



LANDSCAPE DESIGN REQUIREMENTS FOR EDUCATION QUEENSLAND SCHOOL GROUNDS



**Landscape Design Requirements
for
Education Queensland School Grounds**

**by
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| Contents | page no. |
|--|-----------------|
| BACKGROUND | 1 |
| VISION | 2 |
| KEY OBJECTIVES | 2 |
| GUIDING PRINCIPLES | 3 |
| SECTION 1: INCLUSIVENESS | 4 |
| A Place for All | |
| Access for All | |
| Participation | |
| Communication | |
| SECTION 2: CONTEXT AND CHARACTER | 8 |
| Landscape Settings | |
| Outdoor learning | |
| Active Play | |
| Quiet Play and Contemplation | |
| Presentation | |
| Safety and Security | |
| SECTION 3: NATURAL ENVIRONMENT | 15 |
| Biodiversity | |
| Soil Conservation | |
| Microclimate | |
| Water Resources | |
| SECTION 4: FLEXIBILITY AND CHANGE | 20 |
| Space Requirements | |
| Multi-use | |
| Multifunctional | |
| SECTION 5: SCHOOL GROUND PLANNING | 22 |
| Entry Zones | |
| Road Frontage Zones | |
| Active Zones | |
| Passive/Study Zones | |
| Natural Zones | |
| SECTION 6: DESIGN CHECK LIST | 28 |
| Facilities and Infrastructure | |
| Soft Landscape | |
| Hard Landscape | |
| Maintenance | |
| SECTION 7: PROJECT EVALUATION | 31 |
| Pro forma | |
| REFERENCES | 33 |

BACKGROUND

The Landscape Design Requirements relate to the Facilities Design Requirements for Education Queensland School Facilities, including school Master Planning Requirements and supplementary Ecologically Sustainable Development Requirements.

Research for this project has been limited to desktop study of relevant literature and internet research. The revised requirements reflect the 'Learnsapes' concept and topical environmental issues. These revised landscape design requirements are comprehensive. However, consultation with schools and maintenance staff is advised to improve the effectiveness and relevance of the requirements. Consultation with and advice from teaching specialists with regard to preferred teaching techniques and new approaches in learning is advised to support the design of external learning spaces.

This approach to the landscape design requirements is based on philosophy rather than reliance on standards only. The design requirements are based on key principles which apply to the design of external spaces for schools. Design requirements support the main objectives and technical details for the implementation of the landscape design.

The purpose of the landscape design requirements is to empower the Landscape Architect to create a conducive environment for learning and appreciation of the outdoors and to ensure consistent and high performance outcomes. Together with the Landscape Management publication for Education Queensland (EQ) Schools, these design requirements provide the pathway for EQ schools to take up the challenge of improving their landscape and outdoor learning environment.

These requirements are applicable for new and redeveloped schools and will form part of the project brief. The requirements are for use by Landscape Architects and other design professionals.

For new landscape designs for Education Queensland's schools, it is recommended that Landscape Architects be consulted as expert designers. This should occur as early as possible, preferably as part of the site selection team and prior to the location of building envelopes. Integration of the design requirements with underlying philosophy of the master plan is vital to ensure that the Department's vision for school grounds can be realised.

These landscape requirements are challenging because they apply to all types of public schooling from preparatory and primary, to high schools and senior colleges. They apply to urban, regional and rural areas in vastly different climatic zones ranging from subtropical and tropical, to arid zones.

VISION

The Department's vision for Education Queensland school grounds is:

... to provide an inclusive creative landscape setting which fosters the students' intellectual and social interaction and supports their physical development while promoting sustainability of the environment.

KEY OBJECTIVES

The two key objectives for the design of Education Queensland school grounds are:

- To provide a conducive environment which supports the intellectual, physical, artistic and social development of students, thus improving the learning outcomes for all key learning areas.

Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution. (Albert Einstein)

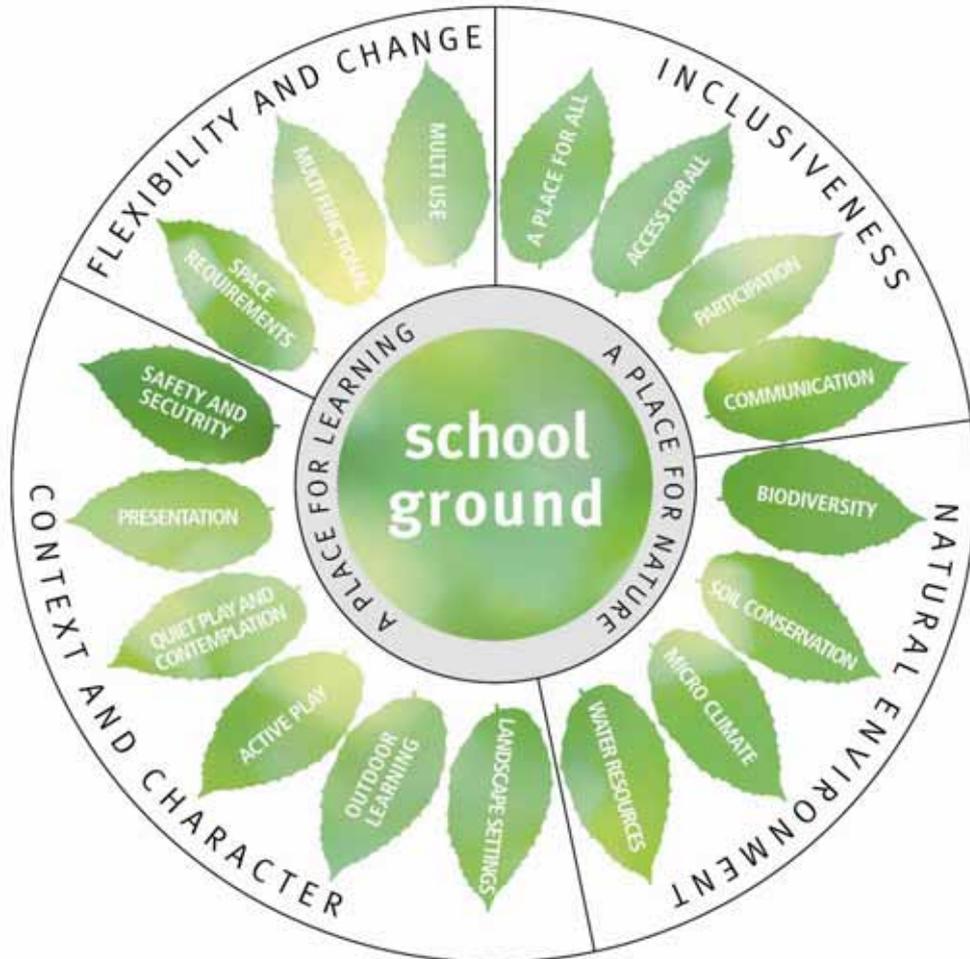
- To provide a landscape setting which creates a 'Sense of Place', enhances the natural environment and instils a lifelong regard for nature.

When we are rooted to the place where we live, it is easier to see the whole, to see ourselves as part of the landscape. When we care enough about life to learn about our place, we understand more about our neighbours. We create the potential to nurture compassion for all beings. (Thomashow 1996)



GUIDING PRINCIPLES

The four key principles which underpin the Landscape Design Requirements for school grounds are Inclusiveness, Context and Character, Natural Environment and Flexibility and Change.



Key Objectives and Guiding Principles

SECTION 1: INCLUSIVENESS

Inclusiveness, as one of the key guiding principles, incorporates a place for all, access for all, participation and communication.

A place for all.

The school ground is a place for children/people of all ages and different social and cultural backgrounds.

Consider gender equity and cultural background of the local and school community in the design.

Consultation with community groups is desirable. Structure process to allow participation with minority groups.

Recognise differences between girls and boys and their play requirements e.g. smaller intimate spaces for girls. Neutral spaces at the edge of main spaces foster a gradual integration of minority groups.



Consider how user groups will use and change their space. Consider moveable seating, the use of the space for ball and other games.

Consider the use of cultural elements to foster integration of minority groups and promote discussion about cultural differences. If required consult with a specialist.

Access for All

The school ground is a public/semi public space which may be used by everybody without possible restriction due to a disability.

Demonstrate that school facilities are accessible for all, regardless of any disability.

This can be achieved by preparing circulation and movement diagrams, and by relationship to site topography, access points and entries to buildings and external school ground facilities. It is important to size pathways and access points according to use frequency and the number of students anticipated at any one time.



The inclusion of seating and meeting spaces on the edges of pathways should be considered. Consider space requirements for circulation and standing groups of students, and equal access for all for play areas and play facilities. Give preference to multifunctional play facilities.



Participation

The school ground is a learning place for cooperative and social interaction and the development of community spirit, and sense of pride and ownership.

Ensure participation of students and staff in the design and implementation.

Collect, evaluate and provide a hierarchy of the users' wishes. Rationalise the 'wish list' in the context of project constraints and convey design outcomes to the local school community. Feedback from students and staff is required at key design milestones of the project.



Together with the school community, identify suitable projects for their involvement and provide technical support. It is imperative to clearly identify project structure, responsibilities, including scope, budget and maintenance to ensure a successful outcome. The participation process must be open to all groups.

Communication, collaboration, negotiation, organisation, motivation, observation, evaluation and social thinking are some of the skills learned in the process. Participation results in a responsive environment, reduction of vandalism and instils a strong sense of ownership and belonging in the school community. Participation provides the opportunity for the school community to understand the overarching design principles and design intent of the landscape design.



Communication

The school ground is a place for meeting, inviting communication and interaction between students, teachers, parents and the local community.

There are different types of communication, such as talking, playing, relaxing and celebrating. Besides using language, communication can be conveyed through body language, eye contact, seeing and being able to be seen. The school ground should provide the opportunity for all types of communication.

Provide places to meet, communicate and interact for both boys and girls.

The school ground should provide for preferred communication and interaction for both boys and girls. It can be important to provide separate spaces for girls where they can talk and play undisturbed. It is also important to consider places for boys to meet on the edge of ovals and other sports facilities, as boys become more interested in talking and verbal communication with increased age.



Design Authority Project Services

Provide separate meeting spaces for different age groups.

It is important to provide age specific meeting areas where children and adolescents can indulge in their preferred way of communication undisturbed. Age separation can be achieved with planting or earth modelling. Communication between different age groups should be possible and encouraged through easy permeability and visibility in the overall space.

Provide meeting places for small and large groups.

The school ground should provide opportunities for small and larger groups to meet and communicate. A creative and multi-use space encourages communication and reduces conflict.



Space for retreat provides the opportunity for individuals to have time out or to talk privately in small groups.

Hummocks have proven particularly popular as intimate communication space for small groups of children.

Separate places where children can look out but believe they can not be seen will foster communication through watching and observing. Small seating areas for 2 – 4 children have a similar effect.

Large open areas are suitable for festivals and large gatherings. In particular, adolescents need space where they can gather, be together and still have the opportunity to play undisturbed if they wish. A pavilion or pergola covered area is popular for this purpose.

A place for spectators is often important near sports ovals and sport facilities.

Places for 'hanging out' are desirable.

Design for interaction along road frontages.

Presentation to the outside occurs along all school boundaries. A well defined edge should mark the school grounds. This can be achieved with planting (low hedging, trees), fencing or built structures. It is important that some visibility from street to school ground is maintained.



Good visibility into the school grounds encourages interaction with neighbours and surrounding community.

Green edges convey an environmentally conscientious school community.

Laughing and playing children convey a happy school.

Ensure that external areas are easy to maintain, aiding good presentation.

Consider proposing traffic calming in adjacent roads if warranted.

Provide suitable spaces for self expression and observation.

Children walking through the school ground want to be noticed by others and/or observe others. This provides the opportunities to get to know each other or to simply be seen. Good visibility of pathways and open areas provides the opportunity for individual skill display such as dancing, skating or acting. Children and adolescents like to observe others while sitting or lying down on grassed hills or elevated surfaces. It is easier to observe things from the top.

SECTION 2: CONTEXT AND CHARACTER

Context and character, as one of the key guiding principles, incorporates landscape settings, outdoor learning, active play, quiet play and contemplation, presentation and safety and security.

Landscape Settings

The landscape setting of the school ground is conducive to the contentment, wellbeing and imagination of children and adults.

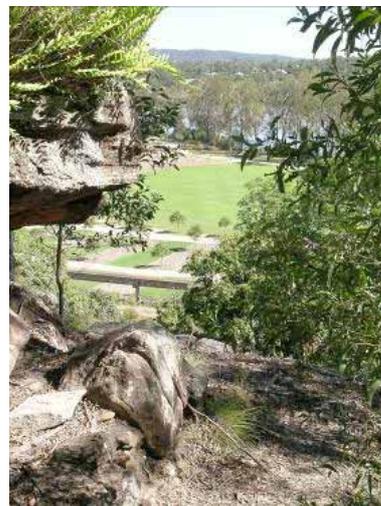
Jay Appleton demonstrates this view in his Prospect-Refuge theory of landscape preferences. Appleton suggests that people prefer to be in places where they have good visual access to the surrounding environment (Prospect), while also feeling protected and safe (Refuge) (Appleton, 1986, 71-74).



It has been found that young children are more likely to engage in creative games in refuge rich environments that provide the protection and safety necessary for imaginative play. Scale and size play an important role in catering for children of different ages.

Design high quality landscape settings.

This takes into consideration psychological needs of humans (Prospect-Refuge theory), aesthetic appreciation and pleasure derived from the landscape setting enriched by shade, colour, spatial arrangements and other visual attributes. Emotions play an important role in design, just as a smiling face evokes happiness and pleasure. It is this link to emotions which the designer needs to express. A well designed landscape feels right, comfortable and provides aesthetic pleasure and becomes the setting for creative thinking and imagination.



- Create spaces with trees.
- Design a hierarchy of spaces.
- Emphasise view and vistas.
- Create mystery, gateways and complexity.

Create a 'Sense of Place' and ownership.

The school ground needs to convey a strong 'Sense of Place' which requires the designer to understand the environment and local community. 'Sense of Place' can relate to the natural terrain, the built environment, previous history of the site or cultural, social or ecological issues.

A 'Sense of Place' maps the invisible landscape and gives the design depth and purpose which can be interpreted in an obvious or subtle manner. The designed landscape becomes part of the learning experience and connects the past, present and future. The landscape experience needs to be memorable and unique. For example a strong planting strategy could support the development of a site specific 'Sense of Place'.

'Sense of Place' can be strengthened with the development of ownership. Active involvement in the design, maintenance or management of facilities or special school ground areas fosters community pride and a sense of belonging.

Provide conspicuous presence of trees in high use areas.

Easy orientation for visitors and protection from ultraviolet radiation are two of the many benefits derived from trees.



'Wayfinding', a term first used by Lynch (1960), considers five main elements (paths, edges, districts, nodes and landmarks) as visual aids to read and find your way in the landscape. Legibility, permeability, variety and image ability are important elements in the design of school grounds. 'Indeed, a distinctive and legible environment not only offers security but also heightens the potential depth and intensity of human experience' (Lynch, 1960).

It has been estimated that Australia has the highest incidence of skin cancer of any country in the world. Ultraviolet radiation exposure in the first 18 years of life has been associated with the development of skin cancer in later life. Shade from trees can reduce the harmful UV rays significantly and at the same time improve the microclimatic conditions (cooling through evapo-transpiration) of the environment.

High use areas include main pedestrian routes, outdoor areas for meeting, eating, teaching, play and contemplation. Relate the size, structure and characteristics of the trees to shade requirements and the size of the space. Small to medium size trees are best along pedestrian routes, larger trees are for larger spaces such as central school spaces or areas adjacent to ovals or along the boundary.

Consider the density of shade, light requirements, sun angle and the ultimate size and characteristics of a tree.

Match tree characteristics (spreading canopy, dense, horizontal leaves) to preferred shade protection in the middle of the day and between 9 am and 3 pm.

Consider suitable tree structure (lateral growth, more vertical leaves) for protection from the westerly sun.

Consider ultraviolet reflection from paving and other surfaces.

Locate seats and play structures under existing tree canopies wherever possible.

Ensure line of sight under trees is maintained.

Outdoor Learning

The school ground is an integral part of school curriculum, teaching methods and scientific and social learning.

Landscape designs that are engaging and responsive support and encourage positive learning experiences for students.



The concept of Learnsapes is well established in Australian schools. Learnsapes promotes and extends environmental awareness, knowledge and understanding within schools and their communities by emphasising conservation principles, biodiversity and ecologically sustainable development, sustainable management principles, and, the development of commitment to action and lifestyle change. (Learnsapes 2006)

Link outdoor learning to the curriculum.

The preference of children up to 12 years old for sensory, hands-on learning has been well documented. Education in the environment brings students into direct contact with trees and natural processes and develops awareness of the environment.



Working and studying outside is exciting and provides a change of environment and stimulation. Additional benefits include appreciation and understanding of the natural environment. Outdoor learning and study areas can include places to observe flora and fauna, to carry out scientific experiments, and to appreciate scale and distance. Outdoor classes for art, drama and handicraft are enjoyable and provide added stimulus for creativity.

Blur the boundaries between indoors and outdoors.

Landscape design needs to promote a seamless transition from inside to outside teaching/study areas. Close proximity of indoor to outdoor learning spaces is required, with appropriate access (level, consistency of material), space allocation, shelter and shade. Outdoor learning spaces should provide individual places for quiet reading or concentrated writing, places and seating for teamwork and open air lectures for the whole class. Quiet places to sit and contemplate are also important.



Consider the use of teaching methods and new technology.

Consult with teachers and design outdoor areas according to teaching requirements. Where possible incorporate new technology (wireless IT environment) and infrastructure requirements.

Active Play

The school ground plays a very important role in the development of healthy children and must compensate for structured indoor learning and the need of children to move and be physically active.

Obesity in children and adolescents can be a serious issue with many health and social consequences that often continue into adulthood.

Outside areas can be designed for children to encourage physical activity. For example, children love the experience and joy of running up and down shaded hills to experience the sensation of speed and change of level. Physical activity contributes to how children learn and can teach them how to deal with dangers and become confident in their activities.



Provide areas for cognitive development.

Children learn about cause and effect by doing things. For example, for primary school children, volumes and distances can be made easier to understand by actively measuring volumes or stepping out distances on the ground. High school children can study the cause and effects of centrifugal and centripetal forces while spinning.

Provide areas for the development of motor skills.

Motor skills need to be fostered and opportunities for improvement provided for varying age groups, confidence levels, and both genders. The provision of level changes in the landscape and opportunities for swinging, climbing, balancing and running are positive design elements.



Consider how children of varying skill levels might use landscape elements for testing and improving their motor skills.

Incorporate landscape elements in addition to fixed playground equipment to improve motor skill levels.

Provide areas for psycho-social development.

Children learn about themselves and their capabilities through their bodies and the movement of their bodies. Identity, confidence and independence need to be fostered. This includes the desire to change the environment to suit the needs of the individual. Opportunities to develop these skills could include small trees for climbing or shrubs with branches to the ground so the inside can be altered to provide space for individuals or small groups.



Provide suitable spaces for formal school sport activities.

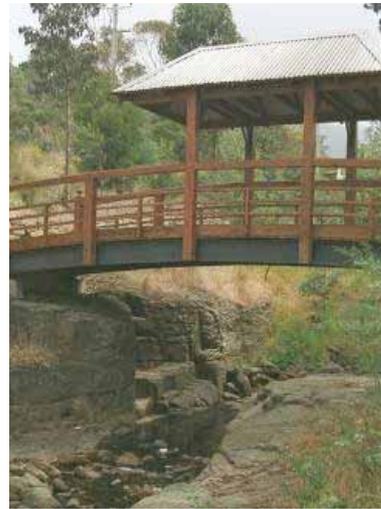
Detailed requirements vary according to school size and type. Consider popular sports for both boys and girls. Active areas require active edges. Consider the need for drinking fountains and shaded marshalling and spectator areas.

Provide play environments for controlled risk taking.

The urban environment, including playgrounds, is often made too safe by responsible people and offers little risk or opportunity to experience risk. The basic need of children to be in motion, experience risk and improve their physical skills is often neglected. The school ground should be seen as a place of fun, challenge, controlled risk taking and a place where serious injuries can be avoided through the application of acceptable safety standards.



- Design play environments which are exciting, challenging and fun.
- Match skill levels and developmental age of children.
- Wherever possible involve children in the design.
- Consult with children, teachers and parents.
- Separate play areas according to age groups.
- Ensure easy visibility for supervising teachers and parents.
- Consider how children may use the space in different ways.
- Allow for adequate access and circulation and consider uninterrupted flow of play.
- Consider the social dynamic in children's play.
- Make the environment fun. Hills and valleys can divide and link spaces, provide opportunity for running up and down, rolling and playing games.
- Bridges can provide links.



Wherever possible integrate off the shelf play equipment for climbing, balancing, spinning and rotating. If required consult with expert consultants for play environments and playground safety standards. Consult also Department of Education and the Arts requirements for outdoor play environments, as may be revised.

Quiet Play and Contemplation

The school ground needs to contain outdoor areas for quiet play, relaxation and retreat.

Boys, girls and teachers recuperate and relax in many different ways. Sometimes it is restful to sit quietly and be by yourself. Other times it is refreshing to run across an open grass field or to talk quietly to friends in a comfortable green environment.



Provide areas for passive recreation.

Consider spaces with an enclosed feel, niches for observation of the natural and school environment and areas which cater to smaller groups or individuals. Size, scale, quality and character of the spaces are important. Low branches can provide the user with a sense of enclosure without being isolated or totally hidden. Consider seating and natural shade.



Seating areas with protected backs and green overhead are popular, such as a seat under a tree. Besides traditional benches, consider the use of moveable blocks of wood, rocks and walls for informal seating.

Consider earth modelling and soft materials such as grass and leaves to define spaces and provide a sense of enclosure.

Consider a variety of textures, colours and materials that have a calming effect such as water, vegetation and stone. Provide the opportunity for lying down on grass or timber platforms.

Playground hummocks are popular places for socialising and resting in small groups.

Provide space for 'being invisible'. These places are ideal for thinking, sharing secrets or to study. A group of shrubs forming an enclosed space in the middle are ideal. It is important that these 'invisible' spaces have many escape opportunities to avoid being threatening.

Presentation

The school ground is an important area for presentation, expression and display of the school's image internally and externally.

The appearance of the school and the school grounds conveys the attitude and openness of the school to the outside world. A friendly, well maintained and welcoming school environment can encourage visitors and interaction between school and the local community.



Students should have the opportunity to express and display their work and achievements. Physical presentation of buildings and school grounds is important, together with opportunities for performances, displays and exhibitions.

Express the school's image in the design of external spaces.

It is important to understand the image each school wants to convey to the outside. This requires consultation with the principal and school community. Reflect the desired image in the design of external areas. For example, the school's entry space is an important meeting place before and after school for children and parents.

School access points should be treated like gateways to the school. A welcoming environment, shade, shelter and seating for waiting and socialising should be made available. This should be reflected in the design with an inviting character and plenty of formal and informal seating. A roofed area is desirable to provide shelter from rain and sun. A change in paving is desirable to indicate the entry to the school and to separate vehicular and pedestrian traffic.

Consider the location of bike racks.

Consider how the entry space could be used for exhibitions and displays.

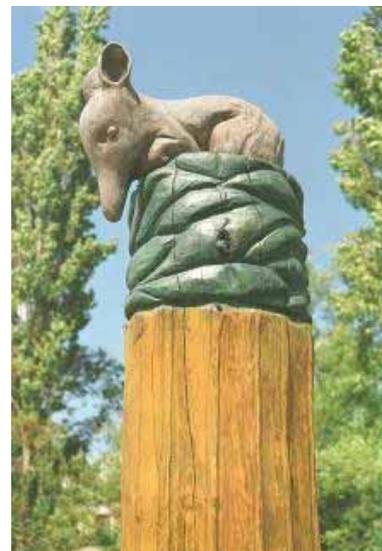
Provide outside work and exhibition areas.

Children enjoy creating and working outdoors. Art work can be inspired, produced and exhibited on outside exhibition areas for a day or weeks.

Consider the type of weather protection required and investigate suitable display systems.

Consult with the school administration and arts teachers with regard to specific requirements.

Consider planting or urban art walls as space dividers.



Provide suitable spaces for outdoor performances.

A raised platform in an open space can be suitable for outdoor performances. In larger schools, consider including amphitheatres which can double as assembly areas or outdoor teaching areas.

Consider suitable elements to define and separate performance areas from other spaces.

Consider use, size, location and infrastructure (power, lighting) for performance areas.

Consider shade and shelter according to local climatic conditions. Steps, raised platforms and low walls are popular meeting places during school breaks and are useful places for physical exercise.

Allow space and suitable access for festivals, exhibitions or performances without impacting on day to day teaching requirements.



Safety and Security

The school ground provides a physical and social environment that reinforces positive behaviour.

Growing awareness about how the physical environment can affect human behaviour has been integrated into a knowledge-base known as Crime Prevention through Environmental Design (CPTED). CPTED focuses on behaviour that is desirable and provides a physical and social environment that will reinforce positive behaviour. Expert advice should be sought when required.

Also refer to Education Queensland School Security Guidelines.

Increase natural surveillance by providing good visibility and sightlines.

This can be achieved by maximising legitimate use of the school ground, by careful location of facilities and by planting which avoids hidden spaces and provides clear visibility of spaces from different vantage points. Ground cover plants and clean stemmed trees are recommended to allow good visibility of all areas and provide a sense of separation while being visible. Plant maintenance is an important part of this strategy.

Provide access control.

Clearly define and control access points and reduce escape opportunities. Guide legitimate users through the school grounds by providing obvious pathway connections, in paths which are frequently used.

Use physical features designed to express ownership.

Examples are entry gates, clearly defined access points, circulation routes and signage.



SECTION 3: NATURAL ENVIRONMENT

Natural environment, as one of the key guiding principles, incorporates biodiversity, soil conservation, microclimate and water resources.

Biodiversity

The school ground provides a place to learn about, experience and treasure the natural world.

Biodiversity is the variety of life: the different plants, animals and micro-organisms, their genes and the ecosystems of which they are a part. Australia is one of the most diverse countries on the planet. It is home to more than one million species of plants and animals, many of which are found nowhere else in the world. About 85 per cent of flowering plants, 84 per cent of mammals, more than 45 per cent of birds, and 89 per cent of inshore, freshwater fish are unique to Australia. Since European settlement, almost 70 per cent of all native vegetation has been removed or significantly modified, including the loss of about 40 per cent of total forest area and 75 per cent of rainforest. (Australian Government, Department of the Environment, Sport and Territories 1996, 23)

Environmental awareness has increased significantly in the past decade. However, most of Australia's population lives in the cities. The ponds, forests and creeks have become harder to find or reach. It is easier to surf the Net, play video games, or cruise the mall. It is easy to forget that we are biological beings. The best way to learn about the world around us is to experience it first hand.

Provide a balance between proposed development and native flora and fauna habitat.

Much lip service has been paid to sustainable development and the need for a balanced integration of the natural world around us. A considered approach towards integration of natural element and system into the built environment is required.

There can be few more pressing and critical goals for the future of humankind than to ensure steady improvements in the quality of life for this and future generations, in a way that respects our common heritage – the planet we live on ... Education for sustainable development is a life wide and lifelong endeavour which challenges individuals, institutions and societies to view tomorrow as a day that belongs to all of us, or it will not belong to anyone.

(United Nations Decade of Education for Sustainable Development, 2005–2014)

When students leave school, they should have an understanding of, and concern for stewardship of the natural environment, and the knowledge to contribute to ecologically sustainable development

(The Adelaide Declaration on National Goals for Schooling in the Twenty-First Century, Department of Education, Science and Training, Canberra, 2005)

Retain and integrate existing vegetation and ecosystems where ever possible.

Existing vegetation and ecosystems, such as creeks or ponds, are a living resource and need to be retained and integrated into the design for the school wherever possible. Ecosystems are costly to replace and invaluable as a natural resource for teaching and experiencing.



School grounds should be biologically connected to local wildlife corridors. In addition, the use of endemic plants will increase the biodiversity of the area and appreciation of the local natural environment.

The opportunity for students to be in direct contact with nature increases awareness and can lead to a life long passion for nature. Existing trees provide shelter, scale and a window into the 'invisible' landscape (historic past). Mature trees take 20, 50 or 100 years to grow. The shade from a mature tree is vastly preferable in quality and experience to shade from artificial structures.



Soil Conservation

The school ground provides a place to protect, conserve and showcase topsoil as a natural resource.

Australia's soils are among the most nutrient-poor and unproductive in the world. This has to do with Australia's geological stability. Many soil components have been leached out during the land's long exposure to weathering. Australia's dryness has also prevented the formation of deep rich soils.

Protect and reuse site topsoil.

Topsoil is a 'living' natural resource, which needs to be treated accordingly and has to be salvaged prior to any earth modelling on site. Topsoil needs to be stored correctly during temporary site storage and needs to be protected during construction.



The structures of many Australian soils are naturally poor and can easily be damaged by compaction and inappropriate land management practices, such as inappropriate storage during construction. A poor soil structure increases run-off and erosion and reduces ability to grow things. To repair soil structure is costly.

Improvement of the soil structure and growing capacity of the soil needs to be considered. This can include the application of lime to reduce soil acidity, the addition of suitable organic or artificial compounds, which can improve the amount of micro-organisms and water and the air capacity of the topsoil. The use of imported topsoil is to be kept to a minimum to save natural resources and minimise the disturbance of the environment.



Balance cut and fill.

Cut and fill is often used to improve access, to provide useable outdoor spaces and to reduce building costs. A balance of cut and fill is desirable to minimise the impact on the environment, save on cartage to and from the site, reduce disturbance to the environment and reduce construction costs.

Minimise the opportunity for soil erosion.

Soil erosion significantly reduces the ability of sustained plant growth. Soil erosion can be caused by overuse and trampling pressure and which reduces air and water holding capacity in the soil, which is essential for healthy plant growth. Consider proposed use of, for example, a grassed oval and ensure that soil characteristics and use pressures are adequately matched. Ensure adequate site drainage and adequate drainage properties of topsoil and subsoil.

Microclimate

The school ground is a place to improve the microclimatic conditions of the built environment.

Microclimate is a climatic condition in a relatively small area. Research has shown that significant climatic differences can exist between two neighbouring areas. For example, a town is usually warmer than the surrounding countryside. The temperature under a shady tree can differ by many degrees compared to the temperature of a bitumen car park in the sun.



Provide natural shade wherever possible.

Trees have the ability to improve microclimatic conditions significantly by reducing heat, wind and dust. In addition, shade from trees provides a more pleasurable experience and contributes to the biodiversity and landscape setting. The type and quality of shade from trees depends on the tree's structure (upright versus spreading canopy) and size and orientation of leaves. Research has shown that upright trees with vertical leaf structure are more efficient in the protection from the westerly sun whereas trees with a spreading canopy and horizontal leaf structure are more effective in sun protection between 11.00 AM to 3.00 PM.

Reduce the amount of sealed area.

Sealed areas are required for heavy and frequent traffic to minimise wear and maintenance. In the past, bitumen has been used frequently and inappropriately in school grounds. The 'sea change' of 'pulling up the bitumen in school grounds' has gained momentum in recent years. Sealed areas such as bitumen car parks or concrete pathways act like a passive heat storage bank and result in the increase of temperature in the area and often contribute to glare and reflection of ultraviolet radiation.



Sealed areas have little room for biological processes and have no habitat value. They concentrate water run off and, hence, require built drainage structures. Large sealed areas minimise the quality of the landscape setting and experience. Sealed areas can, in many circumstances, be replaced with stabilised gravel paving, grass 'paving' or porous paving.

Maximise vegetated areas.

Consider planting vegetation on facades and roofs.

Water Resources

The school ground is a place to harvest water, improve water quality and showcase how to minimise the waste of water.

Australia is the second driest continent on earth behind Antarctica. The rainfall in Australia is highly variable and in some places much of the annual rainfall occurs in a short period of time or can vary from a fraction of its average annual rainfall to several times its size.

Unprecedented urban development and the prolonged drought in south-east Queensland have highlighted the importance of water as a limited and precious natural resource. Increased water harvesting as part of the design process and a reduction in the waste of water are some of the strategies to counteract the problem.



Consider water harvesting opportunities.

This includes the collection of roof and stormwater for irrigation and cleaning. As part of the design process investigate current and future water restrictions. If possible assist in the applications for water grants and sponsorship. If appropriate investigate bore water use.

Where feasible consider water recycling for irrigation purposes through the development of water recycling plans with local government (EPA Water Recycling Strategy and Guidelines).



Minimise the waste of water in the landscape.

This includes the use of water wise plants such as Lomandra 'Katrinus'. These plants have proven drought tolerance and do not require irrigation after they have been established on site. If irrigation is required, use quality fittings, rain and moisture sensors, and drip irrigation to minimise the waste of water. Ensure maintenance requirements are followed to keep the irrigation system efficient.

Design for overland flow capture and make collected water available to school ground vegetation.

Consider the use of Sensitive Urban Water Design Principles wherever possible. This includes the use of swales and buffer strips, bio-retention swales, on-site infiltration, bio-retention basins, sand filters, aquifer storage and recovery, ponds and lakes. Refer to BCC Water Sensitive Urban Engineering Guidelines: Stormwater for general information and construction details. Limit stormwater runoff volume using natural drainage paths and infiltration basins.

Improve water quality of stormwater prior to discharge into creeks and rivers.

Water improvement systems, such as planted or grassed swales, can produce 'mini' ecosystems which come to life when it rains. These swales can trap sediments and contaminants and significantly reduce pollutant discharge into creeks and rivers. These natural looking stormwater drainage systems add to the biodiversity, visual amenity and recreation opportunity in the area.



Celebrate water as part of the landscape.

This might be achieved by creating rain gardens, sculpture and art and by minimising hard engineered structures. Use native vegetation in stormwater management. Link the celebration of water to local water festivals such as the Brisbane River Festival, the Oxey Creek Festival and the 'Splash' festival on the Sunshine Coast.

For current information on specific water efficiency strategies adopted by the Government and being introduced throughout Education Queensland schools, refer to the following Strategic Facilities website:

<http://iwww.qed.qld.gov.au/facilities/strategic/guidelines/environmental/watermanagement-conservation.html>

SECTION 4: FLEXIBILITY AND CHANGE

Flexibility and change, as one of the key guiding principles, incorporates space requirements, multi-use and multifunctionality.

Space Requirements

The school ground needs to be large enough to accommodate all required functions and uses.

Investigation during the early planning phase of a project is needed to confirm the adequacy and suitability of available open space.

Consider 10 m² of outdoor open space per student.

This recommended net outdoor area does not include parking, access and sport facilities. This figure is an estimated requirement only and is recommended as a base line figure which is to be adjusted over time to provide more accurate information for planning purposes. The amount of open space allocation is a guide only and should be assessed in relation to site conditions such as topography and access.



Confirm suitability and useability of outdoor spaces.

This can be achieved by the preparation of a diagram that confirms that all spaces are sufficiently connected and adequate in size for the allocated purpose. Primary and secondary pedestrian routes should be identified together with areas for car parking, cycle, vehicular and service access. The school's external hub/main meeting place for assemblies, performances etc. should be located centrally on the edge of the major pedestrian route through the school grounds.

Multi-use

The school ground is a resource to be used by children and community members after school and on weekends.

Consider multi-use of school facilities after hours and on weekends.

Multi-use makes schools:

- centres of the community,
- ensures community pride and ownership and
- increases natural surveillance and visitor safety.

School grounds are a community resource and multi-use provides the opportunity to expand open space within the community with increased population density. Multi-use provides children with the opportunity to be active after school and on weekends and fosters communication interaction. Multiuse must be considered early in the planning to allow for adequate design, including access and infrastructure requirements such as lighting and power.



Consider the use of public parks and sporting facilities in the area by the school community.

This type of multi-use saves financial resources and benefits include better integration with the local community and potentially better sporting facilities for the school community. Consideration must occur in the early planning stages of the project. The use of public parks and sporting facilities could be considered for small schools or as a short term solution until all stages and facilities of the school development are complete. Logistics and safe access to public facilities should be carefully considered.



Multifunctionality

The school ground is a place designed with multifunctional spaces which can be used in a flexible manner to accommodate the varying needs of the school community now and in the future.

Consider multifunctional use of spaces.

Multifunctional can mean a place of activity for studying and learning, for celebration and communication. Multifunctional spaces encourage openness to the entire open space. The multifunctional school ground is a place with many faces, which can be experienced differently from day to day. Multifunctional spaces are flexible, can change character and can be used in many different ways for different purposes.



Multifunctional spaces do not define the use of spaces exclusively – they leave room for interpretation. Multifunctional spaces provoke unknown ideas and different games. For example, overlapping playing fields running in different directions create interesting space configurations, which can be used by different groups at the same time and in the process, support sportsmanship and social interaction. Multifunctional spaces encourage activity and interaction as well as provide places to sit and observe.

SECTION 5: SCHOOL GROUND PLANNING

The vision, objectives and guiding principles form the basis for subsequent school ground planning and detailed landscape design. The school ground can be divided into the following planning zones:

- Entry Zones
- Road Frontage Zones
- Active Zones
- Quiet/Study Zones
- Natural Zones

School zones give the general outline of the usage patterns within the school grounds and how they relate to the built form and circulation routes. It should be noted that the internal zones are not mutually exclusive and they all exhibit elements of multi-functionality at differing levels. The list of elements should not be considered as exhaustive.

Entry Zones

The school entry is an important area for presentation, expression and display of the school's image internally and externally. For example, a friendly, well maintained and welcoming school entry conveys openness and can encourage visitors and interaction. Green edges can convey an environmentally conscientious school community.

Function and Use:

- Identification and hierarchy of school access points
- Presentation of school's image
- Welcome for students, staff and visitors
- Meeting and waiting areas

Character:

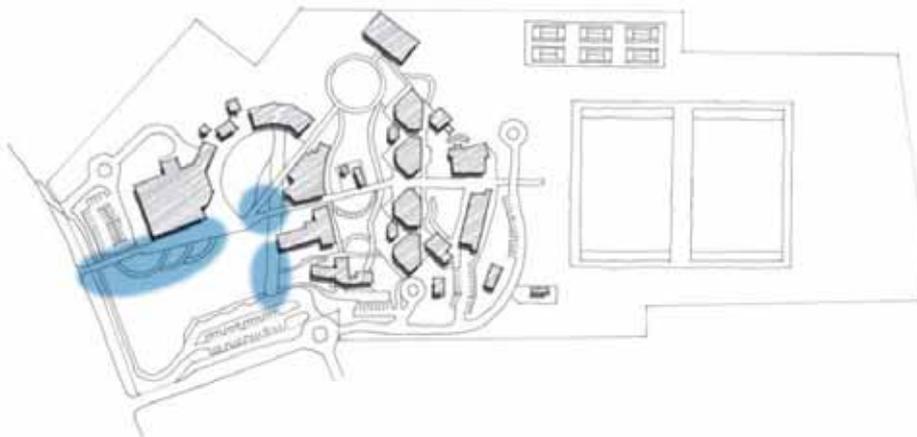
- Friendly and inviting
- Clearly structured and well maintained

Learning opportunities for Students:

- Considering way-finding
- Improving presentation

Elements:

- Entry space with sufficiently wide entry paths and artwork
- Feature and shade planting
- Seating, notice board and signage
- Lighting
- Roofed shelter



Road Frontage Zones

Presentation to the wider community occurs along all school boundaries. The school ground should be marked by a well defined edge that allows visual interaction between the school and local community. Road safety and traffic calming are important considerations.

Function and Use:

- Identification of school ground boundaries
- Visual connection between school and local community
- Presentation of school's image
- Interface between public and semi-public space
- Direction to school entries

Character:

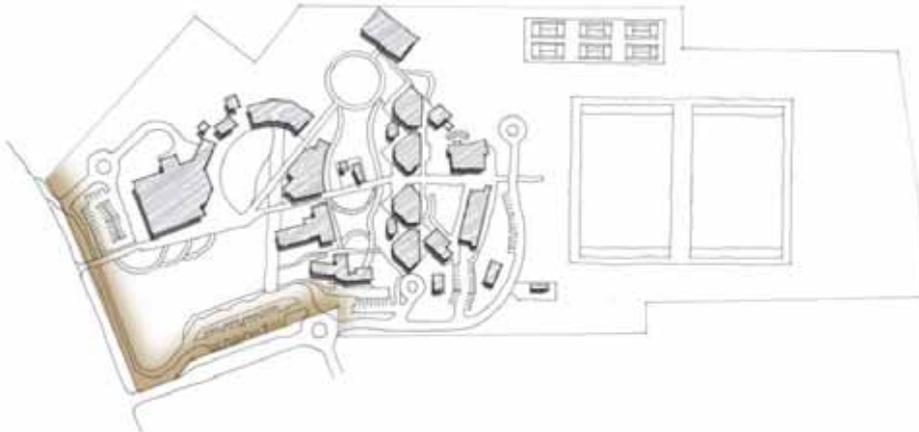
- Defined shady edges
- Visually open and inviting
- Functional planting
- Reinforcement / reflection of local character
- Well maintained

Learning opportunities for Students:

- Considering road safety and way-finding
- Improving presentation

Elements:

- School boundary treatment (fence, planting, wall)
- Shade planting
- Pick-up/drop-off areas with roofed shelters
- Signage and seating
- Lighting



Active Zones

Obesity in children and adolescents is a serious health issue. The school ground plays an important role in the healthy development of our children. Active zones need to provide adequately for the physical development of boys and girls and need to provide the opportunity for controlled risk taking.

Function and Use:

- Development of physical skills
- Formal and informal physical education
- Physical play and games
- School and community events
- Multifunctional – after hour use by local community
- Flexibility and multiuse i.e. multipurpose courts
- Opportunities for risk taking

Character:

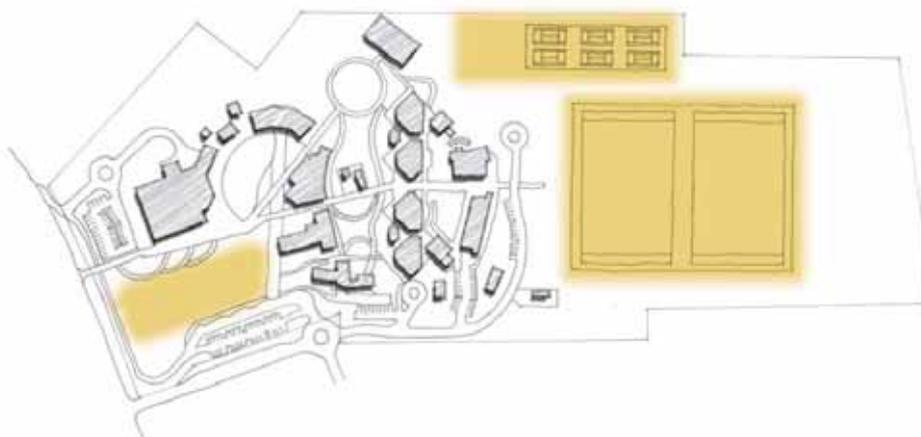
- Challenging and innovative
- Functional and sport oriented
- Shady edges
- Good visibility and sight lines
- Obvious way finding
- Multifunctional and multi-use

Learning opportunities for Students:

- Improving motor skills and social competency
- Working in a team
- Achieving personal goals

Elements:

- Sporting facilities including turfed ovals, running tracks, long jump, multipurpose courts, nets for cricket and softball practice, swimming pool
- Change rooms and storage facilities
- Water harvesting
- Play areas including play ground structures and hit-up walls
- Drinking fountains and taps
- Marshalling areas
- Shaded seating for large numbers



Quiet/Study Zones

The quiet/study zones are the hub and centre of day-to-day outdoor school life. The landscape setting is crucial to the contentment, wellbeing and imagination of students and adults and creates a 'Sense of Place' and ownership for the school community.

Function and Use:

- Passive play
- Eating
- Study
- Outdoor learning
- Socialising
- Relaxation, contemplation and retreat
- Meeting place for small and large groups

Character:

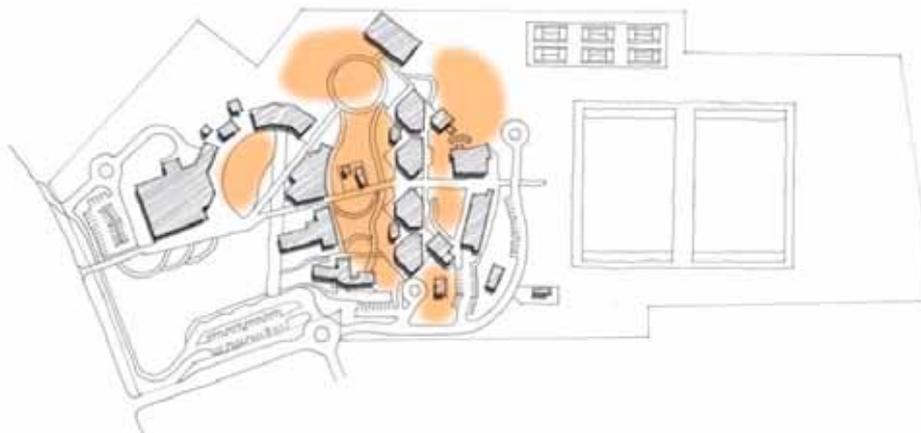
- Comfortable, protected, shady and green
- Interactive
- Sense of enclosure and remoteness
- Calming
- Quiet play
- Inspiring and creative
- Well maintained

Learning opportunities for Students:

- Studying in groups
- Improving social competency
- Nature observation
- Contemplation and thinking
- Participation
- Sense of ownership and pride

Elements:

- Outdoor learning and performance areas
- Display of students' work
- Spaces and seating for individuals, small and large groups
- Variety of open and enclosed spaces
- Roofed shelter and a variety of creative seating
- Water harvesting
- Shade tree and sensory planting
- Sufficiently wide pathways and adjacent paved areas
- Drinking fountains
- Artwork



Natural Zones

The development of natural zones within the school grounds is beneficial for student's learning, creates a 'Sense of Place', provides a balance between the built environment and fauna habitat place and, above all, can lead to a lifelong passion for nature.

Function and Use:

- Place for nature and learning about ecosystems
- Interactive landscapes
- Artistic landscapes
- Areas for exploration

Character:

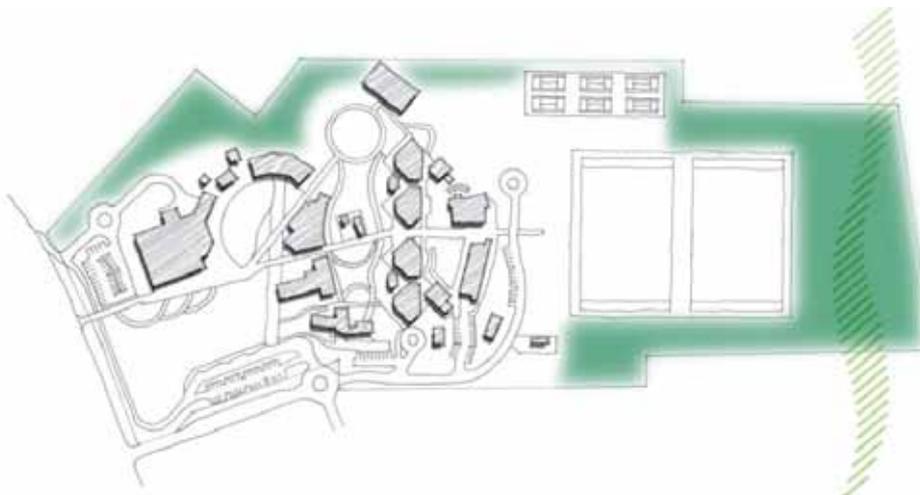
- Stimulating, challenging and rewarding
- Quiet learning
- Close to nature
- Shady, green and teeming with wildlife
- Living and evolving
- Display of student's achievements
- Maintenance close to nature, not fussy

Learning opportunities for Students:

- Learning about the past
- Working towards sustainability
- Applying survival skills
- Improved social competency
- Working studying as a team
- Observing and appreciating nature
- Achieving personal and team goals

Elements:

- Local ecosystems and connection to external systems
- Local native shade planting
- Cultural references
- Water harvesting
- Interpretation and signage
- Pathways and areas for seating of small and large groups
- Performance areas
- Project specific areas, e.g. bush tucker garden, sensory garden
- Shelters



SECTION 6: DESIGN CHECK LIST

For the assistance of project design teams and schools undertaking landscape developments, the following check list is to be applied to all projects to ensure consistency with Education Queensland requirements and in project performance outcomes.

Landscape Master Plan

In consultation with teaching staff, students and the school community prepare a Landscape Master Plan while ensuring an integrated approach with School Environmental Management Plan and other associated plans such as the Water Management Plan.

The following strategies are to underpin the preparation of the Landscape Master Plan and are to be addressed in accordance with EQ Facilities Design Requirements and associated ESD Design Requirements:

- Access and circulation
- Vegetation
- Lighting
- Play areas
- Shade and natural cooling
- Outdoor teaching facilities
- Outdoor furniture
- Seating
- Signage
- Sporting facilities
- Infrastructure provision
- Site drainage
- Water management (harvesting, supply, irrigation and waste minimisation)
- Artwork
- Multi-use
- Multifunctionality
- Participation by school communities.

Prepare an Implementation Plan, showing the stages of implementation for the Landscape Master Plan. This is to include a preliminary costing for the staged development and sign off by the school community with regard to design, consultation, scope and other agreements as necessary.

Facilities and Infrastructure Requirements

Provide

- *Appropriate play facilities for major age groups and sports facilities for formal school sport activities as may be outlined in the project brief.*
- *Assembly area which is large enough to accommodate all students.*
- *Meeting spaces with different characteristics that vary in size.*
- *Landscape spaces with different characteristics (open to enclosed) for each of the major age groups.*
- *Where achievable, adjacent outdoor learning spaces, particularly teaching areas for*
 - Art
 - Music
 - Drama
 - Natural science.

LANDSCAPE DESIGN REQUIREMENTS FOR EDUCATION QUEENSLAND SCHOOL GROUNDS

- *Other outdoor areas and infrastructure for*
 - *Growing fruit and vegetables*
 - *Bush tucker garden or any specialised project.*
 - *A greenhouse.*
 - *Animal husbandry*
- *Storage facilities for*
 - *Moveable play elements for major age groups. Liaise with project architect.*
 - *Landscape maintenance for students and ground staff.*
- *Integrated artwork where briefed*
- *Lighting for main use areas including entry and car park.*
- *Roofed shelters at major pick up points*

Balance cut and fill.

Retain and protect

- *Existing landscape features*
- *Existing topsoil.*

Soft Landscape Requirements

Consider

- *Retention of existing vegetation wherever possible.*
- *Improvement of existing topsoil where required.*

Provide

- *Adequate depth of topsoil for all planting and grassed areas.*
- *Planting plan including type, number and size of plants.*
- *High quality landscape settings.*
- *High quality lawns for ovals and play areas only.*
- *Mulch for all planting areas.*
- *Timber edging to separate planting and grassed areas.*

Use

- *Advanced trees where possible.*
- *Structurally sound trees only.*
- *Plants which are not poisonous.*
- *Local native plants wherever possible.*
- *Water wise plants.*
- *Trees for wayfinding and to create spatial definition.*
- *Trees to provide effective natural shading for major pedestrian routes and meeting places. (80% shading within 5 years).*
- *Use plants which allow good sight lines.*

Give preference to

- *Mass planting areas for areas steeper than 1:4.*
- *Planting areas instead of using turf where appropriate.*

Minimise

- *Disturbances e.g. Noise with planting.*
- *High maintenance planting.*

Improve existing topsoil if required.

Ensure adequate depth of topsoil for all planting and grassed areas.

Hard Landscape Requirements

Provide

- *Multifunctional furniture and landscape structures wherever possible.*
- *Hard paving in heavy use areas.*

Minimise

- *Opportunity for graffiti and vandalism.*
- *Sealed areas.*

Do not use

- *CCA treated timber in landscape developments, retaining walls, seating or fencing (refer to EQ Safety Alert and alternative products to CCA timber).*
- *Peanut shell mulch or other poisonous or irritant materials.*

Maintenance Requirements

Provide

- *A maintenance strategy/plan.*
- *List key maintenance tasks.*
- *Define quality and frequency of maintenance.*
- *Consider student and staff involvement.*
- *Document management structure for school grounds.*
- *Estimate recurrent maintenance tasks and recurrent cost.*

Design

- *For low maintenance*
- *Keep maintenance requirements close to nature.*

SECTION 7: PROJECT EVALUATION

As part of major project reviews Post Occupancy Evaluations are to be applied to determine the success of the landscape design. For the evaluation of other projects, including those initiated by school communities or as a result of sponsorship (e.g. QESSI), the use of the following evaluation template will capture project outcomes, including design, cost and performance objectives.

Such evaluations may be useful for posting landscape projects on school websites. Where a school has produced an exemplar project, such details would provide valuable case study information for the region and for application by other schools in Queensland.

PRO FORMA FOR PROJECT REGISTRATION AND PROJECT EVALUATION

After the completion of major school ground projects please evaluate project outcomes and refer this completed pro forma including a brief project history to your Regional Office for information, project evaluation and capture via the Facilities Asset Management System (FAMS).

| <u>EDUCATION QUEENSLAND</u> | |
|--|--|
| EVALUATION FORM FOR SIGNIFICANT SCHOOL GROUND PROJECTS | |
| PROJECT: SCHOOL: PRINCIPAL: CONTACT: | |
| PROJECT DESCRIPTION: (provide a brief summary of objective) Budget: Sponsorship: Time frame: | |
| DESIGN PERFORMANCE CRITERIA (indicate compliance with relevant criteria by ticking) | |
| INCLUSIVENESS A place for All Access for All Participation Communication CONTEXT AND CHARACTER Landscape Setting Outdoor Learning Active Play Quiet Play and Contemplation Presentation Safety and Security | NATURAL ENVIRONMENT Biodiversity Soil Conservation Microclimate Water Resources FLEXIBILITY AND CHANGE Space Requirements Multi-use Multi-functional |
| PERFORMANCE OUTCOME (Summarise outcomes and include where available related school website information, awards and site plan) | |
| Signed:Name:Date | |

REFERENCES

The provided references are not exhaustive and are for general information only. Further investigations and professional help should be sought where required.

Possible Funding Sources

Following funding sources can be explored:

- Arts grants
- Corporate Sponsorship
- Greening Australia
- Minor Works Fund
- Local Council
- School sponsorship funding
- Queensland Government, Department of Natural Resources, Mines and Water, <http://www.regionalnrm.qld.gov.au/funding/>, as a possible source of funding for sustainable landscaping
- SGAP
- Federal - Investing in Our Schools Program (IiOS)
- Federal - Community Water Grants
- EQ Smart School Subsidy Scheme (SSSS)

Standards, Regulations and Guidelines

The following standards, regulations and design requirements are to be observed depending on project nature.

Australian Standards

Building Code of Australia

Best Practice in Landscape Architecture and the building industry.

Local Planning Scheme (recommended planting list, preferred street tree planting etc)

EQ (Site) Master Planning Requirements

EQ Design Requirements for Education Queensland School Facilities – including design supplements:

- EQ ESD Design Requirements

Websites

The following websites are not exhaustive but are recommended as information sources on various landscape, plant and water management topics.

Department of Education and the Arts, Strategic Facilities intranet website on Water Conservation and Management.

<http://www.qed.qld.gov.au/facilities/strategic/guidelines/environmental/watermanagement-conservation.html>

ACT SunSmart Policy, <http://www.decs.act.gov.au/policies/pdf/sunpro.pdf>

Australian Institute of Landscape Architects, <http://www.aila.org.au> for a list of practicing landscape architects.

Commonwealth Department of Agriculture, Fisheries and Forestry, <http://www.affa.gov.au/>.

Crime Prevention Through Environmental Design, (CPTED)

http://www.canterbury.nsw.gov.au/council/comm_prot/cpted.htm. Also, Crime Prevention Through Environmental Design Policy, Adelaide City Council,

<http://www.decs.act.gov.au/policies/pdf/sunpro.pdf>.

LANDSCAPE DESIGN REQUIREMENTS FOR EDUCATION QUEENSLAND SCHOOL GROUNDS

Gould League, <http://www.gould.edu.au/> (*'The Gould League Australia's leading environmental education organisation has been educating children, schools and the general community about conservation and the environment for over 90 years.'*).

Greening Australia, <http://www.greeningaustralia.org.au/GA/NAT/>

Invasive species in Australia - Refer the Commonwealth Department of Environment and Heritage website below. For regional information on non-invasive plantings – Contact either Local Government, regional management of the Department Natural Resources, Mines and Water, the Environmental Protection Agency, the Queensland Parks and Wildlife, or the Society for Growing Australian Plants.

<http://www.deh.gov.au/biodiversity/invasive/publications/species/index.html>.

Landcare Australia, <http://www.landcareonline.com/>

Queensland Government, Environmental Protection Agency/ Queensland Parks and Wildlife Service, <http://www.epa.qld.gov.au>. (See 'search' e.g. Australian WaterWise plants, water, recycled water, etc.)

Queensland Government, Department of Natural Resources, Mines and Water, <http://www.nrm.qld.gov.au/> (see 'search' e.g. weeds, managing water, recycled water, etc.). Regionally your local DNRM&W Branch is a great place to work out what's going on in your area, <http://www.regionalnrm.qld.gov.au/>.

For weeds see the fact sheets and information available from the 'A to Z listing' of declared weeds of Queensland, http://www.nrm.qld.gov.au/pests/weeds/a_z_listing.html. The site can also be used to aid in Pest Management Planning, for example, for foxes, wild dogs and feral cats, and, non-invasive planting information.

South East Queensland's Healthy Waterways, <http://www.healthywaterways.org/>

Spark School Park Program, <http://www.sparkpark.org/>

The School Learnscapes Trust,
<http://www.learnscapes.org/>
<http://www.curriculumsupport.nsw.edu.au/enviroed/index.cfm?u=2&i=16>

Water forever: Our South East Queensland Water Saving Initiative,
<http://www.waterforever.com.au/>

Weed identification: <http://www.weeds.org.au/weedident.htm>,
http://www.nrm.qld.gov.au/pests/news_publications/publications/weed_id.html,
<http://www.weedinfo.com.au> and local government websites

Recommended further reading

The following list of books has been used as reference material to support the text for the Landscape Design Requirements for Education Queensland Schools and is recommended as further reading.

Appleton, J. 1986. *The Experience of Landscape*. Chichester, NY, Brisbane, Toronto: John Wiley & Sons.

Australian Government, Department of the Environment and Heritage. 2005. *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools*. Australia: Impact Printing (Vic) Pty Ltd.

Australian Government, Department of the Environment, Sport and Territories. 1996. *Australia State of the Environment 1996*. Collingwood, Vic: CSIRO Publishing.

Bentley, I., A. Alcock, P. Murrain, S. McGlynn, and G. Smith. 1985. *Responsive Environments*. Oxford: Butterworth-Heinemann Ltd.

- Billimore, B., J. Brooke, R. Booth, and K. Funnell. 1990. *The Outdoor Classroom: Educational Use, Landscape Design and Management of School Grounds*. London: HMSO
- Brikeland-Corro, J. 1985. Playground Design. *Architecture Australia* November: 40-45.
- BOM. Australian Government, Bureau of Meteorology. 2006. *Living With Drought*. http://www.bom.gov.au/climate/drought/live_drought.shtml (accessed May 2, 2006).
- Bowden, J. 1999. *Living with the Environment in the Pine Rivers Shire*. Brisbane: Pine Rivers Shire Council.
- Brisbane City Council. 2006. *Water Sensitive Urban Design Guidelines*. http://www.brisbane.qld.gov.au/BCC:STANDARD::pc=PC_1898 (accessed March 21, 2006).
- Brisbane Forest Park Authority. 1988. *Eucalyptus Forest Guide*. The Gap, Q: Brisbane Forest Park Administration Authority.
- Buchanan, R.A. 1989. *Bush Regeneration*. Strathfield, NSW: Open Training and Education Network, TAFE NSW.
- Dannenmaier, M. 1994. Sticks, Stones, Water and Leaves. *Landscape Australia* 84 (10): 60-64.
- DFAT. Australian Government, Department of Foreign Affairs and Trade. 2006. *Australia Now*. <http://www.dfat.gov.au/facts/intro.html> (accessed May 2, 2006).
- Gifford, R. 1997. *Environmental Psychology – Principles and Practice*. Boston, US: Allyn & Bacon.
- Greenwood, J.S., G.P. Soulos, and N.D. Thomas. 1998. *Undercover: Guidelines for Shade Planning and Design*. Sydney: NSW Cancer Council and NSW Health Department.
- Kleinschmidt, H., A. Holland, and P. Simpson. 1996. *Suburban Weeds*. 3rd ed. Brisbane: The State of Queensland, Department of Primary Industries.
- Kritchevsky, S. and E. Prescott. 1969. *Planning Environments for Young Children: Physical Space*. 2nd ed. Washington, D.C.: National Association for the Education of Young Children.
- Lazarides, M., K. Cowley, and P. Hohnen. 1997. *CSIRO Handbook of Australian Weeds*. Victoria: CSIRO Publishing.
- Learnsapes. 2006. *The School Learnsapes Trust, Philosophy & Objectives*. Site <http://www.learnsapes.org/> (accessed May 2, 2006).
- Lynch, K. 1960. *The Image of the City*. Cambridge, MA: MIT Press
- Lynch, K. 1970. The Openness of Space. In *Arts of the Environment*, ed. G. Kepes., 108-124. NY: George Braziller.
- Lynch, K. and G. Hack. 1988. *Site Planning*. 3rd ed. Cambridge, MA: The MIT Press
- Logan River Branch S.G.A.P. (Qld Region) Inc. 2002. *Mangroves to Mountains: A Field Guide to Native Plants of S.E. Queensland and N.E. New South Wales*. Brisbane: Copyright Publishing Co Pty Ltd.

- Mellauner, M. Dr. and L. Clees. 2004. *School:FREE: Recommendations for the Design of Schoolgrounds*. Vienna: University of Natural Resources and Applied Life Sciences, Vienna.
- Motloch, J.L. 2001. *Introduction to Landscape Design*. 2nd ed. NY: John Wiley & Sons, Inc.
- NSW Department of Education and Training. 2005. *Landscape Management in NSW Schools*. Sydney: Education Facilities Research Group.
- NSW Department of Education and Training. 2001. *Energy Management in NSW Schools*. Sydney: Education Facilities Research Group.
- NSW Department of Education and Training Properties Directorate. 1998. *Sun Shade in Schools*. Sydney: Education Facilities Research Group.
- Robinson, N. 2004. *The Planting Design Handbook*. 2nd ed. Herts, England: Ashgate Publishing Limited.
- Ryan, M. ed. 2003. *Wild Plants of Greater Brisbane*. Brisbane: Queensland Museum.
- Sanoff, H. 1994. *School Design*. N.Y.: Van Nostrand Reinhold
- Schoolground Planning Support Network. 1998. *Learning through landcare: learnscaping your schoolground*. 2nd ed. Indooroopilly, QLD: The State of Queensland, Department of Natural Resources.
- Sheat, L.G. and A.R. Beer. 1994. Giving pupils an effective voice in the design and use of their school grounds. In, *Breadtime & the School: Understanding & Changing Playground Behaviour*, eds. P. Blatchford & S. Sharp., 90-106. London, NY: Routledge.
- Shepherd, R.C.H. 2004. *Pretty but Poisonous: Plants Poisonous to People An Illustrated Guide for Australia*. Melbourne: R.G. and F.J. Richardson.
- Shepherd, R.C.H., R.G. Richardson, and F.J. Richardson. 2001. *Plants of Importance to Australia – A Checklist*. Victoria: R.G. and F.J. Richardson.
- Sorrell, J. & F. Sorrell. 2005. *joinedupdesignforschools*. London: Merrell Publishers Limited.
- State of NSW, Department of Commerce, and, the Department of Education and Training. 2002. *School Facilities Standard: Landscape Standard*. NSW: Education Facilities Research Group.
- Stine, S. 1997. *Landscapes for Learning: Creating Outdoor Environments for Children and Youth*. NY: John Wiley & Sons, Inc.
- Stoneham, M., C. Earl, and L. Baldwin. *Creating Shade at Public Facilities: Policy & Guidelines for Local Government*. 2nd ed. Site <http://www.health.qld.gov.au/phs/documents/shpu/20267.pdf> (accessed March 20, 2006).
- Taylor, A. How Schools are Redesigning their Space. In *Designing Places for Learning*, ed. A. Meek., 67-76. Alexandria: Association for Supervision and Curriculum Development.
- Thomas, G. 2002. *S.A.D. = Sustainable And Delightful: A Designer's Guide to Sustainable Site Planning*. Brisbane: School of Design and Built Environment, Queensland University of Technology.

Thomas, G., J. Sim, and D. Poulton. 2001. *Planting Design: an exploration of emerging theoretical frameworks to support sustainable landscape design*. Brisbane: Queensland University of Technology.

Thomashow, M. 1996. *Ecological Identity*. Cambridge, MA: MIT Press.

Thompson, W. and K. Sorvig. 2000. *Sustainable Landscape Construction: A guide to green building outdoors*. Washington, DC: Island Press.

University of Southern California. 2001. *Lessons Learned: A Symposium and Display on School Design*, Symposiums 1-3, White Papers. Site <http://www.usc.edu/dept/architecture/lausd/lessonslearned/lessonslearned.htm> (accessed Feb, 2006).

Woodrow, S. and H. Tyas Tunggal. 2005. *KidsGrow Schools Gardening Resource*. Epping, NSW: Nursery & Garden Industry Australia Ltd.