic at the time of undertaking the design.

0.10 Landscape Fixtures

Seating

To be located by the DoE Project Director, in conjunction with the School Principal.

Fabric: Aluminium or other approved material.

Spaces/Requirements: 250mm run of seating per student

Height:

- Primary Schools seating 350mm above finished paving
- High Schools seating 400mm above finished paving

Refer to: Drawings below, [DESIGN COMPONENTS/OPEN SPACE, 05 INTERIOR/0552 METALWORK – FABRICATED](#), [02 SITE URBAN AND OPEN SPACES/0261 LANDSCAPE – FURNITURE AND FIXTURES](#) and [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST - ACCESSIBILITY](#)

Guide only for metal fixtures. Do not use as a construction detail. Not to Scale (NTS)

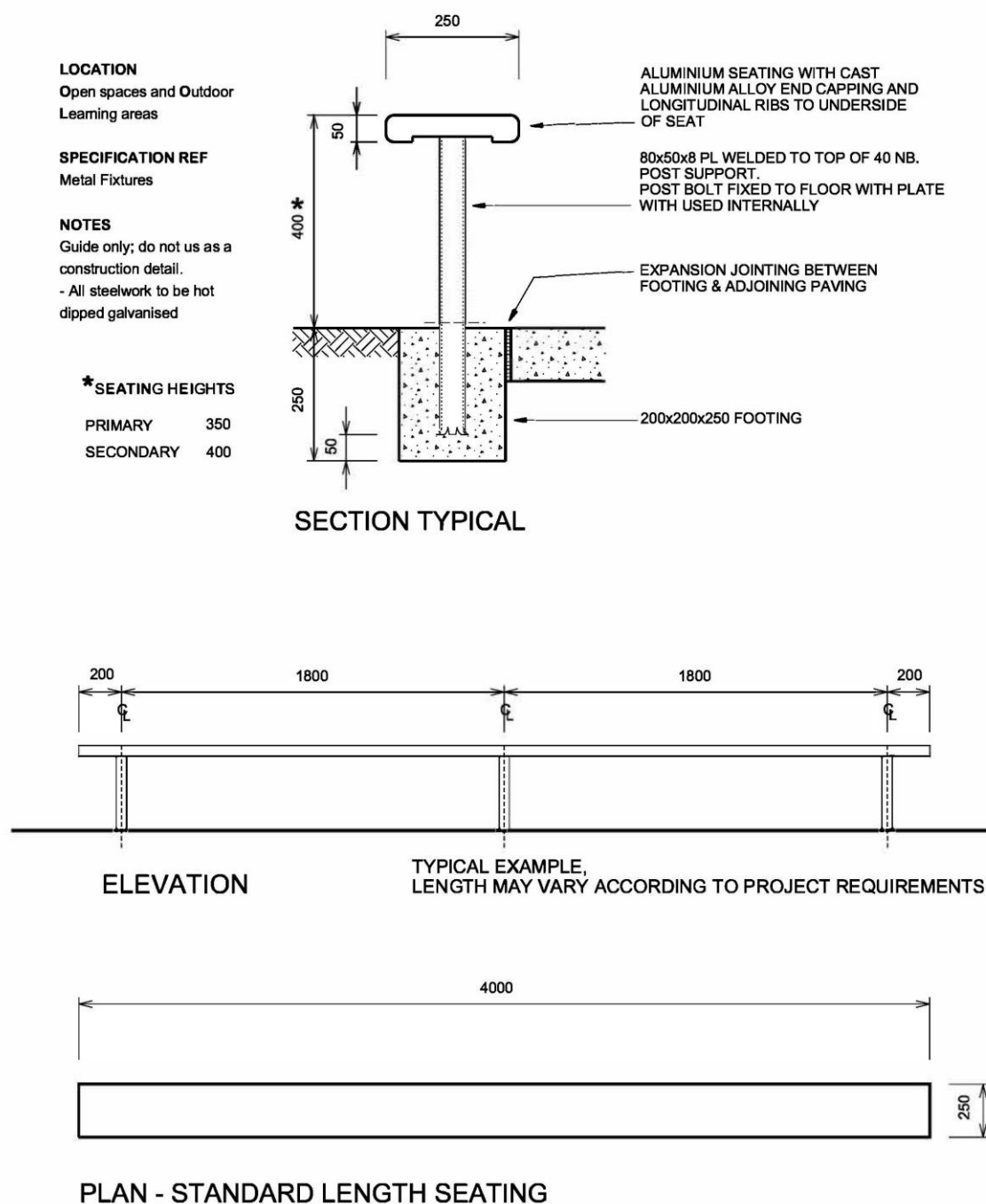


Figure 01: Seating details for open space and outdoor learning units.

Flagpole

Refer to: [DESIGN COMPONENTS/OPEN SPACE](#) and [01 GENERAL/0191 SUNDRY ITEMS](#)

Batting Practice Nets

Refer to: Drawings below, [DESIGN COMPONENTS/GAMES FIELD](#) and [0001c DESIGN CHECKLIST – CIVIL WORKS](#)

Guide only for fences and external walls. Do not use as construction detail. Not to Scale (NTS)

Fix chainwire to the inside of enclosures and to both sides of the intermediate divisions.

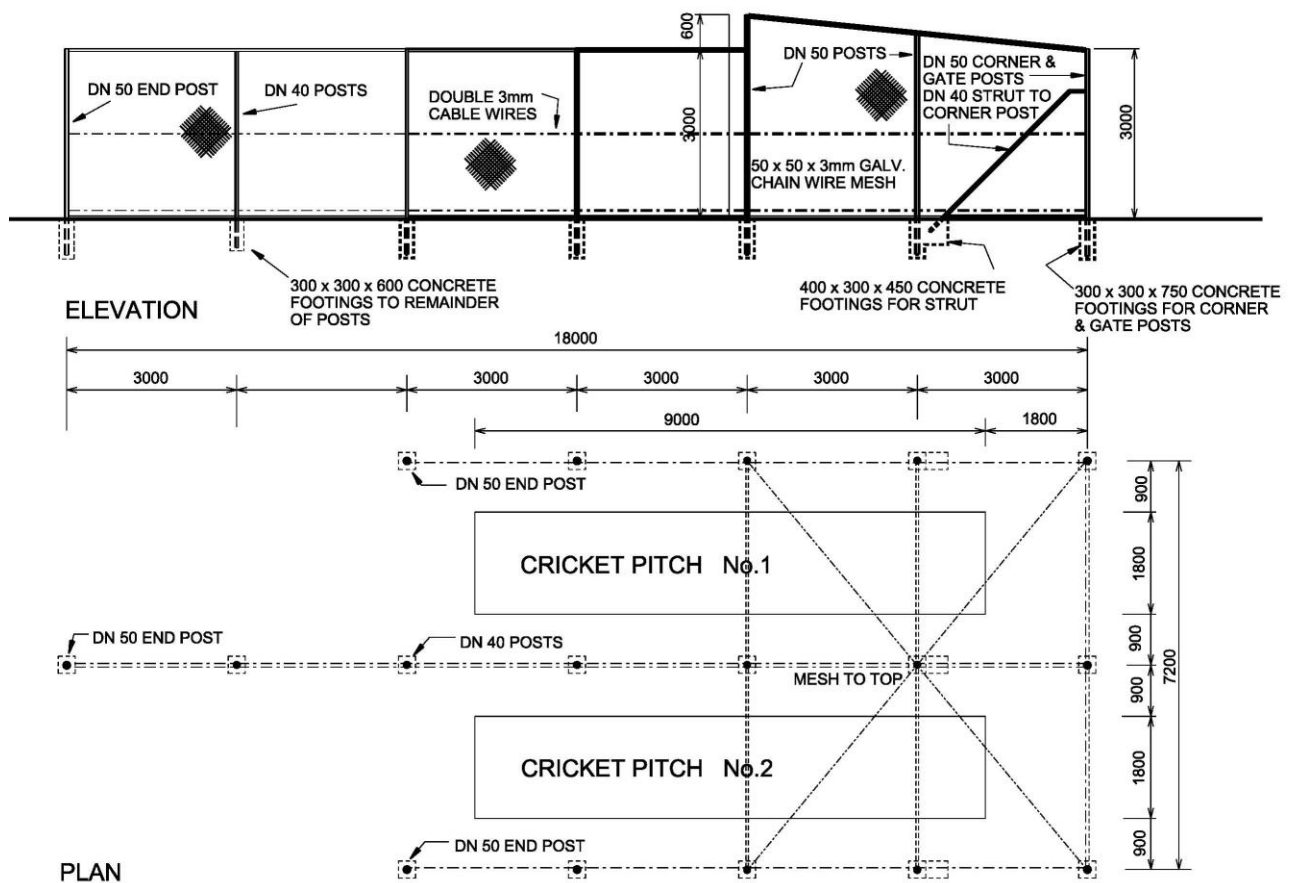


Figure 02: Batting Practice Nets

Games Field

Fabric:

- Turfed (natural or synthetic)
- Spectator Bank turfed

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- Sub soil drainage: where necessary depending on sub soil conditions

Play Equipment

Provision of play equipment in new primary schools is standard procedure. A nominal budget is included as part of the overall cost of a new primary school build.

Play equipment should be chosen and designed in accordance with relevant Australian Standards (AS4685 and AS4422), EFSG Design Principles and '[Playing Safe: Guidelines for the installation and maintenance of playground equipment in NSW government schools](#)', published by the NSW Department of Education.

Ongoing safety checks and maintenance of the play equipment is the responsibility of the school, and should be undertaken in accordance with Australian Standards AS4685.

Play equipment provided by a school may require location or relocation. Location to be determined/approved by DoE.

Water Tanks and Drip Irrigation

Refer to [DESIGN COMPONENTS/GAMES FIELD](#), [DESIGN COMPONENTS/OPEN SPACES](#), [00 PLANNING AND DESIGN/0001C DESIGN CHECKLIST – WATER](#) and [08 HYDRAULIC/0816 TANKS](#)

Where a rainwater tank/s is installed, the harvested water must be used to supplement a drip irrigation system/s (existing or new). Tap mechanism is for manual use with provision of power to assist in use of pump.

Services:

- Hose cocks for irrigation. Must be located a minimum of 5m from the sidelines of the field to ensure student safety.
- Sufficient quick coupling valves are also required for planting maintenance in other landscape areas of the site.