SECTION 31

LANDSCAPE

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1	17 May 2012		First Edition
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3	19/8/14		Issue to web

31.0 LANDSCAPE

31.1 Introduction

31.1.1 These guidelines relate to the JCU campus sites at Douglas (Townsville) and Smithfield (Cairns). Each campus has its own intrinsic quality and character, which is important to capture consistently in design & development to preserve community.

31.1.2 Landscape architectural consultants are to provide design/documentation/contract administration services to building/ infrastructure projects as part of a project consultant team or for specific campus enhancement/development projects.

31.2 Reference material

Designs produced for JCU should respond to the reference documents listed:

31.2.1 Current University Strategy and/or Master Plans

31.2.2 World Heritage Listings – Cairns Campus

31.2.3 Identification of profile areas culturally significant trees and other elements for protection/ retention including plants required for special purpose e.g. Biological classes.

31.2.4 Campus Vegetation Listings

Cairns
http://www-public.jcu.edu.au/discovernature/plantcairns/index.htm
Townsville
http://www-public.jcu.edu.au/discovernature/planttownsville/index.htm

31.2.5 Choosing Plants for Areas Prone to Cyclones

http://www-public.jcu.edu.au/discovernature/choosingplants/index.htm

31.2.6 Areas of vegetation restoration as designated by the Queensland vegetation Management Act 1999. Particular focus on the Cairns Campus for the regrowth vegetation map version 2.1 as produced by DERM.

31.2.7 Bushfire Risk Analysis Mapping as produced by QFRS.

31.2.8 Signage Manual

http://www.jcu.edu.au/estateoffice/public/groups/everyone/documents/manual/jcu_096432.pdf

31.3 Site appreciation and investigations

Investigation of the site for each proposed project needs to be undertaken and include:-

31.3.1 An appreciation of site conditions with:-

- A survey of topographic conditions, aspect, overland flows and run off, rock and soil types.

- An identification and study of circulation, movement predictors, animal habitats, heritage, biological and visual values, access ways and legibility.
- Identification of site vegetation and existing trees in consultation with the Grounds Supervisor and/or a specialist arborist to report on condition and significance of the trees on site and procedures for removal/transplantation and/or protection and maintenance of trees and other vegetation proposed to be retained during the design process.
- On site consultation with JCU Estate personnel for special considerations, existing services, future maintenance, soil conditions, water collection, the presence of Yellow Crazy ants in Townsville and Electric Ants in Cairns.
- Significant weed identification
- Memorials.

31.4 Landscape Scope

The scope for landscape design for external work includes hard and soft landscape elements, minor earthworks, erosion control, external furniture, signage, drainage and irrigation. Co-ordination with specialist services, structural, civil engineers for gradients and levels, external lighting, hydraulic services (drainage and water supply). Scope includes establishment and maintenance of plants for a specified period before handover to the University and where the development adjoins a public road co-ordination with the relevant authority for streetscape design.

31.5 Landscape design

31.5.1 Landscape design and documentation to be complimentary to and integrated with the building and services design and documentation.

31.5.2 The landscape design to conform to Campus landscape principles, strategies and management held in reference documents and, in particular, to design continuity, sustainability, legibility, safety, expression and functionality and ongoing maintenance requirements, specifically:

- Cairns- Maintain visibility from the highway
- Townsville- Consider the landscape enrichment of James Cook Drive as the campus development shop front. Consideration should be made to locating designated “shading areas” outside buildings but clear of entrances/ air intakes.

31.6 Earthworks

Generally bulk earthworks are designed and documented by the civil engineering consultant.
It is important that all aspects of: -

- Protection of existing trees and vegetation
- Maintenance measures for vegetation adjacent to construction – continuity of water supply
- Removal of trees and plants not required on or adjacent to the project site, chipping and stockpiling for reuse as mulch.
- Erosion and sediment control measures

- Stripping and treatment (removal of stone for reuse as mulch) and removal of other extraneous material, stock piling of topsoil; and
- Locations of major infrastructure are co-ordinated with the landscape architect.

31.7 Elements

Generally landscape elements and materials will vary between each campus site, and proposed materials will be required to be submitted for approval by the University

31.7.1 Paths and Paving *(Pedestrian, Bicycle & Occasional Maintenance vehicle drive over. Not including designated vehicle routes or hard stands)*

31.7.1.1 Paths and paving are required to conform to acceptable widths, gradients and cross-falls and the appropriate slip resistance codes for pedestrian use. Proprietary items are to be supported by manufacturer's warranties. Slip rating certificates are to be provided. Consideration of aggregate type for skid and slip resistance (avoid glassy and smooth aggregates).

31.7.1.2 All paving sealed with an approved sealant appropriate to the paving type.

31.7.1.3 Segmented pavers on campus are to be removed.

31.7.1.4 Approved Feature pavers are to be fixed on a concrete base slab 100mm thick and laid, cleaned, sealed, to manufacturer's specification.

31.7.1.5 All concrete to be reinforced, laid on compacted fill (100 mm thick pedestrian use, 150 mm thick for incidental vehicle use), and be complete with expansion, construction and dowel joints, and tactile indicators tiles to 1428.1-2009.

Aggregate must be part of concrete mix (avoid seeded aggregate finish). Aggregate to be carefully washed out to ensure stones do not project more than 2mm. Use of coloured concrete is desirable. New exposed aggregate must match adjacent work as close as possible. Any colour to be integral and aggregate type and finish to be approved by the University. Refer Attachment 1 - Drawing Concrete Pathways.

Aggregate finish in established areas

Area	Aggregate	Cement	Pigment
Townsville Geology Garden	tba	tba	tba
Townsville ATSIP	70% Burdekin Rock (7-10mm) 30% Honey (7-10mm)		CCS Onyx CCS Cardinal CCS Golden Bronze
Cairns QTHA	Tinaroo Gold	Mix supplied by Hanson	
Townsville Building 134	tba	tba	tba

*Consider specifying sample panel of exposed aggregate finish as part of project.

31.7.1.6 Levels external to the building to finish 200 mm below floor level, 100 mm below damp proof course excepting at building entry thresholds.

31.7.1.7 50 mm PVC conduits are to be provided under paving in agreed locations (approx. 20m intervals) for future services with locations marked on kerbs/pavements.

31.7.1.8 Service covers in paths need to finish flush with adjoining pavement and, where possible, align with direction of paving. Lids generally to be 'infill' type lid. Fill lid to match adjoining path finish.

31.7.1.9 Path Schedule

Path Type	Width (mm)	Depth (mm)	Reinforcement
Major pedestrian with vehicular loading	3000	150	SL82 top and bottom
Medium pedestrian only	1800	100	SL62 top only
Minor pedestrian only (infrequent use)	1200	100	SL62 top only
Pedestrian and bicycle with vehicular loading	2500	150	SL82 top and bottom

31.7.2 Steps

31.7.2.1 Avoid steps in footpaths in external areas where possible, in particular ensure that no single steps are incorporated.

31.7.2.2 Where required, external steps generally shall have 150 mm risers with 3^0 raking face and 305 mm treads.

31.7.2.3 Treads to be non-slip with aluminium contrast colour nosings to comply with 1428.1-2009 and fixed to manufacturers recommendation.

31.7.3 Ramps and Walkways

31.7.3.1 All ramps and walkways should be graded to a maximum 1:21 to minimise required handrails where possible.

31.7.3.2 Ramps and walkways are to be suitable for people with disabilities and include handrails, landings and kerbs as necessary to code 1428.1-2009.

31.7.4 Handrails

31.7.4.1 Handrails are to be provided for steps and ramps and generally match adjacent existing handrail design elsewhere on campus to 1428.1-2009.

31.7.4.2 Polished stainless steel handrails are preferred though hot dip galvanised rails may be used upon approval. No Painting.

31.7.4.3 Materials are to be 42 mm outside diameter.

31.7.4.4 Fixing details are to be provided by structural engineer.

31.7.4.5 Open hook ends are to be closed off.

31.7.5 Walls

Avoid retaining walls where possible and use battered banks.

31.7.5.1 Walls adjacent to ramps and buildings are to be in situ concrete (colour to be integral) masonry/stone as appropriate to the situation. They must be constructed to engineering specification and coated with an approved vandal resistant sealant. No timber walls. Approval to be sought for the use of rendered block or inter locking link block walls.

31.7.5.2 Back of retaining walls to be waterproofed and protected with Coredrain® /gravel backfill and agricultural drainage.

31.7.5.3 Design consideration is to be given to capping, falls on capping, possible future staining of walls and use for casual seating.

31.7.5.4 Fall heights hand rails to BCA and Duty of Care.

31.7.6 Garden Edges

Where mown grass areas abut gardens, kerbs and walls, edges are to be concrete, min. 100 mm wide and 125 mm deep, finished with a steel float and construction joints at 1500 mm maximum centres. Any colour additives to be integral. Any elevated edges to be fitted with pipes/slots at ground level to expedite drainage from planted areas.

31.7.7 Kerbs

31.7.7.1 Kerbs generally to be in situ concrete 150 mm x 150 mm, with any additives integral.

31.7.7.2 Proprietary pre-formed kerbs, where appropriate, to be laid to manufacturer's specification.

31.7.7.3 Layback kerbs may be used only in approved situations.

31.7.8 Timber

31.7.8.1 JCU generally discourages use of timber in external landscaped areas. However, under special conditions timber may be acceptable provided that all timber design works are approved by JCU.

31.7.8.2 Timber in landscape to be LOSP (Light Organic Solvent Preservative) treated to AS1604-1993 and is Stress Grade F5.

31.7.8.3 Timber to be painted with two coats of water repellent preservative after cutting and prior to assembly.

31.7.8.4 All exposed edges arrised and all fixings hot dipped galvanised.

31.7.8.5 Timber to be used in external in-ground situations only where approved.

31.7.9 Planting on Structures

31.7.9.1 Planting on structures should be avoided or consulted with and approved by the University. Any approved planting on structures to be drained and fully tanked (with protection) and water tested prior to filling. Safety harness fitting points will be required where structures are elevated.

Plantings of climbing plants on frames/trellis wire should be avoided; approval maybe sought to implement. Ensure any plantings have sufficient space and soil depths for sustainable growth and that climbing frames are constructed using stainless steel. Training of plants on to supports is required during period of establishment and maintenance of plants including pruning to avoid growth which encroaches on to walkways paths etc.

31.7.9.2 No individual pots or planter boxes to be used.

31.8 Drainage

31.8.1 Surface

31.8.1.1 Where appropriate stormwater runoff to be captured and/or integrated into ground water.

31.8.1.2 Falls and run-off for stormwater are to be provided to field gullies and connected to the stormwater system. Pipes are to be a minimum 150 mm diameter.

31.8.1.3 Provision is to be made for overland flow from stormwater collection pits. Do not provide for run off from paved area over grass.

31.8.1.4 Gully and trench grates to be traversed by pedestrians are to be heel guard type and all grates to be hot dipped and galvanized (stainless steel for higher quality finish). Grates to be minimum of 450mm width.

31.8.2 Sub Surface

31.8.2.1 Install sub surface drainage in all garden areas adjacent to paths, buildings and turf.

31.8.2.2 Install sub surface drainage adjacent to paths and buildings in all turfed areas.

31.8.2.3 Corrugated, slotted pipe to be encased in 150mm gravel surround.

31.8.2.4 Solid pipe connections to be used under paved areas.

31.8.2.5 High end of pipe to be turned up and capped 75 mm above mulch or level with turf for flushing.

31.8.2.6 Connect sub surface pipe to stormwater system.

31.9 Water supply

31.9.1 Water is to be supplied to the site for irrigation of designated turf and gardens, for hose points and for drinking fountains adjacent to the building with appropriate backflow prevention units.

31.9.2 Hose points are to be located for ease of access on building and at approximately 40 metres apart, 800 mm above ground.

31.9.3 Field gullies are to be located under hose cocks, and waste water from drinking fountains discharged in accordance with the relevant standards.

31.9.4 Water specific for irrigation should utilize recycled/bore water where available.

31.10 Irrigation

31.10.1 All designated grass and gardens are to be irrigated through an automatically controlled irrigation system and connected to the campus CBUS system.

31.10.2 Systems to be water efficient, low maintenance and are to be designed by an authorized irrigation designer with plans and specification included in landscape documentation and/or specified for design and construction to JCU standards. All systems to be fitted to Manufacturer's design specifications, in their entirety.

31.10.3 Landscape Architect and Irrigation designer to meet on site with JCU Grounds Supervisor before undertaking design.

31.10.4 Equipment to be located for ease of access for maintenance staff, including sprinklers, valves, valve boxes etc to be used.

31.10.5 "Hunter Irrigation Systems" used generally.

31.10.6 Generally systems to use Micro sprinklers spinners, no drippers.

31.10.7 All pipe work to be MDPE. Main lines are to be buried to a minimum of 300mm.

31.10.8 Shop and As Built drawings are to be provided to the client with demonstration at handover to the client at the completion of the establishment and maintenance period.

31.10.9 Materials to have a minimum 12-month warranty.

31.11 Gardens

31.11.1 Categories

Categories for Gardens are to be allocated.

Category	Type	Location
Garden G1	Feature Gardens	High Profile Areas
Garden G2	Medium Profile Gardens	Older Gardens. Areas to be demolished for new buildings
Garden G3	Bush or Screen Plantings	Bushland plantings around perimeter of campus
Garden G4	Revegetation Area	Plantings to assist with revegetation, particularly in zones adjacent to creek

Category	Irrigation Status
Garden G1	Irrigated with an automatic system
Garden G2	Where no irrigation system exists, gardens to be watered by hose/sprinklers during establishment.
Garden G3	No irrigation
Garden G4	No irrigation

31.11.2 Soils

Generally Soils are to be screened existing soils, which may be amended with additives to comply with AS4419 (1988). Any imported soil mixes to be supplied with a current soil analysis for the soil being supplied and to be certified nut grass, ant free. Site topsoil is not to be used in G1 gardens.

31.11.2.1 Site Topsoil

Site topsoil to be used provided that:-

- All emergent weeds are progressively removed from site stockpile.
- All sticks, clods, stones over 50 mm are removed.
- Soil pH is in the 6.5 – 7.0 range, and
- Soil additives maybe used to improve water holding capacity and available nutrients.

31.11.2.2 Imported Topsoil Types

Imported topsoil maybe used to make up quantities in gardens and for back filling planting holes to assist in the establishment of plants and turf.

New Gardens	Approved imported premium quality soil mix pH 6.5 – 7.0
Under Turf	Mineral under turf mix in poorly drained soils. pH6.5 – 7.0 elsewhere
Top dressing for Turf	Sandy fine textured soil pH 6.5 – 7.0

31.11.2.3 Sub Grades

- Sub grades under planted and turfed areas to be scarified to a minimum depth of 150 mm.
- Unless otherwise specified gypsum to be worked into sub grade at rate of 250 gm/m2.

31.11.2.4 Top Soil Depths

Gardens	Minimum 300mm at edges, mound to centre.
Under Turf	100mm
Planters	Minimum of 600mm at edges, mound to centre.
Trees in Paved areas	Minimum of 1000mm

31.11.3 Plants

31.11.3.1 Existing Trees Designated For Retention

- A number of trees on site have been identified as significant and where possible are to be retained – Refer (List of plants used for Teaching)
- Ensure protection of existing trees to be retained within the work site by fencing and other means, to the extent of the canopy drip lines, with specification to maintain health and vigour of the tree throughout the extent of the site development contract.

31.11.3.2 Proposed New Trees

Tree selection to be dependent on location and considered for local suitability to conditions including tolerance to cyclones potential to provide shade, and/or cause nuisance through aggressive root growth, flower seed or limb shedding on to paths or into roof gutters. Tree selection subject to approvals of the University in line with approved planting list unless otherwise specified. Preference for shade trees with substantial spread and branching above 3m.

31.11.3.3 New trees in paved areas to be advanced stock, protected/staked, with planting holes a minimum of 200 mm all round larger than the root ball, drained and provided with irrigation, and root barriers, if required. Tree grates to be provided for trees in paved areas.

31.11.3.4 Generally trees to be planted in clumps in gardens. Avoid individual trees in grassed areas. Any new trees planted in grassed areas to be staked with one metre diameter surrounds, mulched/maintained free of grass.

31.11.3.5 Proposed New Plantings

- Single species gardens should be considered
- All plants should be sun hardened nursery stock, growing soil to be free from weeds.
- Special consideration to be given to planting around fire hydrants and any signage, manholes, and any path areas etc requiring maintenance and visual access for security.
- Consideration should be given to sustainability and the use of plantings in specific environments and for teaching and attraction of wild life especially butterflies and birds.
- Consideration should be given to plant densities pot sizes and growth potential for site coverage to prevent soil erosion and competition from weeds and to minimize the incidence of wild fires.
- Consideration should be given to safe planting distances to buildings depending on tree species / heights. Trees with a potential height of 12m should be planted 12m from the building, trees with potential height greater than the roof line should be located 1.5 times it's height from the building.

31.11.3.6 Fertilizing

- Fertilize each plant at time of planting with long lasting fertilizer suitable for plant species to manufacturer's recommendation.
- Fertilize during establishment period with liquid fertilizers.

31.11.4 Mulch

31.11.4.1 Mulch type is required to be approved.

31.11.4.2 Mulch shall be free from soil, weed growth and green material. Mulch shall be applied to the surface of all gardens unless otherwise approved and finish 25 mm below contiguous paths.

31.11.4.3 Organic mulch shall be well matured, with type suitable for application:-Hoop pine bark to 100 mm long strips for steep slopes, and pine bark 25 mm elsewhere. Mulch to finish flush with edge retainer or adjoining surfaces. Fines to be used only in feature garden situations. Mulch generally 75 mm thick.

31.11.4.4 Gravel mulch to be gravel screened from topsoil washed and spread to a depth of 75mm or other approved.

31.11.4.5 Where gravel is used in surface watercourse for stormwater, overland flow gravel to be LOR with a 10% proportion of larger spalls and geofabric underlay.

31.11.4.6 Keep mulch away from plant stems.

31.11.4.7 Do not use fine mulch, which may cover crowns, particularly for tussock type plants such as Lomandra.

31.12 Grass

31.12.1 Grass Categories

Category	Type	Species	Location
Grass 1	High profile lawns Mown Lawns Turf laid edge to edge 'A' Grade 100% weed free monoculture	Selected Buffalo Hybrid Buffalo - 'Sir Walter' - 'Palmetto' Carpet Grass Sweet Smother Grass	Open sunny situations Shaded situations and under trees
Grass 2	Lawn as ground cover mown/slashed turf laid edge to edge Nut grass and noxious weed free 80% monoculture specified grass	As above	As above
Grass 3	Grass seeded/or Hydromulched	Selected Species	Where specified

31.12.1.1 Species of grass proposed for each situation to be approved by the university.

31.12.1.2 Grass Q1 high profile lawns to be irrigated through popup sprinklers automatically controlled system.

31.12.1.3 Grass Q2 low profile open grassed areas to be watered through broad spread irrigation system automatically controlled.

31.12.1.4 Grass Q3 to be hand watered until established.

31.12.1.5 Turf shall be laid along contours with joints staggered.

31.12.1.6 Top soil underlay to be spread to ensure that the grass finishes level with adjoining paths.

31.12.2 Grass on Banks

Cultivated mown turf Q1 and Q2 to be laid on banks at gradients no steeper than 1:4 (avoided as possible to comply Workplace Health and Safety Standards).

31.12.3 Fertilizer

Top dress and fertilize grass, NPK 22.1.6.12 @ 40gn m2 in September and October.
In April apply 15.0.0.

31.13 Lighting

31.13.1 Light fittings to be vandal proof according to AS1158.1.1986. There are to be no lighting bollards. Fittings to be weatherproof, sealed against entry by insects and vermin, and to be designed to avoid damage and discoloration to the body, glass and lamp.

31.13.2 Provide lighting to ensure full coverage of external landscaped and seating areas. Co-ordinate with Electrical Engineer to ensure minimum lighting levels achieved.

31.13.3 Preference for LED light fittings. Fittings to match existing fittings on campus where possible.

31.14 Landscape furniture

31.14.1 Furniture, including seats, tables, bins, drinking fountains, bike racks, bollards, fences, signs, plaques are to be selected and approved for each campus site. Generally consideration is to be given to matching adjacent, existing furniture and suitability. Preference for furniture using recycled materials. Furniture to incorporate external power outlets wherever possible.

Furniture to be placed clear of paths so the use of furniture does not affect use of paths.

31.14.2 Furniture Schedule

Existing installation information:

ITEM	SUPPLIER	PRODUCT
Bins - Cairns	tba	tba
Bins - Townsville	CMF Combined Metal Fabrication	Riverside Double Bin with Recycling
Seats	tba	tba
Bike Racks	tba	tba
Bollards	tba	tba
Drink Fountains	tba	tba

31.14.3 Seats and tables are to be located with consideration for shade and seasonal conditions. Type (including custom seating) with the incorporation of external GPO's to be approved. All seating to be fixed.

31.14.4 Drinking Fountains are to be weld steel fountain body, stainless steel water dish, handle and bubbler mechanism and gunmetal cap all powder coated, approved colour, suitable for people with disabilities and fixed in accordance to manufacturers recommendation and relevant codes. Preference to have drink fountains located adjacent to buildings in sheltered positions in pedestrian areas. Ensure water supply has sufficient soil coverage to not heat up with the sun. Consider used of chilled fountains within building extents.

31.14.5 Bins are to be 240 litre wheelie bins with enclosures set on concrete base. Location of bin enclosures to be approved and appropriate to maximize ease of bin services use without detriment to visual values. General and recycled waste bins to be included as a minimum. Refer to schedule for types already used.

31.14.6 Bike Racks are to be individual bike loops, approved finish, located adjacent to buildings, preferably covered and located in well lit areas.

31.14.7 Removable and or fixed in bollards are to be used depending on application. Types and finishes are to match existing, and shall be fixed to manufacturers detail.

31.14.8 Tree guards are to be provided to individual trees planted into pavements where guards are to be secured and integral with tree grates.

31.14.9 Special Items

- Any new memorial plaques to be approved. Existing plaques to be retained unless otherwise advised.
- Fountains
  Ornamental water fountains are to be approved. Waterworks strategy for water use are to be designed by an authorized hydraulic/ pool specialist
- Statues and Ornaments
  Location type of statues and ornaments are to be approved. No potted plants.

31.14.10 Provide “wireless” and provision of wireless data on landscape structures/buildings to ensure full coverage of external landscape areas. Consult with IT&R on locations required to achieve coverage.

31.15 Establishment and maintenance period

31.15.1 All soft landscape work and irrigation to be maintained during an establishment and maintenance period of a minimum of 12 weeks after practical completion.

31.15.2 After satisfactory completion of this period, arrangements are to be made for a formal handover and familiarization to the JCU Estate Office personnel.

31.16 Defects liability

All hard landscape work is to have a warranty period for 12 months after practical completion.

31.17 Obligation design/landscape consultant during documentation

31.17.1 Drawings required

- Provide scaled drawings preferably at 1:100 indicating all finishes, levels including planting plans, landscape plans, tree protection plan, details and sections, set out plans, irrigation plans, specification etc sufficient to allow construction.
- Submit drawings for approval prior to proceeding.

31.17.2 Cross checking with other consultants for:-

- Bulk earthworks for sub grade levels.

- Location and level of stormwater and sewerage sumps/inspection/chambers in the landscape with paving infill of lids required in pathways.
- Location and levels of ORGs in external areas with required falls away and location of hose cocks over.
- Location of RPZV, check other valves electricity substations, fire hose reel cabinets and other service elements to be located in the landscape.
- Location of lights and power supply in landscape areas.
- Type and extent of light available in interior landscapes.
- Collection and use of rainwater or grey water.
- Water features and fountains equipment.
- Review design verification.
- Checking Bill of Quantities.

31.18 Obligation design /landscape consultant during construction

- Inspections during construction.
- Certification of the work at practical completion, completion of establishment and maintenance and defects liability period.

31.19 Obligation design /landscape consultant at completion of establishment and period

It is the obligation of the landscape architectural consultant to provide to the relevant personnel:-

- As Built drawings (refer to section 34 – Documentation).
- Warranties for equipment and workmanship.
- Commission of the irrigation system.
- Handover to the landscape maintenance staff.