CITY OF PALMERSTON

DEVELOPMENT GUIDELINE

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INTRODUCTION

The Development Guidelines are provided for the information of developers of projects in the City of Palmerston (CoP).

The Guidelines provide an overview of approvals and permits required for development, and provide minimum standards acceptable to the CoP for the planning of a new development, as well as the layout, design and construction of roads, stormwater drainage, street and pathway lighting, pathways, driveways, open space, and ancillary items.

The guidelines provide a common reference for designers, developers and other stakeholders in the pursuit of developments that add value and amenity to the City of Palmerston in a sustainable way.

The guidelines do not transfer responsibility or limit creativity of the planning, engineering and construction professionals engaged in the development proposal.

The Guidelines and the standards referred to in the document are subject to regular review. It is important to ensure the current edition is being utilised for the development.

STRUCTURE OF THE DEVELOPMENT GUIDELINE

The guidelines have been set out to assist developers in the design and construction of infrastructure required for residential, commercial and industrial developments to comply with CoP preferences and requirements.

Should a conflict arise between the contents of these guidelines and the requirements of other Authorities and or Agencies, clarification is to be sought from the CoP Director of Technical Services.

The Development Guideline is structured as follows

PART 1 DEVELOPMENT PRINCIPLES

This Part is to provide guidance to a developer on the design principles and issues to be considered by a Developer and Designer in the preparation of layout plans and concepts for new urban developments within the City of Palmerston.

PART 2 DESIGN GUIDELINES

The Design Guidelines represent minimum standards acceptable to the CoP for the design of infrastructure assets, including roads, stormwater drainage, street lighting, footpaths, driveways, open space, and landscaping.

PART 3 CONSTRUCTION STANDARDS

The Construction Standards provide guidance on specific CoP preferences for materials, workmanship and construction for assets to be handed over to CoP.

PART4 STANDARD DRAWINGS

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PART 1 - DEVELOPMENT PRINCIPLES

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DEVELOPMENT PRINCIPLES

1.0 INTRODUCTION

This Development Principles section of the Development Guidelines is to provide guidance to a developer on the design principles and issues to be considered by a Developer and Designer in the preparation of layout plans and concepts for new urban developments within the City of Palmerston. Guideline criteria are provided for reference and where exceeded, a technical basis for the design decisions for exceedance is to be provided to the City of Palmerston

The Development Principles are to be considered in conjunction with the Northern Territory (NT) Government planning scheme, local laws and policies.

2.0 PLANNING AND DEVELOPMENT PROCESS

2.1 OUTLINE

This section is a summary of the Planning and Development process in the Northern Territory as it impacts developers.

The Northern Territory Planning Act and Regulations provides the framework for the Northern Territory Planning Scheme and the assessment of Development Applications.

The Department of Lands Planning and the Environment is responsible for managing the development assessment process.

The Department of Lands Planning and the Environment (DLPE) strongly encourages Prelodgement Meetings with the Department to determine the type and extent of information to be included in the Development Application. It is also recommended that applicants for development approval discuss their proposal with the City of Palmerston (CoP) prior to submission to the Development Assessment Services section (DAS) of the DLPE.

2.2 COUNCIL'S ROLE IN THE DEVELOPMENT PROCESS

The Development Consent Authority is the body responsible for the approval of development and subdivision within the Northern Territory under the Planning Act.

The City of Palmerston (hereafter known as 'Council') is not responsible for issuing of subdivision or development permits. Council's role is that of a service authority or referral agency, and Palmerston community advocate.

The Northern Territory Local Government Act (LGA) charges Council with a range of responsibilities in addition to their role under the Planning Act. The LGA makes Council specifically responsible for:

- Maintenance and management of public roads and verges (other than those controlled directly by the NT Government)
- Traffic control;
- Parking, both on and off street;

- Footpaths and cycle paths;
- Foreshore protection;
- Stormwater drainage;
- Waste collection;
- Council owned land and public spaces.

The LGA provides Council with the right to require the upgrade of assets such as roads, drains, street and public lighting, and landscaping of verges and public spaces.

For all forms of development in Palmerston, it is essential that developers engage with Council early to discuss their proposals. This ensures that all Council's requirements have been discussed, negotiated, agreed and understood prior to the issue of a Development Permit.

The issues that Council require discussion during the initial stages of a development proposal include:

- Stormwater;
- Environmental matters;
- Roads, Traffic and Vehicular accesses;
- Landscaping Requirements;
- Pedestrian Access, Footpaths, and Cyclist provisions;
- Waste Management.

3.0 GENERAL

3.1 URBAN DEVELOPMENT OBJECTIVES

In addition to the requirements of the Northern Territory Planning Scheme, local laws and policies, urban development proposal layouts should:

- Enhance and protect areas of environmental significance;
- Be sympathetic to the existing topography and land form;
- Minimize impacts on the surrounding environment;
- Facilitate the provision of urban services;
- Provide an environment for safe, comfortable integrated urban living.
- Create a 'Place for People'.

3.2 IDENTIFICATION OF SITE CONSTRAINTS AND VALUES

In the preparation of an urban development layout an important step is the identification of the natural constraints and values of the site, and any engineering constraints on the provision of urban services and amenities.

Constraints on the development layout may be imposed by the following factors.

- Existing vegetation of significance
- Roads and services connections to adjoining properties;
- Public transport networks;
- Rail corridors;
- External stormwater drainage catchments;
- Downstream Stormwater drainage and receiving;
- Areas prone to flooding and ponding;

- Constraints and impacts on adjoining properties;
- Limitations of existing utility services, and planned augmentation works;
- NT Government resumption requirements;
- Existing topography;
- Water quality issues;
- Geology and geotechnical issues.

Developers and designer are encouraged to consult with council and other relevant authorities prior to or during the preparation of the design concept and site layout. Designers should take into account specific requirements of these authorities as well as the requirements of these guidelines as they influence the design of the development.

Prior to preparation of a development layout, all areas with significant environmental value shall be identified for protection and preservation. Any disturbance within these areas shall be minimised to the satisfaction of the NT Government, Council and other relevant authorities.

3.3 ENVIRONMENTALLY SIGNIFICANT AREAS AND VEGETATION PROTECTION

All existing natural streams and water courses including riparian vegetation should be preserved.

3.4 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

The principles of crime prevention through environmental design shall be considered and applied when the development layout is being designed.

Issues that must be considered

- Natural surveillance of public open spaces.
- Long pathways or obscured park areas are avoided.
- Interaction of street lighting and landscaping treatments to preclude “dark zones”. Design is to be predicated on the encouragement of the active use of public spaces both at day and at night so as to minimise antisocial behaviour and vandalism.

A number of publications exist that provide insight into the improvement of urban spaces through CPTED principles.

4.0 ENGINEERING ISSUES

4.1 GENERAL

The optimum road and site layout for a development is a result of consideration of social, environmental, town planning, traffic and engineering issues.

Although the engineering design of roads and urban infrastructure is the province of the Engineer; it is important that the Urban Planner and Surveyor preparing a site layout be completely mindful of development engineering issues to ensure development layouts are satisfactory in these respects. Major alterations to the development layout may otherwise arise to effectively accommodate roads and infrastructure solutions.

Factors to be considered when designing new development layouts include:

- Proposed land use
- Road hierarchy, including ultimate arrangements;
- Public transport network, including future plans;
- Local planning policies; including pedestrian and cyclist provisions, and open space;
- Council's drainage management plans;
- Railways;
- Access requirements for emergency and service vehicles;
- Topography;
- Road frontage provisions to parks and drainage reserves;
- Utilities constraints, including provisions for planned augmentation works;
- Crime prevention through environmental design;
- Impacts on adjoining properties;
- Existing storm water drainage;

- Flooding and ponding issues;
- Preservation of existing water courses;
- Vegetation areas of significance;
- Bushfire prevention measures;
- Impacts of earthworks;
- Water quality improvement measures;
- Existing soil conditions;
- Geotechnical considerations

4.2 ROAD NETWORK

The extension of the road network into a subdivision development is to be designed to achieve the following:

- Safe and convenient access to all allotments for vehicles, pedestrians and cyclists;
- Safe and convenient access to public buildings and schools;
- Safe and logical hierarchical transport linkages to the existing street network;
- Suitable access for buses, emergency and service vehicles;
- Convenient service corridors for utilities;
- Sufficient convenient parking for visitors;
- Opportunity for landscaping street spaces.

A road network with appropriate hierarchical arrangements is necessary to achieve acceptable amenity, road safety and clarity. Each class of road in the network provides a distinct set of functions and service, and is designed accordingly. A typical road hierarchy is shown below.

TYPICAL ROAD HEIRARCHY DIAGRAM

The number of turning movements at intersections or junctions that a visitor is required to take to reach a specific address within the development should be minimised.

The development road network should be designed to ensure roads connect to the next order of roads in the hierarchy. Connections between roads more than two levels higher or lower in hierarchy are not permitted.

The pedestrian and cycle path network is to be designed to be functionally efficient. Where necessary connections between minor roads and/or open spaces should be provided to create the functionality.

The road hierarchy must adequately cater for public transport. The criteria for determination of the bus route location are set by the NT Government. Developers shall consult with CoP prior to finalising bus routes. The road development layout should be designed to achieve the desired speed environments without the use of traffic control/calming devices. The use of traffic control devices will require approval of the Director of Technical Services.

The road and pathway network for Palmerston is generally defined and fixed. Developers must join this network, integrating their development and land use pattern to the Palmerston road and pathway network with due consideration to safe transport routes between existing and proposed commercial areas, and schools.

Development road and pathway networks should be prepared considering sustainable community outcomes.

Master plans for all road and path networks are to be submitted to Director of Technical Services for review and consideration early in the design process.

4.3 SITE REGRADING

Excessive site regarding should be avoided. Wherever possible, development layouts should be sympathetic to the topography so that road and drainage networks utilise natural surface grades.

Site layouts that minimise land disturbance require less soil erosion and sediment control measures during construction, reducing the risk of environmental damage and costs.

Where earthworks are proposed on steep slopes the input from a qualified geotechnical engineer should be sought to determine slope stability and constructability issues.

4.4 STORMWATER DRAINAGE

The stormwater drainage system, and earthworks, shall be designed so that the upstream and downstream drainage is not adversely affected. The incorporation of retention or detention systems may be required so that the downstream drainage system is capable of adequately catering for the discharge of stormwater flows that may be produced as a result of the development.

Where the downstream system is not capable of conveying the modified discharge, the designer shall determine the measures proposed to ensure the downstream system is able to carry the modified discharge. This may require the written approval from downstream landowners to create easements for downstream drainage paths. Written approval from property owners is required for easements and/or any engineering works on their property between the development site and the legal point of discharge.

4.5 STORMWATER QUALITY MANAGEMENT

Developments may have adverse effects on the quality of stormwater runoff. The overriding objective of stormwater quality management is to minimise the potential of development activity to cause harm to the environment and or receiving waters.

The City of Palmerston will not accept polluted stormwater runoff into its drainage systems. Adequate planning for stormwater quality and erosion control in proposed developments is essential.

The location and design of interception and treatment devices for stormwater quality improvement should consider public safety, community health and access for cleaning and maintenance.

4.6 WATER SUPPLY AND SEWERAGE RETICULATION

In the preparation of a development layout plan, the provision of sewerage reticulation and water supply to adjoining properties is to be considered in the context of development strategies within the NT Planning Scheme.

The preparation of water supply and sewerage reticulation solutions for a development proposal should be undertaken in consultation with the relevant utility authority.

4.7 TELECOMMUNICATIONS AND ELECTRICITY SUPPLY

In the preparation of a development layout plan, the relevant service authorities should be consulted to confirm the provision of electricity and telecommunications services to the development, and the land provisions necessary for siting the utility infrastructure within the development.

PART 2 DESIGN GUIDELINE

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PART 2 DESIGN GUIDELINES

1.0 INTRODUCTION

The Design Guidelines are provided for the information of developers of land within the City of Palmerston.

The Design Guidelines represent minimum standards acceptable to the CoP for the design of infrastructure assets, including roads, stormwater drainage, street lighting, pathways, driveways, open space, and landscaping.

The responsibility for a cogent integrated design for the development remains with the Developer's team of professionals. These guidelines are a common reference for the adoption of recognised current standards of work and procedures. Where design decisions utilise criteria inconsistent with the standards of this guideline, a technical submission to the City of Palmerston supporting the deviation from the guide will be required.

The Guidelines are subject to review. It is important to confirm the currency of this edition prior to application of the guidelines to the design of a development proposal.

The Guidelines are to be considered in entirety. Application of individual sections of the guide in isolation is discouraged.

1.1 Approvals and Consultation

Responsibility for engineering services, infrastructure networks, and environmental issues in Palmerston are administered by a number of Authorities, Agencies and NT Government Departments.

Formal approval must be obtained from relevant government departments and other authorities or agencies prior to the commencement of construction of new developments.

A number of Agencies must be consulted with prior to undertaking design and construction of new Developments. Examples of such Agencies include but are not limited to the following:

Issue	Agency
Health/Entomology	Department of Health
Planning Environment Development Assessment	Department of Lands Planning and the Environment
Roads Network (NTG) Public Transport	Department of Transport
Fire and Emergency Services	NT Police, Fire and Emergency Services
Utilities:	
Water and Sewerage	Power Water Corporation
Power	Power Water Corporation
Communications	NBN; Telstra; Austar
Gas	NT Gas and Origin Energy;

2.0 ROADS AND PATHWAYS

This section details the design criteria for the design of roads and pathways in subdivisions in Palmerston.

Definitions

Residential Catchment: - the residential catchment of a particular road is the residential area that contributes directly or indirectly to the traffic flow on that road.

Nominal Kerb Line: - as defined in the standard drawing DEV703-C-DWG-001 Typical Crossover & Kerb Details and is typically the invert of kerb and gutter. In the case of standard kerb or mountable kerb, where there is no channel, it is the front face of the kerb.

Carriageway Width: - is the area of road pavement between the nominal kerb lines of opposing kerbs.

Verge Width: - is the area between the nominal kerb line and the road reserve boundary.

Lot Frontage: - is the side of the lot that has access to the road.

Urban *Road Hierarchy* - Refer to Development Principles Section.

Arterial Road

Arterial roads link with other arterial roads and sub arterial roads and typically border townships or Municipalities, providing service to a series of suburban areas. No lot frontage access is allowed to arterial roads.

Sub Arterial Road

Sub arterial roads act as feeder or connecting roads, linking the residential areas with the arterial road system. They are typically dual lane.

Typically sub arterial roads run external to the suburb, forming part of the suburb boundary and do not provide direct frontage to the residential lots. However they can provide access to larger traffic generating developments such as schools, public facilities and shopping centres.

Collector Roads

Collector roads primary purpose is to connect the residential cells of a suburb to the traffic carrying sub arterial roads. The roads generally have a number of access roads branching from them and can provide direct access to residential lots. Collector roads will typically be single.

Secondary collectors typically cater for catchments of up to 250 residences and provide access to one or more local access roads. Generally, secondary collector roads servicing more than 125 residences should have more than one access outlet. Typically, no schools, shops or bus routes are allowed on secondary collectors.

Primary collectors have the same definition and criteria as a secondary collector but have a stronger connectivity between suburbs and the sub-arterial road system. Schools and shops may access the road and the cross section is wide enough to accommodate a bus route. Direct residential lot frontage access to primary collectors needs to be assessed in terms of impacts on function of the road.

Local Access Roads

Local access roads consist of loops and through roads between collector roads. They provide lot frontage and generally give access to up to 60 residences. Local access roads are single lane with a maximum speed limit of 50 km/hr.

Minor Roads

Minor roads include short loops and cul-de-sac's which provide direct access to residential lots. Minor roads typically service no more than 25 residences and should generally not exceed 200 m in length.

Industrial Collector

Industrial collector roads act as feeder or connecting roads, linking industrial areas with the arterial or sub-arterial road system. Industrial collectors will provide direct frontage to industrial lots and access to industrial access roads.

Industrial Local Access

Local access roads connect cells of up to 70 industrial lots to the traffic carrying collector roads. Cul-de-sacs are strongly discouraged and may be considered only for infill development proposals.

2.1 GEOMETRIC DESIGN

This section sets out the Guidelines developed specifically for the design of roadworks using principles of street design to ensure safety and improved amenity and to reduce pedestrian/vehicular conflicts.

The geometry of a road is to be designed so as to achieve the following aims:

- Provide convenient and safe access to all allotments for pedestrians, vehicles and cyclists.
- Provide appropriate access for buses, emergency and service vehicles.
- Provide a convenient way for public utilities.
- Provide an opportunity for street landscaping.
- Provide convenient parking for visitors.

REFERENCES

Australian Standards – current relevant standards.

AUSTROADS

Guide to Road Design.

Guide Policy for the Geometric Design of Major Urban Roads.

Guide to Traffic Engineering Practice:

Contemporary Urban Design guidelines will be considered as references.

2.1.1 Consultation

Designers are encouraged to consult with the City of Palmerston (CoP) and other relevant authorities prior to or during the preparation of the design. Designers should in addition to requirements of this Guideline ascertain specific requirements of these authorities as they relate to the road and pathway designs in hand.

2.2 ROAD DESIGN CRITERIA

2.2.1 Design Speed

The design speed for the geometric design of roads shall be as nominated in **Table 2.1** unless otherwise approved by the Director of Technical Services. The development layout should be designed so as to achieve the desired speed environment. The use of Traffic Control Devices to regulate speed in lieu of a suitable road layout is not permitted.

2.2.2 Longitudinal Grade

The desirable **maximum** longitudinal grade on roads, including kerb grades are as follows:

Residential Sub-arterial Roads	6%
Other Residential Roads	6%
Industrial Roads	6%

Where topographical constraints or other factors require deviation from these maxima, consideration will be given to a change in the maxima. Alternate grades are subject to the developer demonstrating adequate road safety and disabled access along pathways.

The desirable **minimum** longitudinal grade on roads, including kerb grades is 1.0% for roads that do not contain 300mm gutters; and absolute minimum grade 0.5% for roads that utilise 300mm gutters.

The Consultant shall include in the Design Report details of any areas where road grades are above or below the desirable criteria listed above along with explanations for why the desirable criteria were not achieved.

Table 2.1 Street and Road Hierarchy Design Criteria

Road Hierarchy	Classification	Catchment Size[1] (dwellings)	AADT[1] (vpd)	Road Reserve Width (Min)	Carriageway Width (Min)	Verge Width (Min)	Footpath	Design Speed (km/h)
Minor Road	P > 17 note[3]	< 25	150	15m	6.0m	4.5m	1 side	50
	P < 17 note[3]			16m	7.0m	4.5m		
Local Access Road		< 60	1000	16m	7.0m	4.5m	1 side (min)	60
Collector	**Secondary**	< 250	2500	18m	8.0m	5.0m	Both sides	60
	Primary	< 400	3000	21m	11.0m	5.0m	Both sides	60
Sub Arterial[2]	**Single Lane**	> 400	> 3000	21m	11.0m	5.0m	Both sides, 1 side as a shared ped/cycle	Note[2]
	Dual Lane			27m	17.0m	5.0m		
Industrial Access		< 8Ha		21m	11.0m	5.0m	1 side	60
Industrial Collector		< 30Ha		23m	13.0m	5.0m	Both sides	60

[1] Primary criteria is the road function, road hierarchy catchment and traffic are guides only.

[2] Sub Arterial size varies dependent on projected traffic use.

[3] Refer to Part 2 clause 2.2.6 for P

2.2.3 Horizontal Alignment

Horizontal alignment should comply with the requirements AUSTROADS Guide to Road Design.

Designers should ensure that, for a given design speed, the minimum radius of curvature utilised is such that drivers can safely negotiate the curve. Curves that progressively tighten produce an uncomfortable sense of disorientation and alarm. Sudden reverse curves that drivers cannot anticipate also have a potential to cause similar conditions.

The horizontal alignment shall ensure adequate sight distances where sight lines are kept within the road reserve boundaries.

2.2.4 Vertical Curves

Vertical curves should be used on all changes of grade where the algebraic change of grade exceeds:

Sub Arterial Roads	0.6%
Other Roads	0.8%

Vertical curves should be designed to conform generally with the requirements of AUSTROADS Guide to Road Design.

Drainage poses a practical limit to the length of sag curves and a maximum length (in metres) of 15 times the algebraic sum of the intersecting vertical grades should be adopted. This is to avoid water ponding in excessively flat sections of kerb and gutter. A minimum grade of 0.5 per cent should be maintained in the kerb and gutter.

Every effort should be made to provide vertical curves as long as possible, for improved appearance.

In general, a minimum 10m vertical curve shall be provided where the side road joins the through road at three way intersections. Concrete inverts are not to be used.

The three dimensional coordination of the horizontal and vertical alignment of a road should be aimed at improved traffic safety and aesthetics. The following principles should be applied:

- The design speed of the road in both horizontal and vertical planes should be of the same order.

- Combined horizontal and vertical stopping sight distance and minimum sight distance should be considered three dimensionally.
- Sharp horizontal curves shall not be introduced at or near the crest of a vertical curve.
- Horizontal curves should leave the vertical curve and be longer than the vertical curve.
- A short vertical curve on a long horizontal curve or a short tangent in the grade line between sag curves may adversely affect the road's symmetry and appearance.

2.2.5 Crossfalls

Pavement cross fall shall generally be 3% from the centreline for crowned roads and from kerb to kerb on one way cross fall roads.

One way cross fall shall be avoided on all undivided roads and will not be approved on arterial, sub-arterial and collector roads and for all undivided roads in industrial subdivisions. On divided carriageways with central medians (e.g. on sub-arterial roads) one way cross fall may be adopted, particularly where it is being used to achieve WSUD.

On minor and local access roads, where one way cross fall is impossible to avoid, drainage connections shall be provided to each allotment on the high side and all internal lot drainage shall be directed to the collection point. The collection point shall be designed to take the 'initial storm' as specified in section 3, Stormwater Drainage.

Where one way cross fall is proposed, reasons shall be included in the design report and will only be approved at the discretion of the Director of Technical Services.

Verge cross fall shall be 2% minimum to 5% maximum fall towards the kerb.

2.2.6 Cross Section

Cross section criteria are summarised in **Table 2.1**. Typical Cross Section drawings are appended as **Appendix A**.

The cross section for sub-arterial roads will be based on the consideration of the ultimate traffic for the road, and the planned mix of traffic generating land uses. Consultation with the CoP is encouraged.

Where allotments adjoining a minor road include MR or MD lots, and P < 17, the minor road reserve shall be 16m wide, and the minor road pavement between nominal kerb lines 7m wide.

P = ((L-6) x 2)/D

L = length of the minor road along centreline from intersection with local road to culdesac head (or next local road). (in metres)

D = Dwelling units = sum of SD lots + total number of MR and MD units.

Road widths and carriageway widths shall take into account requirements for public transport. A Master Plan showing the location of all proposed bus routes and bus stop locations which shall be developed in liaison with Public Transport and submitted to the CoP for review and consideration. Where desired road widths do not adequately cater for on street parking and bus stops, indentations shall be provided at bus stops to the satisfaction of Council. The master plan shall also indicate where sheltered bus stops are to be provided and/or where bus stops include other types of street furniture (e.g seats, bins etc).

Indented bus bays are to be constructed with concrete pavement.

Selection of road cross section widths shall consider the requirements of cyclists and other vulnerable road users.

Cul-de-sac Turning Area – Residential

Cul-de-sac turning areas shall be circular in shape. Council will not accept t-shape or any other geometry for turning areas. For circular turning areas at the head of cul-de-sacs, the acceptable kerb radius is 9.0 metres. The space reserved for special services shall not be reduced because of the increased width of road pavement at the head of a cul-de-sac.

Cul-de-sac Turning Area – Industrial

Cul-de-sacs are considered undesirable in an industrial subdivision and will generally not be approved by Council. Where a cul-de-sac cannot reasonably be avoided, and at the discretion of

the Director of Technical Services, approval may be given for its use. Lots should generally be of a smaller size so as not to encourage industry which would attract heavy transport.

Turning areas in industrial cul-de-sacs shall be circular. The minimum acceptable kerb radius is 13.5 metres which will preclude the turning around of road trains.

The space reserved for services shall not be reduced because of the increased width of road pavement at the head of a cul-de-sac.

2.2.7 Intersections

All new intersections of Access Places, Access Streets and Collector Streets, shall be three way (T) intersections designed and located in accordance with the AUSTROADS Guide to Road Design.

Staggered three way (T) intersections will be separated as far as practicable but desirable minimum distances are:

- Local Access 50m*
- Collector 80m
- Sub-arterial 200m

* Where sight distance is adequate, and the subdivision layout warrants, the intersection separation distance for local access roads may be reduced to 30m subject to approval by the Director of Technical Services.

Crossroad intersections will not be approved without the installation of a roundabout as a minimum treatment. Other controls (e.g. signalised intersections) may be considered by the Director of Technical Services where considered appropriate based on road hierarchy and traffic.

Y intersections are not acceptable.

At all intersections the through road shall maintain its cross section. The terminating road shall match its longitudinal gradient to the pavement cross fall of the through road.

2.2.8 Kerb and Gutter

Layback kerb shall be used on all minor, local access and secondary collector roads.

Standard barrier kerb and gutter shall be used on primary collectors and sub-arterial roads as well as adjacent to all reserves and general open space.

Kerbs shall generally not be constructed on roads in rural subdivisions except at all intersections where kerbs shall be required to at least the tangent points on all intersection radii.

Kerb and gutter is to be provided at intersections at the following minimum turning radii.

Residential	
Local Access Road	8m
Collector Road	10m
Sub-arterial Road	15m
All Industrial Roads	20m

Wherever practical, the minimum kerb and gutter grade around quadrants at intersections should be 0.7%.

All kerbs shall be constructed on a minimum of 50mm thickness FCR with subgrade compacted to 95% MMDD and sub base compacted to 98% M.M.D.D. The FCR is required to establish hydraulic connection between the road pavement and the subsoil drain system.

Expansion joints (12mm) are required to be installed in the kerb and gutter at the turning point of kerb returns. The joints are to be filled with an appropriate flexible-jointing compound.

2.2.9 Traffic Islands

Traffic Islands shall be designed in accordance with the AUSTROADS Guide to Road Design.

Traffic Islands shall be a minimum width of 1200mm; and 2500mm where pedestrian refuge is being provided.

Traffic islands to be surrounded with mountable kerbing. Island infill to be:

- Islands 2500mm wide or larger – landscaped.

- Otherwise islands to be full depth concrete with appropriate reinforcing. Minimum thickness for concrete infill is to be 150mm with SL82 reinforcing.

Subsoil drainage is to be provided behind the kerb for all islands including concrete filled.

2.2.10 Vehicle Access

A vehicle access or cross over is to be provided for each allotment in accordance with the City of Palmerston Standard Drawing 3598-001 (**Appendix A**).

The width of accesses shall be as follows in **Table 2.2**

Allotment Type	Width	Concrete Min Thickness	Reinforcing (Min)
SD Residential	3.5m [1]	100mm	SL72
Multi Residential	6m [2]	100mm	SL72
Commercial	6m	150mm	SL82
Industrial	6m	200mm	SL92

[1] Access strips for lots on Minor and Local Access Roads to be Tapered type

[2] Driveway to 6m wide for the first 6m inside the property boundary.

Table 2.2 Access Requirements

2.2.11 Access to Open Space

General vehicle access to public open space is not permitted. Controlled vehicular access shall be provided for the purposes of maintenance, and emergency vehicle access.

The location and number of accesses required shall depend upon size, shape and location of each open space. The following gives an indication of the requirement in each open space area:

- A minimum of one service access shall be provided.
- Accesses should be spaced at a maximum of 300m in elongated areas.
- It is preferred that access is from a sub-arterial or collector road rather than an access road.
- Access points shall contain barriers that are removable and lockable.

2.2.12 Entry Statements

Where it is proposed to construct an alternative road surface treatment such as a form of subdivision entry statement or as a special feature throughout the subdivision, plans and specifications for the alternative treatment are to be submitted to the Director of Technical Services for approval.

Surface treatments that may be approved include; exposed aggregate and coloured concrete pavements; and coloured asphalt.

2.3 PATHWAYS DESIGN CRITERIA

Pathways and associated facilities shall be designed to comply with all relevant disabled access legislation, regulations and standards, including AS1428 Design for Mobility and Access. Where exceptions are sought application for exemption to the CoP for approval is necessary.

Pathways including footpaths and cycle paths shall be designed to provide a logistical network throughout the development, and providing connection to the networks of surrounding development.

2.3.1 Pathway Location

The location of footpaths should consider the following:

- The shortest route
- Require the least road crossings
- On the bus stop side of bus routes
- Achieve appropriate grades (cross fall and longitudinal)
- Be appropriately lit
- Achieve linkage to open space and other facilities.
- Contribute to CPTED principles.

Footpaths shall be located to be compatible with service corridors in the road verge. Cross section details are to be approved by all service authorities.

Footpaths will be typically located at a 500mm offset from the property boundary.

The requirement for footpaths within the road network is shown in **Table 2.1**.

In addition footpaths shall be provided adjacent to:

- Unit and/or flat developments,
- schools,
- shops,
- major areas of open space,
- playing fields.

A Master Plan showing all footpaths shall be submitted to the CoP Director of Technical Services for approval prior to the commencement of any stage of a Development.

The Master Plan shall show all paths and links throughout the entire development, not just an individual stage.

2.3.2 Footpath Section

Footpaths shall be a minimum 1.5 metres wide in all roads and open space areas.

Footpaths shall widen to 2.5 metres minimum width in the vicinity of meeting points, schools, shops and other activity centres – the length of 2.5 m wide sections are to be agreed with Council in the concept development/preliminary design phase.

Footpaths in all areas shall be minimum 100mm thick concrete pavement with SL72 reinforcement mesh (centrally placed).

Subgrade preparation for footpaths shall include the compaction of 150mm thick subgrade zone of suitable material with CBR ≥ 15 to 95%MMDD as a minimum.

2.3.3 Pedestrian Open Space Links

Pedestrian links between roads, and roads and open spaces may be required to provide a logistical pedestrian network.

Landscaped open space shall be provided wherever pedestrian linkages are required and shall have a minimum width of 15 metres. Narrow laneways will not be approved at any location within a development.

Pedestrian linkage reserves shall, where possible, serve as cut off drains and flood surcharge routes. Stormwater design criteria for these links is provided in Section 3.2.2 and Table 3.2.

2.3.4 Pedestrian Access Ramps

Access for people with a disability is to be provided at all kerb crossings where footpaths and shared pedestrian/cycle paths cross roadways. The access ramps shall conform to current standards for access for persons with a disability.

Typically crossing points will be at intersections or where designated paths change from one side of a road to the other.

The location of pedestrian crossings is to be considered for ease of use by pedestrians, location where traffic can observe pedestrians at crossings with sufficient time to react appropriately; and where visual backgrounds do not 'hide' pedestrians.

2.3.5 Cycle Paths

Cycle paths shall be designed in accordance with Austroads Guide to Geometric Design and Australian Standard AS 1742.9 Manual of Uniform Traffic Control Devices

Shared use paths (pedestrian and cyclist) are relatively efficient in use of space. Due to the safety risks from vehicular traffic accessing lots shared paths should be located along roads where there are limited vehicle crossovers, or, on the public reserve side of a roadway adjacent to parkland.

Shared use paths shall be designed in accordance with the Austroads guide for pathways. Construction of shared use paths shall be concrete as detailed for footpaths.

Cycle paths (either shared or separate in high demand situations) are required in parklands and reserves to provide links within the development to the cycle and pedestrian network.

2.4 ROAD PAVEMENTS

The objective in the design of the road pavement is to select appropriate pavement and surfacing materials, types, layer thicknesses and configurations to ensure that the pavement performs adequately and requires minimal maintenance under the anticipated traffic loading for the design life adopted.

2.4.1 Reference Documents

Structural pavement design should be completed by an accepted pavement design process such as Austroads.

2.4.2 Design Variables

The design of the pavement shall involve consideration of the following five input variables:

- Design Traffic
- Subgrade Evaluation
- Environment Factors
- Pavement and Surfacing Materials
- Construction and Maintenance Considerations

2.4.3 Design Traffic

The minimum design life for pavement design shall be 30 years.

Unless determined otherwise by the Director of Technical Services, the minimum number of design Equivalent Standard Axles (ESA's ie, 80 kN axle load passes) for the various road categories shall be as calculated in accordance with the requirements of the AUSTROADS publications.

Design traffic shall be calculated for the applicable design life of the pavement, taking into account present and predicted commercial traffic volumes, axle loadings and configurations, commercial traffic growth and street capacity. For new subdivisions, the design traffic shall take account of the construction traffic associated with the subdivision development, the in-service traffic, proposed and potential public Transport routes and connection to adjacent development.

The pavement design shall include all traffic data and/or assumptions made in the calculation of the design traffic.

The minimum requirements for design traffic are for road classifications are listed in **Table 2.3**:

Table 2.3 Minimum Design Traffic and Surfacing Thickness

Road Classification	Residential Design Traffic (ESA)	Industrial Design Traffic (ESA)	Min Depth of Asphalt Surfacing
Sub-arterial	1.0×10^6	5.0×10^6	30mm
Collector	5.0×10^5	2.0×10^6	30mm
Local Access Road	5.0×10^4	8.0×10^5	30mm
Minor Road	8.0×10^3	6.0×10^4	30mm

Consultation with CoP to confirm the likely waste collection traffic is encouraged.

2.4.4 Subgrade Evaluation

Subgrade evaluation shall be carried out by a NATA registered materials test authority on each different natural sub-grade material evident and shall be by the conduct of soaked 4 day CBR laboratory testing.

Design CBR for each subgrade area shall be determined in accordance with the method outlined in the AUSTROADS publications.

The following factors must be considered in determining the design strength/stiffness of the subgrade:

(a) Sequence of earthworks construction
(b) The compaction moisture content and field density specified for construction
(c) Moisture changes during service life
(d) Subgrade variability
(e) The presence or otherwise of weak layers below the design subgrade level.

The subgrade Design CBR adopted for the pavement design must consider the effect of moisture changes in the pavement and subgrade during the service life, and hence consideration must be given to the provision of subsurface drainage in the estimation of equilibrium in-situ CBRs, and hence in the design of the pavement structure.

If the insitu subgrade test results in a CBR of less than 5%, the pavement is to be designed with input from geotechnical engineer experienced in the design of road pavements.

Where the insitu subgrade tests results in a CBR of greater than 10, pavement design shall adopt a subgrade strength of CBR 10.

2.4.5 Environmental Factors

Environmental factors, which significantly affect pavement performance, are moisture and temperature. Both of these factors must be considered at the design stage of the pavement.

The effect of changes in moisture content on the strength/stiffness of the subgrade shall be taken into account by evaluating the design subgrade strength parameters (i.e. CBR or modulus) at the highest moisture content likely to occur during the design life, i.e. the Design Moisture Content. The provision of subsurface drainage may, under certain circumstances, allow a lower Design Moisture Content, and hence generally higher Design CBR.

The pavement design shall include all considerations for environmental factors, and any assumptions made that would reduce or increase design subgrade strength, or affect the choice of pavement and surfacing materials.

2.4.6 Pavement Structure General

The preferred road pavement material is a manufactured crushed rock material in accordance with the NT Government standard specifications for roadworks.

Sub grade materials requirements, preparation, and compaction shall comply with the requirements of the NT Government (Department of Infrastructure) standard specifications.

Subsoil drainage is required for the full perimeter of all new road pavements. All road islands shall incorporate subsoil drainage.

Regardless of the outcomes of the pavement design process the minimum pavement thickness to be adopted is 150mm (excluding surfacing).

2.4.7 Approval

The pavement design including all assumptions and calculations, subgrade assessment, materials properties, and technical specifications shall be submitted to the CoP Director of Technical Services as a Pavement Design Report for approval.

2.5 ROAD SIGNS AND MARKING

All road signs, warning signs, regulatory signs, direction signs and road marking shall be designed and provided in accordance with AS 1742 Manual of Uniform Traffic Control Devices.

Use reflective High Intensity grade reflective material for all signs. This material is classified Type III in the Manual of Uniform Traffic Control Devices.

As a minimum the following signage and marking shall be provided:

- street name signs at each intersection (the colours shall be white background with black lettering and in accordance with CoP's standards which are shown in **Appendix B**),
- warning signs at the approach to all hazards,
- "keep left" signs at the approach end of the first island at all channelled intersections and at all median openings,
- separation lines on sub-arterials and collectors,
- double unbroken lines on road centreline at locations on two-way roads where the sight distance available is less than the desirable minimum,
- at a temporary termination of road construction, such as a subdivision or stage boundary, a diagonal striped sight board shall be erected,
- holding lines at T intersections and
- other traffic control devices necessary for effective traffic control and any traffic control devices required by the Director of Technical Services.

Line marking is to be applied with a minimum of two (2) coats. The first coat is to be applied at Practical Completion; and the second coat six (6) months later.

3.0 STORMWATER DRAINAGE AND QUALITY

This section sets out the guidelines for the design of stormwater drainage systems within the City of Palmerston.

The designer should make reference to the design guideline Section 2 Roads and Pathways.

3.1 GENERAL DESIGN PHILOSOPHY

The objectives of stormwater drainage design are as follows:

a. To collect and convey stormwater from a catchment to its receiving waters with minimal nuisance, danger or damage and at a development and environmental cost which is acceptable to the community as a whole.
b. Limit flooding of public and private property, both within the catchment and downstream, to acceptable levels. Refer to Section 3.2 and Table 3.1.
c. To provide convenience and safety for pedestrians and traffic in frequent stormwater flows by controlling those flows within prescribed velocity/depth limits. Refer to Section 3.2.2 and Table 3.2.

The stormwater drainage design shall be based on a system of sealed road, kerb and gutter, entry pits, underground drainage, and a system of floodways located in open spaces or drainage reserves.

Floodways on land to be released for residential or commercial purposes will not be approved.

Drainage systems for developments shall be designed to cater for **both** the initial storm event, and the major storm event.

3.1.1 Consult with City of Palmerston

Drainage proposals for new developments and subdivisions should be discussed with Technical Services of the City of Palmerston prior to making a Development Application. The drainage proposal will summarise investigations and address

- Drainage requirements for initial and major storms;
- Consider upstream and downstream catchments;
- Identify upgrades necessary for existing drainage infrastructure;
- Identify necessary floodways, including easements and appropriate safety measures as required;
- Provide design velocities with proposal;
- Indicate the type and location of WSUD features.

The drainage proposal will be the basis for a Drainage Master Plan to be provided to the Director of Technical Services for approval prior to the commencement of the first stage of the development or subdivision.

3.1.2 Allotment Drainage

Stormwater drainage from residential lots may be discharged across the lot surface to the road reserve or main drainage system.

Cases where direct discharge from lots is not permitted are:

- Where internal lot drainage concentrates the flow of stormwater, for example down pipes.
- Residential lots of area less than 600m^2;
- High density residential;
- Medium density residential of four (4) or more units;
- All lots with a zero lot line;
- Commercial and Industrial lots;

In these cases, internal lot drainage will have to be collected within the allotment in an underground drainage system, and connected to the City of Palmerston drainage system to the satisfaction of the Director of Technical Services. The capacity of the allotment drainage system

pipes shall be sufficient to cater for the initial storm. Major storm flows shall be discharged to the adjacent public drainage system (usually a road reserve).

Drainage shall not be directed from one lot to another. Where the topography is too steep for practical lot regrading, the Developer shall seek approval from CoP for alternative arrangements.

3.1.3 Public Drainage Reserves

Public drainage reserves are comprised of open surface drains and road reserves.

Road reserves are primarily for safe access to allotments by vehicular and pedestrian traffic. Public amenity and safety shall be paramount in design considerations. (refer to **Section 3.2.2**)

Environmental considerations and the control of biting insects are to be included in the design for all drainage infrastructure. The design of subdivisions must be undertaken in consultation with the NT Department of Lands Planning and the Environment, the Department of Land Resource Management, the Department of Health, and other relevant agencies.

Where tidal action may influence drainage outlets or outfalls, additional appropriate analysis to ensure major storm criteria are met, and the minor system is not impacted.

3.1.4 Catchments and Drainage Networks

Where a new development is discharging to an existing drainage system the Developer is to:

- Investigate the capacity of the complete drainage network to receive runoff from the development, and prepare an overall drainage plan;
- Where the runoff from the new development will exceed the capacity of the drainage network the Developer shall either,
    - Detain surplus runoff within the development, or;
    - Upgrade the capacity of the network to the satisfaction of the Director of Technical Services.

Where a new development is upstream of privately owned land, the Developer is to, at no cost to the CoP:

- Arrange to construct or upgrade the drainage system as necessary, and;
- Arrange easements as necessary over the route of the drainage system in favour of the City of Palmerston to the legal point of discharge.

Where an upstream catchment discharges to the new development, the drainage system of the new development must cater for the ultimate flows from the upstream catchment.

3.1.5 Flood Management

The aim of the stormwater management system is to achieve post development peak flows in the design event close to the pre development peak flows.

Control of the peak discharge with retardation or detention systems may be required.

3.2 DESIGN CRITERIA

GENERAL

- The design of the stormwater system shall conform to the methods described in Australian Road Research Board Special Report No. 34 (ARRB).
- Minor system flows created by the initial storm are to be conveyed underground to a legal point of discharge unless otherwise approved by the Director of Technical Services.
- The design of the stormwater drainage system, for the development shall be such that upstream drainage is not adversely affected, and the downstream drainage system is capable of adequately catering for the discharge as a result of the development.
- All works proposed within creeks and natural water courses, or lands under the control of other statutory authorities must have the approval of all relevant authorities prior to the commencement of works. Evidence of such approvals shall be provided with the design submission.
- The design of the stormwater drainage system shall accommodate future fully developed peak flows from upstream catchments on the basis of development in accordance with the Northern Territory Planning Scheme.
- The designer shall be responsible for assessing the existing and future developed flow regime entering the development site from upstream catchments and shall provide detailed calculations with the design submission.
- All materials and components of the stormwater drainage system shall be durable and fit for purpose with a minimum design life of 100 years.
- The hydraulic grade line (HGL) for a piped system shall be a minimum of 150mm below ground surface level in side entry pits, and 150mm below the ground surface in junction boxes, access chambers, and other structures during the initial storm event.
- Subsoil drainage is essential in road reserves and shall be provided in accordance with this guideline.

3.2.1 Design Probability - Average Recurrance Interval

The design Average Recurrance Interval (ARI) for the stormwater systems is given below in

Table 3.1 Recommended Design Average Recurrance Interval

Table 3.1 Recommended Design Average Recurrance Interval

MAJOR SYSTEM DESIGN ARI (years)		100
MINOR SYSTEM DESIGN ARI (years)		
Development Category		
Central Business and Commercial		10
Industrial		10
Urban Residential High Density (>20 units/Ha)		5
Rural Residential		5
All other categories		2
Major Road	Kerb and gutter Flow	10
	Cross Drainage (culverts)	50
Other Roads	Kerb and gutter Flow	Refer to relevant development category
	Cross Drainage (culverts)	10

Developers and Consultants shall be responsible for determining suitable run-off coefficients and catchment characteristics for a drainage system based on the ultimate development of all allotments to the relevant land zoning.

The minimum of time of concentration for an allotment shall be 5 minutes. Fully developed catchments shall be considered when determining the catchment time of concentration and the resulting critical storm durations and consequent storm water flows.

The design rainfall intensity for the calculated storm duration is to be determined from the appropriate sections of Australian Rainfall and Runoff.

3.2.2 Use of Roads, Open Space and Drainage Reserves for Storm Runoff

Table 3.2 Flow Criteria

Road or Space	Minor System Criteria	Major System Criteria
Residential		
Minor/Local Access	• Flow should not overtop kerb. • Flow width ≤ 2.5m from kerb	• Flow contained in road reserve boundaries. • Max depth 400mm • DxV* ≤ 0.45
Collector	• Flow should not overtop kerb. • Flow width ≤ 2.5m from kerb • Min. 3m of road pavement free of inundation.	• Flow contained in road reserve boundaries. • Max depth 400mm • DxV* ≤ 0.45
Sub-arterial	• Flow should not overtop kerb. • Flow width ≤ 2.5m from kerb • Min. 3m of road pavement free of inundation in each direction of traffic.	• Flow contained in road reserve boundaries. • Max depth 400mm • DxV* ≤ 0.45
Open Space & Drainage Reserves	• Flow to be contained in formal drain section. • Flow velocity < scour velocity.	• Flow contained within boundaries. • V* ≤ scour velocity
Pedestrian Linkages	• Pathways to be free of inundation. • Min 1.0m width next to boundaries free of inundation.	• Flow contained within boundaries. • Max depth 400mm • DxV* ≤ 0.45
Industrial/Commercial		
All Roads	• Flow should not overtop kerb. • Min. 3m of road pavement free of inundation.	• Flow contained in road reserve boundaries. • Max depth 400mm • DxV* ≤ 0.45
Rural and Semi Rural		
All roads	• Flow contained in road side drains	• Flow contained in road reserve boundaries. • V* ≤ scour velocity (drains)

* D= Depth (m); V= velocity (m/s)

3.3 DRAINAGE STRUCTURES

All drainage structures including pipes, culverts, pits and open drains shall be constructed in accordance with the CoP Specification for Civil Works and these guidelines. All structures where entry by a person is possible are to be fitted with safety grates to the satisfaction of the City of Palmerston. Open drainage structures are to be fitted with features that assist persons within the flow to exit the open drain structure.

Design of such structures is to consider the impact of the safety grates becoming blocked.

Standard drawings exist for drainage structures however, alternatives including precast concrete inlet structures may be used subject to approval by the Director of Technical Services.

Drainage structures shall have a minimum fall across the bottom of each pit of 30mm.

3.3.1 Side Entry Pits

The spacing and size of side entry pits shall be designed to achieve the flow criteria specified in **Table 3.2**.

Side entry pits (SEP) should be located at all road low points and immediately upstream of intersections and pedestrian crossings. An additional side entry pit is to be located 200mm higher than the SEP at the bottom of the sag low point.

Side entry pits shall be located to avoid conflict with driveways on new allotments. To avoid conflicts a Master Plan shall be produced prior to commencement of development works which shall show the nominated location for driveways at each new allotment. Rectification of clashes between driveway locations and pit locations shall be undertaken by the property owner at their expense.

Additional pit requirements:

- clearance between the kerb invert and the underside of the lid or lid support shall be 100mm (+/- 5mm); and
- deflectors shall be used within the water kerb table at all site entry pits (with the exception of pits located at sag low points.

The location of stormwater pits on intersection tangent points or within the kerb radius at intersections shall be avoided. In the event that there is no suitable alternative, stormwater pits located in these areas shall be fitted with heavy duty frames and lids to provide protection from damage by wheel loads.

The design of the drainage system and side entry pits shall incorporate blockage factors for the pits.

Other factors to be considered in the design of the pits and drainage system are:

- pits to be free draining;
- reduction in pipe sizes downstream of pits shall not be permitted;
- pipeworks openings are to be located within in a single wall of the pit. That is pipes shall not be permitted to enter through the corners of a pit structure.

The desirable maximum inlet pit depth should be limited to 1.5 metres for access purposes.

The desirable stormwater access pit depth is to be minimum 1.2 metres and maximum 3.0 metres.

Inlet pits should be located at the mid-point of allotment frontages to minimise the likelihood of conflict with service conduits and future driveways.

3.3.2 Junction Pits and Kerb Side Access Chambers

Junction pits or kerb side access chambers shall be constructed at all pipe junctions and at changes in direction, grade or diameter of pipe where there is not already a side entry pit or other inlet pit.

On long lengths of constant size and grade, junction pits shall be constructed at maximum 90 meter intervals for cleaning and maintenance purposes. A closer spacing may be required by the Director of Technical Services in some instances and these shall be included in the design.

3.3.3 Grated Inlet and Letterbox Inlet Pits

Grated inlet pits maybe permitted, subject to maximum depth of standing water in blockage situation of 300mm and relief is provided in the event of a blockage.

Letterbox inlet pits are preferred.

3.3.4 Underground (Blind) Pits

Underground pits or junction chambers are not permitted.

3.3.5 Pipes and Culverts

Stormwater drainage pipes and culverts shall be reinforced concrete including fibre reinforced concrete manufactured and tested to Australian Standards. Pipes shall be in accordance with the following:

- minimum diameter for stormwater pipes in road reserves is 375mm;
- minimum class of pipe is Class 2 concrete;
- concrete pipes shall have sealed joints, such as rubber ring joints or external bands;
- minimum clear cover shall be 600mm in general or in accordance with the manufacturers specification;
- the minimum vertical and horizontal clearance between stormwater pipe or any other pipe or service conduit shall be 150mm;
- pipes which are the responsibility of Council but located on private property are to be laid centrally within easements granted to Council. The minimum easement width shall be 3 meters;
- pipes located within private property shall be a minimum pipe size of 375mm diameter sewer grade PVC; and
- in areas of high water table the designer must consider buoyancy in relation to pipe and culvert joints.
- Invert levels of pipe outlets shall be above any receiving water body to allow for positive discharge.

3.3.6 Catch Drains

Where undeveloped land slopes towards the development, open catch drains shall be provided in open space, walkways, drainage reserves and at the rear of allotments. Catch drains in urban residential areas shall be concrete lined unless it can be demonstrated that the flow velocities and soil properties will not be susceptible to scour. In those situations, drain shall be lined with suitable dry land grass, with a 1 metre wide concrete invert.

In rural subdivisions grass catch drains with 1 meter wide concrete inverts may be permitted.

Where deflections in drain alignments are necessary, horizontal curves with a minimum 5 meter radius shall be provided.

Easements are required over all drains and associated structures within allotments. Where water drains from Council land then the easement is to be in favour of Council; otherwise the easement is to be in favour of the land it serves.

3.3.7 Stormwater Property Connections

A dedicated underground drainage connection, designed to collect drainage during the initial storm, shall be provided for in accordance with the requirements of 3.1.2.

3.3.8 Inter Lot Surface Drainage

Inter lot surface drainage will not be approved.

Where practical allotments should be graded towards the adjacent servicing road or drainage reserve.

Justification for internal drainage as described shall be provided for consideration in the Design Report.

All drainage infrastructure located on private land which falls under City of Palmerston responsibility, must be located within an easement. The easement minimum width is 3 metres.

3.3.9 Subsoil Drainage

Subsoil drainage is required in all road reserves to protect road infrastructure from the effects of groundwater seepage. Where necessary, subsoil drainage shall also be incorporated into new allotments, walkways, drainage reserves and open space to ensure adequate protection of buildings, structures and public amenities from groundwater. The Developer/Consultant shall be responsible for undertaking a detailed investigation to determine the scope of drainage works required. In any case, sub-soil drainage shall be provided as directed to the satisfaction of the Director of Technical Services.

Subsoil drains within road reserves shall include a trench extending below the pavement sub grade level containing even sized, hard, durable aggregate and a slotted pipe or strip drain at the invert of the trench. The entire trench shall be wrapped in a suitable geotextile.

If groundwater seepage problems occur in the developed area within the 3 year defects liability period, the developer is responsible to carry out remedial works to ensure that each lot remains suitable for its intended residential use.

The developer is responsible for future problems caused by unforeseen seepage problems in road infrastructure. Any failure resulting from high wet season ground water levels shall require sub-soil drainage to be installed by the developer at their cost.

3.3.10 Major Open Drains

Generally open drains will only be permitted where they form part of the trunk drainage system. The design of open drains is to ensure public safety and amenity is a priority.

Open unlined drains will not be approved.

Open drains shall be lined with appropriate dry land grasses as a minimum and have a concrete invert of 2m width minimum; provided flow velocity is less than 1.0 m/s and the natural soils are demonstrated to be non- erosive.
For all other conditions additional scour protection will be required to the satisfaction of the Director of Technical Services.

Open drain design shall conform to the following criteria:

- major storm flows (100 Year Average Recurrence Interval) from contributing catchment;
- provide a minimum 150mm free board at design flow;
- maximum permitted flow velocity 1.5 m/s;
- utilise a low flow pipe of minimum 300mm diameter;
- where drop structures are employed to control slope and velocity, the designer shall consider the potential for additional scour and erosion, associated maintenance issues and public safety;
- profiles of grass lined drains to be such that mowing can be achieved with tractor mounted equipment, to the satisfaction of the CoP Director of Technical Services;
- Subsurface drainage shall be provided in grass lined drains to preclude the creation of boggy saturated areas, and mosquito breeding sites. Alternatively concrete inverts may be used, minimum width 2 metres side slopes no steeper than 1 to 6 on grass drains;
- side slopes no steeper than 1 to 6 on grass drains;
- all other drains no steeper than 1 to 4, unless otherwise approved by the Director of Technical Services;
- maximum depth of open drain 1 metre, 850mm flow depth plus 150mm free board;
- drains to only retain water during storm conditions, with the exception of ornamental lakes and wetlands;
- Concrete lined open drains must be fenced. Fences shall have suitable gate provision to permit access for maintenance purposes.

Other safety measures may be required by the CoP Director of Technical Services.

3.3.11 Rural and Semi-Rural Subdivisions

Stormwater drainage to be provided in accordance with Australian Rainfall and Runoff (Engineers Australia).

Typical stormwater system for rural and semi-rural areas is open drains with 2m wide concrete inverts along roads in road reserves, and concrete lined drains through drainage easements.

Pipes and culverts in roadside drains for driveway crossovers are to be sized so as not to restrict the drain design capacity.

Scour protection is to be provided at the change of direction, drop structures and at the inlet and outlet to pipe culvert structures.

All culverts under roads and driveways to have standard headwalls.

3.4 WATER SENSITIVE URBAN DESIGN

Where WSUD is determined necessary, the Developer shall adopt WSUD and sustainable development principles in the design of stormwater drainage systems for a subdivision development in consultation with the CoP.

3.4.1 Stormwater Quality Management

The management of water quality is based on the need to protect the baseline water quality to ensure there is no risk to public health, and to minimise stresses placed on the ecosystems of the development, and ecosystems reliant on water ways within the development.

The primary aim for water quality management is to minimise the potential for development activity to cause harm to the environment, including receiving waters.

The key principles adopted for water quality management to achieve the objective are:

- Minimisation of increase in flows arising from the development of land for urban use;
- Stabilisation of stream profiles to maintain hydraulic capacity and ensure public safety;
- Ensuring that the quality of the water within the waterways throughout each catchment is consistent with the ecological needs of the environment and the health needs of the community, and that environmental values are preserved;
- Vegetative enhancement of the riparian zone to ensure the overall stability of the waterways throughout each catchment and improve its resistance to contaminants;
- Adoption of appropriate management practices for the control of erosion and sedimentation for the period that a development site is disturbed

Site based infrastructure will be required to address the impacts on water quality of development activity, and will be focussed on gross pollutants such as trash, sediment, hydrocarbons prior to their entry into drainage systems and waterways. Site based issues can be dealt with by interception solutions (stormwater quality interception devices) which may include;

- Proprietary interceptors
- Trash racks;
- Sedimentation basins
- Retention lakes etc.

The interception devices are to be designed in accordance with Australian Rainfall and Runoff, Australian Runoff Quality and other relevant design guides. The locations of these devices are to suit the drainage system requirements, and the CoP. The design of the devices is to cater for the first flush runoff, which is defined as the volume of water equivalent to the runoff from the 3 month Average Recurrence Interval storm event (60% of the 1 year ARI storm event)

Stormwater quality interception facilities that may hold water shall be designed with public safety as a primary consideration, and to restrict mosquito breeding and impact on residents. These facilities will require review and approval of the Department of Health.

Stormwater quality interception systems should be located at the source wherever possible. Source location is necessary for commercial and industrial developments.

The Developer shall design an appropriate range of treatments in consultation with the CoP.

Detention and retention basins shall be considered and included as part of the development. The retention system should be designed to control peak runoff to match the capacity of the downstream drainage system. The Director of Technical Services may require additional restrictions at approval stage.

Design of detention and retention basins must take account of the safety of the general public, including the safe egress of persons that may unexpectedly enter the structure. Fencing of all or part of a detention or retention basin may be required at the discretion of the Director of Technical Services.

3.4.2 Erosion and Sediment Control

Designers are required to consider the impacts on water quality resulting from the construction phase of a development for the period from when the site is initially disturbed until it is stabilised by permanent works.

The aim of erosion and sediment control is to minimise the potential for construction activities to cause harm to the environment including receiving waters.

An Erosion and Sediment Control Plan is to be provided as part of the approval process. Formal Review and approval is required by the Department of Land Resource Management.

4.0 LIGHTING

4.1 STREET LIGHTING

Street lighting shall be designed by an electrical engineer that is an Accredited Design Consultant for electrical design for the relevant regulatory authority.

Street lighting design shall conform to the requirements of relevant Australian Standards, including the control of the Obtrusive Effects of Outdoor Lighting.

Design criteria for residential, commercial and industrial land subdivision street lighting are as follows:

- Lighting category to be appropriate for the subject road and classification; and lighting types to be consistent with adjacent surrounding areas and to consider/minimise ongoing maintenance requirements and costs including energy consumption. Confirm lighting category with the CoP Director of Technical Services.
- Lighting shall be provided at the following locations in accordance with the development approval conditions and relevant Australian Standards:
    - Straight Sections;
    - Curves;
    - Intersections and Junctions;
    - Pedestrian Refuges;
    - Cul-de-sacs;
    - Local Area Traffic Management Devices including Roundabouts.
    - Where a pedestrian crossing has been installed it shall be lit in accordance with relevant Australian Standards for lighting at pedestrian crossings.
- Lighting of entry points to pathways and cycleways shall be achieved by the selected placement of a road light nearby.
- Light poles shall not conflict with any infrastructure including stormwater pits, pedestrian crossing points or driveway crossovers. Light poles shall be a minimum of 1 m from the nearest driveway edge.

- Fittings/luminaries, poles/outreaches, rag bolt assemblies/pole footings shall be of a type in accordance with current requirements of the regulatory power authority.
- Public lighting shall not create nuisance to residents.
- The placement of lighting columns shall not occur within 1m of any water main that crosses the road.
- Preference shall be given to energy efficient devices and or low power options (for example LED luminaires) that are accepted by the statutory authority.

Street lighting solutions that are connected to the statutory authority's lighting network are preferred for cost reasons.

4.1.1 Street Lighting Approval Procedure

i. Council will nominate the lighting category for all roads.

ii. The Developer is to submit a Street Lighting plan detailing the nominated road lighting category to the CoP Director of Technical Services which shall contain the following as a minimum:

- the subdivision layout,
- the zoning,
- the location of schools, shops, unit/flat developments, parks, and pedestrian/cycle paths,
- the road lighting category, for each road including a brief description of why the particular road lighting category was chosen,

iii. The Developer incorporates into the design any changes required by the CoP Director of Technical Services.

iv. Design drawings are prepared on PWC title sheets (drawing number/s and street light numbers to be obtained from PWC).

v. The Developer submits the design drawing/s to PWC, together with a copy of the "Certificate of Street Lighting Compliance", for comment and approval.

vi. The Developer submits to the CoP Director of Technical Services a copy of the design drawing/s approved by PWC (for construction), together with a copy of the "Certificates of Street Lighting Compliance" for information.

vii. PWC will inspect works during construction for compliance of materials/fittings used, installation methods and quality of works. A defects list (if applicable) will be forwarded to the CoP Director of Technical Services with all defects to be rectified by the Developer prior to the stage being accepted by Council.

viii. Developer provides certification that the constructed lighting conforms to the Australian Standards and lighting categories approved by the CoP Director of Technical Services.

ix. Developer prepares "As Constructed" drawings in accordance with PWC requirements/standards and submits to both PWC and the CoP Director of Technical Services.

4.2 PATHWAY AND OPEN SPACE LIGHTING

Pathway and open space lighting shall be designed by an electrical engineer.

Pathway and open space lighting design shall conform to the requirements of relevant Australian Standards, including the control of the obtrusive effects of outdoor lighting. The developer should consider opportunities for up lighting and canopy lighting within open space.

Design criteria for pathway and open space lighting are as follows:

- The spacing between pathway lights shall be determined from the luminaire/pole type selected for the adopted pathway lighting category.
- Pathway intersections and changes in direction are to be lit to the satisfaction of the CoP Director of Technical Services.
- A separate "metered" power supply is required for Council parks, including a Power Water Corporation (PWC) metering panel, in accordance with PWC specifications. The panel shall be enclosed within a weatherproof (IP66 rating) panel with hinged lockable door with double locking system required with separate keys for PWC and CoP.
- A distribution switchboard is to be incorporated within the panel which is to include earthing, main switch and circuit breaker/s for pathway lighting circuit/s.
- All fittings/luminaries, PE switches, poles, rag bolt assemblies/pole footings shall be to the satisfaction of CoP Director of Technical Services. Use energy efficient lamps/fittings/switches.
- Lighting category and types to be consistent with adjacent surrounding areas and to consider/minimise ongoing maintenance requirements and costs.

- Alternatives to reticulated power may be considered (e.g. solar, battery etc) at the discretion of the Director of Technical Services.
- All open space areas intended to be used or traversed at night should allow appropriate levels of visibility and should clearly illuminate the faces of all users of open space and pathways.
- Lighting in open space areas should be consistent in order to reduce the contrast between shadows and illuminated areas.
- Avoid vegetation that impedes the effectiveness of public and private space lighting.
- Lighting should be designed so that it is significantly resistant to vandalism.
- All areas where intruders may hide must be illuminated. As a guide, areas should be lit to enable users to recognise a face 15 metres away.
- Public lighting shall not create nuisance to residents.
- Lighting designs shall incorporate CPTED principles.

4.2.1 Pathway and Open Space Approval Procedure

i. The Developer submits a Pathway and Open Space Lighting plan detailing the proposed lighting category to the CoP Director of Technical Services. The detail can be included in the Street Lighting Plan. The Pathway and Open Space Lighting plan shall contain the following as a minimum:

   - the subdivision layout,
   - the zoning,
   - the location of schools, shops, unit/flat developments, parks,and pedestrian/cycle paths,
   - the lighting category, for each area and pathway including a brief description of why the particular road lighting category was chosen,

ii. The Developer amends the design to incorporate any changes required by the CoP Director of Technical Services.

iii. The Developer submits design drawings, prepared on Consultant title sheets together with a copy of the “Certificate of Street Lighting Compliance”, for comment and approval by the CoP Director of Technical Services. Pathway and open space light numbers are required.

iv. Consultant and electrician inspect works during construction for compliance of materials/fittings used, installation methods and quality of works. A defects list (if

applicable) will be prepared by CoP Director of Technical Services. The Developer rectifies all defects.

v. Developer prepares “As Constructed” drawings in accordance with CoP requirements and standards and submits these to the CoP at practical completion.

vi. Engineering certification shall be provided as part of Handover Documentation.

5.0 SITE REGRADING

Areas of a development site proposed for building or recreational purposes may not be suitable in their natural state for their intended function without improvement works, the designer shall review the natural surface contours and where necessary shall design finished surface levels that ensure the land is suitably prepared.

Excessive site regrading should be avoided, wherever possible site layouts should be developed to position roads and drainage networks to take advantage of natural surface grades. Site layouts that minimise the disturbance of the land will require less erosion and sediment control measures during construction phase and reduce the risk of environmental harm.

The designer shall consider the implications of site regrading in relation to the existing natural environment. Generally site regrading shall be minimised in heavily treed areas.

The design of site regrading areas preferably should aim to achieve a balanced cut to fill to minimising haulage of imported fill or spoil to and from the development site.

Where practical, areas should be regraded to minimise the necessity for underground drainage systems with surface inlet pits, and allow surface water to flow naturally to roads or drainage reserves without excessive concentration.

All lots shall have a minimum grade of 0.5%, be self-draining and shall be graded so as to drain to the adjacent road reserve which services the lot.

Drainage shall not be directed from one lot to another unless the natural terrain is too steep to make lot regrading practicable. In such situations, rear or side of lot drainage shall be provided in accordance with section 3.3.8 and easements granted to Council (at no cost to Council) shall be provided over all necessary drainage infrastructure included within lots. Lots required to be regraded to achieve these requirements shall be indicated on the plans.

Ponding of water on allotments is not acceptable.

6.0 LANDSCAPING

The primary purpose of this section of the Design Guidelines is to set the parameters whereby the creation of a landscape suitable to enhance the City of Palmerston.

Open Space areas, recreation parks and landscaped streets become part of the fabric of daily life for residents and visitors, and often create the first impression people have of an area.

Suburban parks are important visual and recreational assets of the City and Council places high importance on their design and establishment. As social spaces they will help build the identity of our communities and provide the facilities for residents to recreate, socialize and communicate with each other. Parks also provide the vital arteries of safe access between schools, shops and for some, the workplace as well.

The design philosophy should incorporate features that provide a stimulating, thematic and aesthetic approach that establishes a sense of unique space and landscape to Palmerston.

The design should encourage the development of Community sense of ownership and pride. The design philosophy should also be consistent with environmental protection and sustainability regulations and practice.

Safety and crime prevention is paramount in the design of all landscaping and open space and Crime Prevention through Environmental Design (CPTED) principles must be adhered to with all facilities. In particular, all areas of open space shall include road frontage on at least one side to promote casual surveillance.

Landscaping and irrigation works shall be designed to achieve efficient use of water.

6.1 Naming of Streets and Parks

The Developer is responsible for proposing names for streets and parks; and to obtain the approval and gazettal from the NT Place Names Committee and the City of Palmerston.

Name choice is to be guided by, the CoP Place Names policy.

The Developer shall refer to the CoP for the naming of all Parks. Where a name is not proposed and approved by Council then the park will be assigned a generic name based on the name of the adjoining street.

The developer shall put a plaque with the street name on the footpath at the entry of the street in addition to the usual street signage on the board. Alternative arrangement may be considered for the plaque.

6.2 Safety and Crime Prevention

All landscape developments and public spaces shall be designed to actively support the principles of CPTED.

A CPTED report shall accompany the Master Plan.

6.2.1 Visibility

Clear lines of sight and casual surveillance shall be incorporated in development landscape designs as an important strategy in minimising opportunities for anti-social behaviour.

The following principles should be considered to maximise the impact of CPTED in respect of visibility.

- All barriers along pathways should be visually permeable including the landscape and fencing.
- Avoid medium height vegetation with concentrated top to bottom foliage. Adopt plants that promote natural surveillance such as low hedges and shrubs with higher canopied vegetation.
- Trees with dense, low growth foliage should be spaced to avoid a continuous visual barrier.
- To ensure that all building entrances are clearly visible from the street avoid vegetation that will obscure sight lines.
- Integrate plant choice with public space lighting to maximise lighting effectiveness.

- Seating within active or communal open space should be provided to maximize casual surveillance.
- All lighting is to be installed and operational prior to titles being released.

6.2.2 Lighting

Safety of open spaces is enhanced by adequate lighting that supports casual surveillance.

To actively reduce the possibility of crime being committed in open spaces, it is essential that landscaped areas are well lit so that users of these spaces can see what is ahead of them and respond appropriately.

Lighting of public spaces is to be designed so as to not create a nuisance for neighbouring developments.

Lighting shall be provided in accordance with Section 4 of this guideline.

6.2.3 Hazards

Landscapes can include many hazards which may adversely affect the safety of users of the landscape. It is important that design reduces the use of or creation of hazards in accordance with CPTED principles.

- Entrapment opportunities in the landscape adjacent to pedestrian routes shall be removed from designs. Examples are changes of level, feature walls, small storage areas and inappropriate vegetation.
- Pedestrian underpasses should not be included in any new development unless absolutely necessary. Well designed at-grade crossings or pedestrian bridges are far safer and should be used instead.
- Hard works such as concrete inverts and letterbox pits shall not be placed in or near kick and play areas.

6.3 ENVIRONMENT AND SUSTAINABILITY

Preservation of biodiversity and the natural landscape are essential requirements for the landscape design in all new developments.

Conservation of habitat and vegetation are particularly important and must be achieved to the satisfaction of Council.

6.3.1 Linkages

Developers shall incorporate natural area elements into parks and open space, especially open space linkage systems. Particular attention shall be given to areas of ecological importance, important plant and animal species and those species that are becoming rare or threatened.

The Developer shall plan the open space system, including linkages, species selection and areas of retained bush so as to maximise the habitat value and movement corridors for native birds and animals.

Wherever possible open space linkages should provide both an environmental function as well as a pedestrian linkage function. 'Wildlife corridors' should provide under road access for small animals and enhance the habitat values of the landscape by allowing for improved species migration through an area.

Engineering design requirements for pedestrian linkages are included in section 2.3 of these Guidelines.

The design of open space within the subdivision may incorporate significant areas of remnant vegetation into the internal system of parks and linkages to provide habitat continuity for native species subject to a satisfactory risk assessment in respect of the fire hazard posed by the top end native vegetation types.

Drainage lines and creeks provide excellent linear systems that are home to a wider variety of species and allow for species migration. These corridors need to be of sufficient width to ensure good vegetation diversity and adequate landscape buffer to the riparian vegetation.

Creeks should be maintained in their natural state and formal stormwater discharge to natural creeks shall not be undertaken without specific approval by Council.

6.3.2 Public Use

Preservation of remnant plants, as individual specimens, or groups of plants is an important outcome of landscape design.

The nature of subdivisions is that they provide a living environment for human habitation. Preservation of natural native landscapes at the interface with subdivisions will be enhanced with education of the residents on how to live with the landscapes.

The Developer shall provide for public information displays on the value of preserving native habitat and incorporate remnant habitat into the living spaces of the subdivision.
Public use of preserved bushland areas should be encouraged and enhanced with the use of signage to interpret the value of the species and why they have been protected.

Pathways and circulation systems can be built around, along and through areas of preserved habitat. This could be along a drainage line or creek for example, with various crossings and observation areas to view different aspects of the ecosystem.

6.4 DESIGN CONSULTANTS

6.4.1 Landscape Design

The landscape plans and technical specifications, whether a master plan or construction documentation, are to be designed and certified by a qualified Landscape Architect. Minimum qualification is eligibility for Australian Institute of Landscape Architects (AILA) membership.

Certification of landscape architect qualifications is to be provided with all landscape plans submitted to Council for approval.

6.4.2 Irrigation Design

The irrigation system is to be designed and certified by a qualified irrigation designer. Minimum qualification is Landscape/Turf Commercial Irrigation Design from the Irrigation Association of Australia.

Irrigation designs must comply with the Irrigation Association of Australia Best Management Practice Guidelines.

All electrical supply requirements shall be designed by an accredited electrical engineer.

6.5 OPEN SPACE MASTER PLANNING

The consideration of landscape design issues early in the development process is important. The design of open space areas shall be undertaken to create a consistent character that integrates with surrounding neighbourhoods, existing open spaces, and sets the character for future neighbourhoods.

The developer and the landscape architect (the Consultant) should consult with Council prior to any detailed design to discuss the brief for the landscape design.

The design shall consider all other engineering works.

The Developer must prepare design drawings to fully describe the landscape treatments for all open space areas, including drains and streets within the area of development. Proposals must comply with all relevant Australian Standards, statutory requirements, the requirements of these Guidelines and any other specific directions issued by the Director of Technical Services.

The timing of the landscape works is critical to the achievement of a successful suburban landscape and approved plant material will need to be ordered well in advance. Refer to section 6.6.2 for planting requirements.

Modern open space planning aims to integrate parklands within a subdivision with all the other features and services at the design stage.

The landscape design concept must consider the allocation, shape and size of park areas with associated access/streetscapes in a completely functional and usable way with all other design issues such as safety in the proposed subdivision.

All elements of lot size and orientation, street alignments, drainage and utilities should form a single integrated design and be illustrated by means of a Master Plan (refer to section 7.3). The Master Plan should clearly demonstrate the following elements:

- Locations, size and function of open space including a summary of the total area and the proportion of the area designated to different types of open space (active, passive, wildlife corridors, retained bushland etc), provided to CoP at design stage.
- Linkages of open space throughout the subdivision and how these are connected to external linkages, open space in neighbouring suburbs or adjacent shopping/educational facilities.
- How the proposed open space will provide for adequate biodiversity and wildlife corridors between and within developments and provide links to areas of significant biodiversity value.
- A street tree framework which clearly notes which tree species, will be planted in which street.
- How the proposed network of pedestrian and cycle paths in the development will link to each other and adjoining subdivisions/ developments, and provide a clear hierarchy of

pedestrian movement to critical destinations such as schools, shopping centres, sporting and community facilities.

- How the proposed open space works and coordinates with the open space in adjoining residential areas. In particular, consideration must be given to the range of recreation activities and play equipment to be provided across the open space system. This must be clearly illustrated in the landscape master plan.
- Access for persons with disability, and appropriate furniture shall be provided to all parks compliant with regulations for access for persons with disability.

Council will only accept useable open space. Council will not maintain areas of conservation, or service easements and reserves on land not owned by Council, and provided solely for service authorities.

6.6 OPEN SPACE NETWORKS

A hierarchy of public open space can be classified as follows IN **Table 6.1**, reflecting the distances that people are prepared to travel to use open spaces:

Table 6.1 Open Space Hierarchy

Hierarchical Classification	Description
Local	Open spaces (min. 0.5ha) that cater for the local community and will generally not attract people from a wider catchment. The catchment is generally around 500m or a 10 minute walk. Local open space is usually used for short periods or can have a predominantly amenity value only.
Major	Larger open spaces than local open space (1ha+) that cater for a larger catchment (around 600 – 800 dwellings). Generally within walking or cycling distance although are sometimes accessed by car. Can cater for a range of activities or be natural areas with limited facilities. Every Suburb shall at least have one Major Open Space park with a range of attributes such as play equipment, furniture, etc., to allow multiple users.
Regional	Generally larger open spaces (at least 2 - 4 ha in area) that appeal to a wide cross section of the community and offer experiences which people are prepared to travel further distances to access, such as organised sport. These open spaces can be used for longer periods of time.

Open space can also be assigned a functional classification, which reflects its primary use, as follows in **Table 6.2**.

The functions provide guidance on different types of open space and the types of development suitable for each type.

Table 6.2 Open Space Functional Classification

Functional Classification	Description
Recreation	Recreation / sport either associated with clubs or for social reasons, as well as informal recreation activities such as picnicking and relaxing.
Physical Activity/Linkage	Walking, cycling and other shared use trails.
Cultural/Heritage	Sites of special cultural or heritage significance..
Water management	Sites that incorporate urban water management measures.
Tourism	Sites that are tourist destinations in their own right.
Visual Amenity/ Environmental/ Buffer	Sites that provide visual relief from the urban environment, contain valued natural features (e.g. remnant vegetation, habitat, wetlands) and/or are created to provide a buffer between urban development and incompatible land uses.
Community Purpose	Sites that contain community facilities such as libraries, neighbourhood or community centres, kindergartens.
Combined	Sites that include a combination of two or more of the above functions.

The facilities and or development that is suitable for each type of open space is detailed in **Table 6.3** below.

These open space functions and associated facilities are provided as a guide only. Developers are required to liaise with the CoP in determining appropriate open space and shall consider the specific needs of the development with respect to natural landform, environmental and ecological issues, remnant vegetation, cultural issues, the character of adjacent existing developments and likely future developments.

Table 6.3 Open Space Facilities Guide

Type of Open Space	Typical Facilities/Development
Local Open Space	• Trees and landscaping (including irrigated grassed areas) • Seating / shelter • Play space / equipment • Rubbish bins • Paths and lighting • Compliant with requirements for access for persons with disability.
Major Open Space	• All of the above • Drinking fountains • Youth activity areas (e.g. half court) • Natural areas (e.g. creeks, wetlands, remnant vegetation) • Walking trails • Signs and interpretation • Car parking • Compliant with requirements for access for persons with disability.
Major Sportsground	• Ovals • Public toilet facilities • Drinking fountains • Change rooms • Security lighting • Seating (including tiered seating) • Landscaping • Seating / shelter • Play space / equipment • Paths • Lighting • Car parking • Compliant with requirements for access for persons with disability.

Table 6.3 Continued

Regional Open Space	• As per Major Open Space • Trees and landscaping, possibly including more formal gardens for weddings etc • Picnic areas (including barbecue facilities) • Seating, tables and shelter • Public toilets • Walking/cycling paths • Dog park (dog off lead areas) • Outdoor courts • Youth activity areas (e.g. skate, BMX) • Water or natural features • Lighting (including security) • Signage and interpretation • Car parking • Links to other community facilities • Compliant with requirements for access for persons with disability.
Regional Sportsground	• As per Major Sportsground • High standard ovals/sporting fields • Irrigation and drainage • All weather playing surfaces • Regional, national or international standard sporting facilities • Club rooms and/or function facilities • Spectator seating (including tiered seating) • Kiosk • Permanent or temporary fencing • Support sporting facilities e.g. cricket nets • Field lighting • Compliant with requirements for access for persons with disability.

Table 6.3 Continued

Natural Area Bushland, Wetland or Watercourse	• Native trees and vegetation • Natural or constructed water features e.g. creek, wetland • Walking trails • Seating and shelter • Signage and interpretation • Compliant with requirements for access for persons with disability.
Corridor / Linear Reserve	• Trees and landscaping • Walking / cycling trails or constructed paths • Seating and shelter • Play elements • Lighting • Signage and interpretation • Links to other open space and/or community facilities • Compliant with requirements for access for persons with disability.

6.6.1 Open Space Calculations

Public open space calculations associated with particular land subdivision proposals shall be in accordance with Northern Territory Planning Scheme requirements.

In calculating the total area of private open space required, the following applies:

- Buffer strips of land that do not provide any usable open space or environmental function must be excluded from the open space calculation, and not gifted to CoP;
- No more than 20% of the total area of public open space can be allocated for:
    - stormwater management / drainage purposes (e.g. creeks, drainage channels, wetlands, detention basins etc); and/or
    - the retention of remnant vegetation;
- Any drainage or detention area that does not have a recreation or natural area value all year round (e.g. concrete lined drains) cannot be included as part of the open space area calculation, and further, these drainage or retention areas are to be designed to prevent access by persons to the drains;

- In any individual park, no more than 40% of the area can be allocated for stormwater management purposes required for the 1 in 10 year ARI event.
- Pathways shall not run across drainage inverts.

Developers shall consult the CoP Director of Technical Services regarding the proposed area, type and function of open space for new developments. Council may consider changes to the area of open space required where Developers can add value through the inclusion of other forms of social infrastructure including but not limited to public amenities, play equipment, sporting facilities and wildlife corridors.

Applications should be made to CoP Director of Technical Services including detailed supporting documentation for approval of the area and function of open space to be provided. This application should include a master plan of the locations, size and functions of open space including a table of proportion of open space dedicated to different functions (e.g. active, passive, etc).

6.6.2 Planting

All open space areas shall be landscaped to a minimum standard for the purposes of public amenity. Landscaping shall include grassing or other stabilisation of all surfaces and shade tree planting.

Open areas are required for active recreation purposes, but elsewhere, especially near play equipment, seats and along pathways, shade trees should be provided for aesthetic and comfort reasons.

The Developer shall ensure that all open space areas are appropriately landscaped throughout the subdivision and that high quality spaces are created. A range of plant material shall be used in the design of all open space areas with an appropriate balance and mix of upper canopy to provide shade, shrubs and ground covers. Planting of shrubs and groundcovers should support the principles of CPTED.

For areas where grass cover is proposed, the Developer shall obtain approval from the Director of Technical Services for appropriate species of grass to be used. In all cases, grass species shall be suitable for the intended use and location and shall be low maintenance.

Refer to the City of Palmerston standard drawings for planting.

Planting design shall meet the following objectives:

- Species will be chosen to create shade and aesthetic value. Select species appropriate to the site soil and drainage conditions. Documentation plans will nominate the species selected for each open space area and where species change to reflect local changes in topography, soil or drainage. Planting installed will be in accordance with the approved design drawings in species and pot size. The minimum size for street trees and trees in parks is 25 litres. Trees supplied are to comply with the current Australian Standard AS2303-2015 Tree Stock for Landscape Use.
- Developers shall liaise with Council to develop an approved species list prior to undertaking any planting design.
- Provide a range of shade trees in parks, playgrounds and open space. Group trees to provide maximum shade to areas of play equipment, seating, pathways and other facilities.
- Grass all areas that are disturbed during construction. Prior to grassing, cultivate the sub grade as specified and spread topsoil to a minimum depth of 100 mm. Use imported topsoil or approved site soil, which is free from debris, and weeds and has been improved with additives to meet the requirements of AS 4419- Soils for landscaping and garden use.
- All areas of open space, other than natural areas and dry land grass areas are to be irrigated with automatic underground irrigation systems (refer to section 6.8). Irrigate the verges adjacent to irrigated parks or open space areas with underground irrigation systems and pop-up sprinklers. These will be of a permanent nature. Complete all trenching and pipe work prior to spreading of topsoil.
- All trees are to be provided with permanent irrigation or are to be individually watered for a minimum period of 3 years.
- Areas of remnant vegetation to be improved with additional planting of native species, mulch and kerbed edges.

6.6.3 Park Furniture

A range of Park furniture items, including picnic tables and play equipment, shall be provided at appropriate locations in parks and open spaces to improve public amenity and recreational usage. Places where people gather (near play equipment or at park entrances for example) need some form of litter collection, seating and shade cover. Designs shall incorporate requirements of regulations for access for persons with disability.

The Developer shall ensure that adequate park furniture is placed at appropriate sites throughout all open space areas in order to create parks and open spaces that are desirable places for recreation in terms of both passive and active pursuits.

Park and open space furniture is to be approved by the Director of Technical Services as a part of the landscape design and documentation process. Items should be robust and vandal proof, built of durable materials and in the case of seating both be placed under shade trees and built from materials that do not overheat. Consideration of seating that discourages use by vagrants should be made.

Shade sails shall be designed and installed to meet the following criteria, in addition to other structural and legislative requirements:

- Shade sails shall have a minimum of 4.5m clearance from the ground level. The top of a fort or other structure that can be used to reach a shade sail by balancing on top shall have a minimum clearance of 3.0m. Where the top of a swing or other equipment that cannot be stood on, the clearance shall be a minimum of 2.5m.
- A shade diagram must be illustrated to provide a minimum of 50% shade cover of the playground between 9am and 3pm.
- All shade sails are to be cyclone rated, therefore shade sails that are designed to be taken down in strong winds, are not to be installed.

In general, park furniture is to be provided in accordance with **Table 6.4** below.

Table 6.4 Park Furniture

Park Type	Furniture Requirement (minimum)
Local	• Park signage with park name and Council Logo to Council standard drawings (name and wording to be approved) • Tables and shelters x 1 (negotiable) • Playground features x 1 • Strategically located litter bins (2 minimum depending on size) • Water bubbler x 1 • Seating x 2 locations • Shade sail covering the playground • Coordinated lighting as required to meet CPTED requirements
Major	• Park signage with park name and Council Logo to Council standard drawings (name and wording to be approved) • Tables and shelters (2 minimum depending on size and function) • Playground features x 2 – junior and youth • Strategically located litter bins (4 minimum depending on size) • Water bubbler x 2 • Seating x 4 locations • Shade sail covering the playground • Coordinated lighting as required to meet CPTED requirements
Regional	• Park signage with park name and Council Logo to Council standard drawings (name and wording to be approved) • Tables and shelters (5 minimum depending on size and function) • BBQ's • Playground features x 3 – junior to youth including rubber soft fall with concrete kerbing • Strategically located litter bins (10 minimum depending on size) • Water bubbler x 4 • Seating x 8 locations • Shade sail covering the playground • Coordinated lighting as required to meet CPTED requirements. • Inclusive play equipment

All seats must be shaded using appropriate shade trees and shall have paved links to all adjoining pathway. All seating shall have a concrete pad under the seat with a clearance of 1200 mm from the front extremity of the seat and 200 mm each from the sides and the back. Slabs shall extend to allow wheel chair to parks near seats and move around tables.

6.6.4 Access and Circulation

Access and circulation must be considered at the design stage to provide safe thoroughfare through each park, to link with external pathways and avoid use conflicts.

The Developer shall ensure that an adequate and safe hierarchy of linkage and pathways is achieved throughout the open space areas such that pedestrians and cyclists can move around and between areas of open space easily and with a high level of amenity.

Pathway construction shall be in accordance with section 2.3 of these Design Guidelines.

Pathways in open space areas will need protection provided by planted shade trees, and include rest areas / shelters in strategic locations such as at the junction of pathways or viewing areas. Where trees are located less than 3 metres from built infrastructure (roads, pathways, shelters, buildings etc), root barriers will be required. Existing native trees may require greater distances to built infrastructure and trenches in accordance with Australian Standard AS4970-2009 Protection of Trees on Development Sites.

Pathways shall be designed to comply with all disabled access requirements and standards and shall meet the CPTED design principles.

6.6.5 Play Equipment and Features

Developers shall provide a range of play opportunities and equipment or features for users of a variety of ages. They shall liaise with the Director of Technical Services prior to commencement of open space design to agree on necessary play equipment or features, and appropriate age group areas.

The overall approach to provision of play equipment and recreation range should be outlined in the landscape master plan phase.

Play equipment shall be provided generally in accordance with the following guide:

- Open space is to be provided with play equipment/features that meet the relevant Australian Standards including AS 4486.1-1997 and AS 4685.1-6-2004 at a rate that is consistent with Section 6.6.3 – Park Furniture.
- Play equipment is to be consistent with the CoP's Playground Strategy (available on CoP website). New and innovative play opportunities that are not necessarily dependent on fixed equipment are encouraged.
- All play equipment is to be installed with impact absorbing surrounds to Australian Standard requirements. All playgrounds within parks classified as Regional or Major parks shall have rubber impact absorbing surrounds in accordance with Australian Standard requirements.
- All play grounds are to include shade structures. Bins and shaded seating shall be provided nearby. Shade is to extend over the playground and comply with the CoP specification.
- Play equipment will need to be included in the documentation process and approved by the Director of Technical Services.
- Consideration should be given to the inclusion of youth oriented equipment such as basketball hoop and hardstand area, hitting wall, and/or adventure play equipment as well as skate facilities. This is particularly the case with major and regional parklands as defined in Section 6.6.
- Bicycle path connections shall be provided between all playgrounds.
- Playground areas shall have adequate separation from traffic conflict areas (vehicle, bike and pedestrian traffic) and large open stormwater drains.
- Adequate drainage is to be provided to all playground areas and include subsoil drainage.
- The design and location of play equipment is to consider the CPTED controls contained in Section 6.2 of this document.

6.7 STREETSCAPES

Streetscape is defined as the street and all of the various elements that go to make up the publicly visible areas surrounding and within the street. This may include elements that are in public or private ownership such as street trees and verge planting, pavement textures and colours, road and path widths, fencing and building facades.

6.7.1 Street Tree Planting and Landscaping

Streetscapes are an important visual element in our cities and provide one of the first impressions for new residents and visitors. Street tree planting is critical to achieve a level of visual coherence throughout the subdivision against the variations of style and colour of the adjacent housing. Such theme planting will thus provide a visual marker for each precinct while providing valuable shade and amenity for pedestrians.

The Developer shall ensure that all streetscapes are thematically and appropriately landscaped throughout the subdivision and present a high quality design outcome.

Street tree planting and landscaping shall generally be in accordance with the following guidelines.

- The landscape master plan will include all tree planting, landscape proposals and grassing.
- Planting design for streets is to be based on the use of theme planting with selected species used to create avenues. Select species appropriate to the site soil and drainage conditions. Design plans will nominate the species selected for each road.
- The CoP has a preference for native and indigenous species being used in the planting designs and has developed an approved tree species list. Developers shall liaise with the Director of Technical Services to choose appropriate species from this list before undertaking planting design.
- Trees are to be appropriately spaced depending on species on all verges. In median areas, trees will be spaced at approximately 6 metre centres. All trees are to be located in the nominated planting easement in road verges. Typically the tree planting corridor is located 1100 – 1600mm off the kerb and is installed with root barriers (refer standard details in regard to root barriers and distance from kerb) and kept 8 metres clear of Side Entry Pits (SEPs) and light poles. No trees are to be located on the truncation or within the tangent points of any intersection. Spacing to consider mature canopy size.

- When designing streetscape planting consideration will need to be given to the location of light poles, lighting requirements, underground services, stormwater pits and driveways to ensure that there is no conflict. Consideration also needs to be given to sight lines for vehicles at intersections or exiting driveways.
- Landscape treatments are to be designed to be low maintenance and to reinforce the status and character of each type of road.
    - Sub Arterial Roads – Thematic planting is required on all verges and in any median areas. Verges with no residential access are to be fully landscaped. Landscape treatment to include garden beds, tree planting and grassing to both verges and medians as well as appropriate drainage, irrigation and growing medium.
    - Collector, Local Access and Minor Roads – non sub-arterial roads can be landscaped in accordance with the above at the developer's expense.
- Roundabouts are to be designed with approved topsoil, subsoil drainage, feature planting, irrigation and approved mulch.
- The developer will be responsible for all construction and establishment works including the cost of power and water.

6.7.2 Pathways

Pathways in streets shall be provided following the principles outlined in section 6.6.4 and designed and constructed in accordance with section 2.3 of these Guidelines.

6.7.3 Street Furniture

To enhance public amenity it is necessary to provide a range of street furniture items at appropriate locations. Places where people gather, busy pathway intersections and bus stops need some form of litter collection and some form of sheltered seating.

The Developer shall ensure that adequate street furniture is placed at appropriate sites throughout the subdivision. In general, street furniture shall be provided in accordance with the following guidelines:

- The palette of proposed street furniture is to be submitted and approved at the master planning approval stage. Discussion as to how the palette of street furniture fits into the overall design theme is to be provided with the landscape master plan.
- Appropriate street furniture should be considered at key sites on the streetscape. Such places would be at bus stops, near shops or entrances to parks. Items may include seating, rubbish bins, bollards, signs and shelters in selected locations.
- Items should be robust and vandal proof, built of durable materials, and in the case of seating either placed under shade trees or built from materials that do not overheat (e.g. aluminium).
- All seating is to have a concrete pad under each seat. This is to have a clearance of 1200mm from the front extremity of the seat and 1200 mm each from the sides and back for wheel chair access. Wherever possible, provide paved access between seats and adjoining paths.
- All furniture installation is to conform to the relevant local and national building codes.

6.8 IRRIGATION

The establishment and maintenance of an urban landscape in the tropical climate of Palmerston requires the use of an irrigation system during the dry season. The irrigation system has to be robust, built to a recognised standard and efficient in the use of water.

6.8.1 Water Source

All possible sources of water for irrigation purposes shall be investigated by the Developer. Potable water generally shall not be used for irrigation. Alternative sources may include (but not limited to):

- Bore water;
- Treated waste water;
- Sewer mining;
- Harvested stormwater.

The use of each of these water types shall be investigated with outcomes and recommendations (including the proposed source of water) provided in a feasibility report to the CoP.

Bores have been shown to be a reliable water source with relatively high flow rates where suitable aquifers have been intersected. Where bore water is proposed, the feasibility of the use of underground aquifers shall be include in the water source report. The drilling and completion of bores must comply with the Northern Territory *Water Act*.

The requirements of the PWC for back flow prevention must also be met.

Where a bore supply is used, allow in the cost of development for the drilling, equipping, commissioning, water storage tank, and operation of the bore(s). Also make allowance for the supply of all associated infrastructure including telemetry control, pressure relief and lightning protection. The bore is to be fully operational at handover of the development to the CoP.

Bore extraction has limits to control impact on the groundwater recharge within the catchment. Consultation with the Department of Lands Resource Management is recommended.

Potable water will only be considered for supply of irrigation if the Developer can provide strong written evidence that there is no suitable bore water supply or other alternative source of water within or adjacent the proposed development. In this situation, the Developer shall make all

arrangements and pay all necessary fees to PWC to connect to the mains water supply including provision of metering arrangements to PWC standards.

6.8.2 Irrigation Design

Developers shall ensure that all open space and streetscapes are appropriately irrigated using irrigation systems designed and installed to the satisfaction of Council. All irrigation systems shall provide adequate water for healthy growth of plants without wastage.

Irrigation systems must be designed by a Certified Irrigation Designer with information submitted to Council for approval in the documentation phase of development.

No irrigation works are to be installed without the approval of the Director of Technical Services.

All irrigation systems shall be controlled by telemetry which conforms to CoP's current telemetry system. Details of the current system are to be obtained by consultation with the CoP.

It is recommended that the telemetry control system is installed just prior to handover of landscape works.

All fees and costs associated with water usage, power supply and telemetry, including the commissioning of telemetry, shall be borne by the Developer for the establishment and maintenance period.

6.8.3 Irrigation of Trees and Shrubs

The irrigation design shall allow for the different irrigation requirements of tree and shrub plantings, when compared to broad grassed areas.

All tree and shrub planting shall be achieved using an appropriate water efficient system with up to date technology that is vandal proof and requires low maintenance. Systems can include flood bubblers, or drippers and should all be connected to controllers to the satisfaction of the Director of Technical Services.

Watering rates shall be sufficient to maintain healthy plant growth and to the satisfaction of the CoP.

6.8.4 Grass Irrigation

Irrigation of broad grassed areas will require quality systems that provide reliable, efficient, even watering and that contain up to date technology, are vandal proof and require low maintenance.

The design shall allow for permanent and temporary irrigation systems.

The irrigation system design shall incorporate the following criteria:

- Areas of open space, other than natural areas shall be irrigated with automatic underground irrigation systems conforming to the NT Plumbing Code and Australian Standards (AS3500.1)
- Design precipitation during construction and establishment, minimum of 50mm per week.
- Ensure uniform coverage with matched precipitation;
- Sub-arterial Roads
    - Irrigate verges where residents back onto or have side fences to the road. Use underground irrigation system with popup sprinklers
    - Irrigate all medians and roundabouts.
    - Developer responsible for all construction and establishment costs including water.
- Irrigate the verges adjacent to irrigated parks or open space areas with underground irrigation systems and pop-up sprinklers.
- Permanent irrigation is not required for grassed verges on other roads but is required for street trees.

- All other verges – Irrigate all other road verges with temporary irrigation systems. Systems to be designed so that following handover, the grass irrigation shall be turned off at the end of the verge establishment period.

6.9 AMENITY

The landscape plays an important role in ensuring a high level of amenity for Palmerston.

Important attributes of amenity which the landscape can contribute to positively include providing shade and allowing cooling breezes to enter buildings, to moderate undesirable winds and for visual impact.

While appropriate building design is essential to ensure privacy between buildings the landscape can also assist in this process.

The Developer shall ensure that the landscape design achieves the following objectives:

- Assists in providing privacy between developments.
- Provides sun shading.
- Allows free flow of cooling breezes.
- Improves visual amenity.
- Softens the landscape.

6.10 NEIGHBOURHOOD CHARACTER AND COMMUNITY

Assisting in creating a sense of community and ownership of a place is an important part of designing new subdivisions. A part of belonging to a community is about recognising and knowing your neighbours. Not only will a strong sense of community ensure that it is more pleasurable to live and work in a place but it will also assist in improving the safety of a place. The design of the landscape around a new development can directly assist in the relationship and community building process.

Understanding and responding to the existing neighbourhood character is an important part of site planning and achieving a quality development.

This section seeks to provide information on determining the landscape elements of neighbourhood character and how these should be used to ensure a quality development.

The Developer shall ensure that the proposed landscapes actively promote the building of character and community relationships within new development by adhering to the following guidelines:

- Developers are required to prepare a site analysis plan with the development application which includes a statement of neighbourhood and landscape character.
- The positive values identified in the site analysis shall be carried through to the landscape design process.
- All development is to be compatible with the landscape elements of the surrounding neighbourhood character or the relevant desired future neighbourhood character.

6.10.1 Fencing

There are many different fencing elements which contribute to neighbourhood character including solid fences, permeable fences, bollards, height and design, allotment size and materials and finishes.

Fencing of front yards at the road reserve boundary are not supported in the City of Palmerston. Any front fences shall be set back at the front of building line.

The developer is required to place an encumbrance on all residential allotments prohibiting front boundary fences.

Council encourages all owners to install adequate dog proof fencing to side and rear boundaries.

The Developer shall ensure that fencing fosters a sense of community identity and does not lead to alienation of public areas such as streetscapes. The following requirements generally apply to fencing:

- Design and locate fencing to control vehicle access and provide easy access for pedestrians, cyclists and maintenance vehicles in all parks and other areas of open space.
- Consider the use of bollards or other permeable fencing instead of solid fences where appropriate.

- Use bollards to control vehicle access at entry points to cycle, pedestrian or shared use paths.
- Use safety fencing in conjunction with chicanes to deter entry straight onto the road from a cycle, pedestrian or shared use path running through a park.
- Common design standards should apply so that single thematic elements are used across the subdivision, or on a precinct by precinct basis. The use of common colour, style or materials in community furniture and fencing will further add to the sense of local ownership and identity.
- Fencing of public spaces shall be powder coated and be either a minimum of 1.5 metres high pool surround style fencing or 1.8 metres high chain mesh style fencing.

6.10.2 Community Building/Facilities

Fostering a sense of community can be created in a number of ways, including the use of public art to create a neighbourhood identity. A social venue is one of the most valuable elements that can contribute to this ideal. Typically some form of community structure where regular or ad hoc meetings/events/entertainment can take place is the best way to focus community attention and provide ‘ownership’ and sense of place.

The Developer shall ensure that provision has been made to supply community facilities in line with Council directions. In general, the following requirements shall apply:

- Common and other landscaped areas within development should include artistic elements such as sculptures, mosaics and murals to assist in creating an individual feel to the landscape and ensure that these spaces are enjoyable to be in.
- Landscape designs in new development should create opportunities for incidental meeting of residents or workers. These opportunities can be created through attractive and functional milling/seating opportunities surrounding pathway intersections and grouped letterboxes to allow people who may meet by chance to stop and relate.
- The Developer shall either provide public art to the satisfaction of Council or provide a contribution equal to 5 percent of the overall cost of open space development for future provision by Council. Where the Developer intends to provide public art it shall be developed in consultation with Council.

6.10.3 Entry Statements

Entry statements can take many forms and are generally used to indicate the main entrance into the suburb or precinct.

Developers shall ensure that all entry statements are attractive, vandal resistant and easy to maintain. Generally, entry statements shall comply with the following:

- Entry statements may be located within Council property and are to be removed by the Developer at the completion of the development.
- A minimum 300mm gap is to be provided between the entry statement and private property.
- Entry walls shall have a concrete surround between private property and the wall for ease of maintenance.
- Entry statements must state the suburb or precinct name if it is different from the subdivision name in fixed metal lettering or similar. Painted names are not permitted below 2.5m.
- All entry statements must conform to Councils Signs Code.

7.0 DESIGN APPROVALS AND PERMISSION TO USE

The processes necessary for acceptance of a development design by the City of Palmerston are contained in this section.

7.1 REPRESENTATION

7.1.1 Developer's Representative

The developer may either act for themselves in negotiations with the City of Palmerston (CoP) or employ an agent to act as their representative for the development.

The developer shall notify the City of Palmerston in writing of the name of their representative and promptly advise any subsequent changes to the representative.

Any negotiations, directions or matters made with or within the knowledge of a representative shall be deemed to be within the knowledge of the developer.

If the CoP makes a reasonable objection to the appointment of a representative, the developer shall terminate the appointment and appoint another representative.

7.1.2 City of Palmerston Representative

The Director of Technical Services or any other person appointed by the CoP shall be the CoP's Representative in all negotiations with the developer.

All correspondence, drawings for approval and certificates for handover shall be addressed to the attention of the Director of Technical Services.

7.1.3 Consultant Engineer

Designs and specifications shall be certified by an Engineer with suitable qualifications and experience acceptable to the City of Palmerston. The Engineer shall supervise the construction of all works.

Engineers employed by the developer that carry out design work, or certification of works completion must carry Professional Indemnity insurance acceptable to the CoP to a minimum of $10 million.

Engineers must have no pecuniary interest in the time or cost of completion of such works to the required standards, as set out in the detailed plans and specifications.

The Engineer shall undertake to have a suitable representative on site at all key times, such as during clearing and earthworks operations, during the stormwater drainage works and when sub grade preparation, pavement finishing, concrete works, pavement and associated appurtenances are being undertaken or tested.

The Certifying Engineer shall lodge certificates with the CoP prior to handover of the works certifying that such works are constructed in accordance with all the requirements of the CoP and of the design. The certificate shall be to the satisfaction of the CoP.

7.2 SCOPE OF DESIGN

The design and specifications for any development project shall include all works necessary for full completion of the project. Works necessary for the completion of the development that lie outside the developer's site shall be included in the designs and specifications for the project.

7.2.1 Subdivision Layout

The layout of a subdivision development shall conform to the planned development of adjacent areas, and the principles set out in these guidelines.

Where Planning Conditions have been issued for the subdivision development, the conditions shall be incorporated into the layout design.

The development must match existing land contours and grades to join into existing or planned services in adjoining areas.

7.2.2 Fees

The developer shall pay CoP a fee which shall be a percentage of the actual construction costs, including all variations, for all assets gifted to/accepted by CoP including but not limited to road works, landscaping and stormwater drainage. This fee covers CoP costs incurred on plan review and approval, works inspections and handover activities. The value of fees shall be based on the actual construction costs including variations provided by the developer and will be kept commercial in confidence by Council.

The fee shall be paid in two amounts as follows:

Amount 1: Design Approval Fee (Civil and Landscape) – This amount is based in an estimate of tender price of the subject works.
Amount 2: Construction Approval Fee (Titles Release, Civil and Landscape) – This amount is based on the actual construction costs, and shall include any shortfall from the amount paid as the Design Approval Fee as mentioned above (which was only an estimate at the time and not inclusive of variations etc).

The scale of fees is subject to review by Council in accordance with the review of all fees and charges and is available on the Council website.

7.3 MASTER PLANS

Master Plans for the development shall be provided to the CoP for review and approval prior to the commencement of the first and every subsequent stage of the development.

Master Plans shall include:

(a) Subdivision Road Layout

- road reserve widths,
- road pavement widths,
- road and intersection priorities,
- public transport routes,
- identify commercial areas;
- identify schools;
- speed zones,
- proposed services infrastructure,
- land use types and proposed allotment densities.

(b) Stormwater Drainage for entire development

- Contour plan with subcatchments for the whole development;
- major flow paths,
- necessary infrastructure upgrades
- required widths for drainage reserves
- WSUD features as determined.

(c) Environmental Management

- indicating areas of significance,
- native flora and fauna to be protected,
- land clearing requirements,
- erosion and sediment control,
- construction 'no go zones' and,
- required fencing.

(d) Pedestrian and Cycle Routes

- Circulation routes within development;
- Linkages to adjacent developments.

(e) Landscape

- location and types of open space areas,
- WSUD features, if any,
- location of play equipment and park furniture,
- indication of planting philosophy and species,
- irrigation reticulation system;
- sources of irrigation water (bores), and
- weed management requirements.

Prior to the commencement of each individual subsequent stage of development, master plans shall be provided to CoP for review and approval showing, as a minimum:,

- Confirmation of pedestrian and cycle routes.
- Master plan of allotment sizes, driveway locations and on-street parking provision for any medium density areas.
- Stormwater control plan.
- Erosion and sediment control plan.
- Landscape plan.

7.4 INVESTIGATIONS

Detailed geotechnical investigations shall be undertaken by the Developer prior to the commencement of the design of any stage of the Development for the purposes of providing the inputs necessary for pavement design and subsoil drainage design.

The investigations are not confined to, but include logging of soil profile, identification of groundwater conditions, assessment of sub grade CBR and comment on the suitability of insitu soils to be used in construction.

Geotechnical investigations should include sufficient boreholes or test pits along proposed road reserves to adequately characterise pavement subgrade conditions for pavement design.

Copies of the completed investigation reports shall be provided to the CoP.

7.5 REQUIREMENTS PRIOR TO COMMENCEMENT

It is recommended that progressive design reviews be undertaken with CoP to assist developers and their consultants.

These reviews could be at conceptual design stage, during design development and at the completion of detailed design/documentation. The detailed design/documentation review is mandatory.

7.5.1 Detailed Design Review

One (1) copy of all engineering documents shall be submitted to the CoP Technical Services Department for a detailed review. The documents submitted for a review shall include as a minimum the detailed drawings, technical specification, calculations and a design report, all presented in accordance with current standard engineering practice.

The design report shall summarise all aspects of the design of Council infrastructure including design criteria and assumptions. The report shall focus on the requirements of these Guidelines and shall specifically identify any aspects of the development where the criteria set out in these Guidelines have not been met, including providing detailed reasons for varying from the Guidelines.

Detailed calculations should be provided for all infrastructure including road pavement design, stormwater drainage, erosion control, traffic management and 100 year flood paths. The developer shall provide information for asset valuation and pavement management.

Technical specifications should be produced based generally on the standard NT Government DOI Master Specification for Roadworks but in full compliance with all criteria set out in these Guidelines.

Detailed drawings shall include but not be limited to the following:

- Locality plan and index of drawings
- Site regrading plan
- Erosion control
- Proposed allotment plan
- Setbacks and lot sizes
- Block zonings e.g MD, MR etc
- Lot grading
- Contour plans before and after the development
- Geotechnical report
- Road set out plan
- Road longitudinal sections
- Road cross sections
- Intersection details

- Stormwater drainage compilation plan
- Stormwater control plan (Q100)
- Stormwater drainage longitudinal sections
- Stormwater easements
- Stormwater connections from MD and MR lots to the existing Council stormwater drainage reticulation
- Irrigation and landscape plan
- Subsoil drainage plan
- Water supply compilation
- Sewerage compilation plan
- Electrical conduit plan
- Street and park lighting plan
- Master services plan (Plans showing all services, pits and inspection covers, street lights, footpaths, allotment setbacks, pedestrian crossing points, driveway crossovers etc)
- Traffic control plan
- Bicycle corridors and signs
- Footpaths and pedestrian linkages
- Parks and recreation equipment
- Park development plans

Council will review all of the submitted documents and provide comments which shall be incorporated into final documents.

7.5.2 Final Review of Plans and Specifications

The developer/consultant shall incorporate all comments provided by the Director of Technical Services and produce final documents.

The final documents shall be presented in accordance with the following requirements and shall be accompanied by a letter from the Consultant summarising the changes required by Council and how those changes have been incorporated.

The final documentation shall be reviewed by Council to ensure that all corrections have been made and that the plans and specification fall within the Guidelines. When satisfied, the documents shall be approved and signed by the Director of Technical Services subject to any conditions required.

Approval of the documentation for use for construction does not imply that the CoP accepts any responsibility for the technical adequacy of the design. The developer is accountable and responsible for the adequacy of the development design.

7.5.3 Final Documents

All documents in the final documentation submission shall be provided to the CoP digitally in PDF format. The documents shall be sent by email to palmerston@palmerston.nt.gov.au .

The documents include:

- Design Drawings/Plans
- Specifications
- Design Report
- Instrument of Determination
- Site investigation reports

Each of these documents shall also be provided on CD. The CD shall also include all drawings in files compatible with the program in which they were produced (AutoCAD, Microstation etc); and in PDF format.

7.5.3.1 Roadworks Plans

Drawings shall be prepared to the appropriate scales as shown below:

(a) Plan and longitudinal section:

Horizontal	1:500
Vertical	1:100

(b) Typical cross section 1:100 Natural

(c) Intersection details 1:200

(d) Other details 1:1, 1:5, 1:10

Detailed scale drawings shall be prepared of road intersections showing Telstra, power and water services, stormwater and sewerage pits, valves, manholes, etc to ensure that interference does not occur.

7.5.3.2 Stormwater Drainage Plans

Drawings shall be prepared to the appropriate scales as shown below:

(a) Compilation Plan 1:1000

(b) Longitudinal section:

Horizontal	1:500
Vertical	1:100

(c) Other details 1:1, 1:5, 1:10

(d) Catchment Plan

(e) Drainage Computations

(f) 100 year flood plan

(g) Stormwater discharge point for each allotment

7.5.3.3 Master Services Plan

The Master Services Plan shall show location of all services, pits and inspection covers, street lights, footpaths, allotment setbacks, pedestrian crossing points, driveway crossovers etc.

Where Telstra, Austar and PWC ducting and water mains are laid at non standard depths, the depth to these services shall be indicated on the plan. Any potential service conflict points shall be identified along with an explanation as to how the conflict is to be avoided.

7.5.3.4 Stamping of Drawings

Drawings shall include a digital stamp which should be placed in the title block.

The required stamp is

PERMISSION TO USE FOR CONSTRUCTION PURPOSES ROADWORKS AND STORMWATER DRAINAGE

SIGNED:……DATE:…….

DIRECTOR OF TECHNICAL SERVICES
CITY OF PALMERSTON
This permission to use is given on the basis that the Developer and/or Consultant is not absolved from full responsibility for the correctness and accuracy of the design and/or associated documents.
This permission is valid for a period of two years from the date of signed approval

PART 3 CONSTRUCTION STANDARDS

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PART 3 CONSTRUCTION STANDARDS

1.0 INTRODUCTION

The Construction Standards guidelines are provided for the information of developers of land within the City of Palmerston.

Construction of assets is to be undertaken to conform to the Approved design plans and Specifications for the development. Technical specifications are to be generally based on the standard NT Government Department of Infrastructure (DOI) Master Specification for Roadworks, augmented by the developer's design team to reflect the criteria of all Parts of the Development Guidelines; where CoP technical specifications are not available Specification approval processes are addressed in Part 2, Section 7.0. For the purposes of this guideline the approved specification will be known as the Project Specification.

These Part 3 Construction Standards represent standards acceptable to the CoP for the construction of infrastructure assets, including roads, stormwater drainage, street lighting, footpaths, driveways, open space, and landscaping. This Part also addresses additional inspection and approval processes for the finalisation of the delivery of development works.

The responsibility for a cogent integrated outcome for the development remains with the Developer's team of professionals. These guidelines are a common reference for the adoption of recognised current standards of work and procedures.

The Guidelines are subject to review. It is important to confirm that the developer has used the current version of the guidelines.

The guidelines are to be considered in entirety. Application of individual sections in isolation is discouraged.

2.0 COMMENCEMENT OF WORKS

Engineering construction works for the development shall not commence until after the design plans and specifications for the development are approved by the City of Palmerston (CoP).

2.1 DOCUMENT APPROVAL

The process for approval of the development design and drawings is provided in Part 2 Section 7.

Approved documents are designated by the addition of a digital stamp by CoP. Approval for documents for a development project are valid only for a period of two (2) years from the date of approval.

Design and specification approval is provided on the basis that the Developer and Consultant retain full responsibility for the correctness and accuracy of the design and associated documentation.

Where work is commenced without prior notification to CoP, the additional costs to CoP assuring itself that the completed works are satisfactory (as determined by CoP), shall be borne by the developer.

Where such work is not accepted by CoP the Developer will be required to remove, remediate or reconstruct the work as directed by CoP at the Developer's expense.

2.2 NOTIFICATION OF CONTRACTS

After the engineering plans and specifications have been given approval by CoP, the developer or their representative shall inform the CoP in writing of the name(s) and address(es) of Principal Contractor(s) to whom it is proposed to award the contract(s).

The CoP will advise the developer or their representative who will be carrying out inspections on site.

The Developer is responsible to ensure that the Council is notified of the commencement and completion of each phase of work. While as much notice as possible is desirable, a minimum of twenty four (24) hours is required, excluding weekends and public holidays. All notifications shall be in writing.

2.3 MAINTENANCE OF CONSTRUCTION STANDARDS

The Developer is responsible, both directly and through their appointed representative, to ensure that all work carried out directly or by contractors or sub contractors is at all times in accordance with the approved project drawings and specifications.

2.4 VARIATIONS

Where a deviation from the requirements of the approved project drawings and specifications may be necessary to meet particular circumstances, the deviation from the approved project drawings and specifications shall be referred to the CoP for specific Permission to Use.

2.5 DAMAGE

The Developer shall avoid any damage to new infrastructure. New kerbs shall be protected or barricaded to avoid construction traffic damage. The developer is liable for all damage to private property or existing infrastructure, including roads, utilities services etc, or the disturbance of survey marks due to or caused by the development works,

As soon as the developer becomes aware of such damage, the CoP shall be notified.

The developer must repair damage immediately it is instructed to do so by the CoP. Where immediate repairs are not practical, the developer shall make the area safe.

Where the work is not commenced within a reasonable time then the Director of Technical Services may arrange for the necessary work to be carried out and charged to the developer.

This provision includes removal of mud and debris from existing roads in the vicinity of the subdivision. A daily removal of such debris may be necessary in the interests of traffic safety.

2.6 QUALITY CONTROL AND CERTIFICATION

Development works shall be completed by contractors and professionals that operate under certified Quality Assurance Systems.

Testing certificates to confirm material, workmanship and construction standards shall be performed by NATA registered entities with no conflict of interest with the Developer. Certificates of testing must be provided to support the compliance of all works on the development project. All sampling and testing shall be in accordance with NTG, DOI specification.

The developer shall reject any material or work, which is not in accordance with the drawings and specifications, and shall direct such replacement, removal or correction as appropriate.

The certifying engineer shall certify that works are in accordance with the approved designs, project drawings and specifications at practical completion and final completion. Test certificates resulting from Quality Assurance procedures shall be provided to support the certification.

2.7 PERMISSION TO WORK ON COUNCIL LAND

A permit is required to work on CoP land within Palmerston. Permits will generally not be given in the wet season.

A separate permit is required for each entry activity. Each permit will describe the project and date when all works including reinstatement will be completed.

Work or trafficking which disturbs the surface or grass cover shall be reinstated to the satisfaction of CoP.

Reinstated areas must have established grass cover before rainstorms occur. Any failure of the reinstated areas shall be made good.

2.8 MISCELLANEOUS PROVISIONS

2.8.1 Level Checking

Levels shall be checked using a competent surveyor who is eligible for membership of the Institution of Surveyors or the Institution of Engineering and Mining Surveyors.

2.8.2 Protection of Persons and Property

The developer shall provide, erect and maintain all barricades, guards, fencing, temporary roadways, footpaths, signs and lighting and maintain all watching and traffic flagging lawfully required by any public of other authority or necessary for the protection of the works or of other property or for the safety and convenience of the public and others and shall remove the same when no longer required.

The Developer shall provide CoP with a detailed Traffic Management Plan for works that impact on Council land or roads prior to commencing works.

The developer shall avoid obstruction or damage to roadways and footpaths, drains and watercourses and any public utility or other services on or adjacent to the site which are visible or the location of which can be ascertained by the developer from the appropriate authority and shall have any obstruction removed immediately and at own cost shall have made good all damage caused.

The developer shall avoid interference with or damage to property on or adjacent to the site. The Developer shall provide temporary protection for all property and shall repair and reinstate all damage caused thereto, either directly or indirectly.

The developer shall prevent nuisance to the owners, tenants or occupiers of properties adjacent to the site and to the public generally. This provision includes removal of mud and debris from existing roads used to access or service the development in the vicinity of the development. It shall also include the control of dust generated from the development through watering or other measures and shall include noise generated by the works or plant and machinery.

In the event of the developer's failure to conduct repairs or remedial action within two days notification of such damage, CoP may have the remedial work carried out and the cost incurred shall be recovered from the developer.

2.9 INSPECTION

The developer shall arrange with the Certifying Engineer and representative of CoP for joint inspections of works when each new element of construction is being performed for the first time.

The developer shall also notify the Council representative in writing, and at least twenty-four hours in advance, of the commencement and completion of each phase of development. The Certifying engineer shall conduct all inspections.

Normally the phases at which the work must be notified are as follows:

- Prior to commencement of clearing.
- Setting out and commencement of earthworks.
- Completion of subsoil drainage prior to backfill.
- Completion of earthworks to sub grade before laying pavement.
- Commencement of kerb and channel.
- Commencement of sub-base.
- Commencement of base course.
- Preparation of surfacing.
- Commencement of surfacing.
- Stormwater drainage - pipe laying, prior to backfilling and testing.
- All other underground services - backfilling and testing.
- Final inspection.

3.0 CONSTRUCTION STANDARDS

Infrastructure assets for acceptance by CoP, shall conform with the following specific criteria.

The specific criteria take precedence over the criteria contained in the DOI Master Specification for Roadworks.

3.1 ROADS AND PATHWAYS

Road pavements shall be constructed from manufactured crushed rock materials in accordance with DOI standard specifications. Alternative pavement materials may be approved at the discretion of the CoP Director of Technical Services.

All pavement materials must be tested insitu after compaction to comply with all DOI materials requirements for grading, Plasticity Index (PI), Linear Shrinkage (LS), soaked CBR, compaction etc. As constructed pavement layer thicknesses shall also be measured during pavement testing.

Council shall be informed immediately where test results do not comply with specification and results will be issued to Council.

3.1.1 Compaction

The compaction standards listed in **Table 3.1** are to be achieved.

Table 3.1 Compaction

Pavement Layer	Required Relative Compaction MMDD
Carriageways	
Base course	100%
Sub Base	98%
Subgrade (top 150mm)	95%
Earthworks	90%
Access Strips	
Subgrade	95%
Footpaths, Walkways and Cycle ways	
Pavement	95%
Subgrade	90%
Kerbs	
Sub Base	98%

Test frequency for compaction on road and pathway pavements shall be in accordance with DOI specification requirements.

3.1.2 Kerb and Gutter

Refer to Table 3.1 for compaction standard.

Expansion joints (12mm) are to be installed in the kerb and gutter at the turning point of kerb returns. The joints are to be filled with an appropriate flexible-jointing compound.

3.1.3 Road Service Crossings

All existing road service crossings shall be backfilled using cement stabilised sand, minimum 3% by mass general purpose (GP) cement for the full width of the trench to sub grade level.

Conduits for the conveyance of telephone, cable television, irrigation lines and electrical cables under roadways, footpaths, access strips and elsewhere are required in accordance with relevant service authority requirements.

3.1.4 Allotments

Construction activity shall not create ponding on finished allotments.

Erosion and sediment control measures shall be put in place on all lots until they are fully developed and landscaped.

3.1.5 Timing for Construction of Pathways

Council does not support the Developer installing pathways and driveways prior to practical completion due to the potential for damage during building construction.

The developer shall pay Council for pathways and driveways in accordance with Council's fees and charges.

Where kerb and gutter or semi mountable kerb conflicts with driveway access location the developer shall also be required to pay for the kerb to be removed (knockout). Each knockout shall be for the driveway width plus 1.2m to allow for kerb transitions.

In order for Council to provide a neat and compliant pathway (post practical completion), all service pits within the verge shall be set 100mm above the height of the top of kerb.
Service pits shall be set centrally within the proposed pathway alignment or shall be set entirely out side the pathway footprint, in order to avoid weak points and areas where pathway thickening or widening is required. Where services pits are not located in accordance with this requirement, the developer will be charged for extra widening and or thickening of the pathway. The top level of the service pits within footpath shall match the finished level of the footpath.

3.2 STORMWATER DRAINAGE

All drainage structures including pipes, culverts, pits and open drains shall be constructed in accordance with the approved design and drawings.

Council will not accept any polluted stormwater runoff into its drainage systems. It is therefore essential to thoroughly plan construction works for Stormwater Management and Erosion control.

All temporary as well as permanent facilities that hold water for any period of time shall be fenced for the safety of the general public.

3.2.1 Inspection of Stormwater System

The completed stormwater system is to be confirmed with a CCTV. A CCTV survey of the pipes and pits comprising the stormwater system handed over to CoP is to be completed immediately prior to the completion of the defects liability period. If the CCTV survey report is not satisfactory to CoP, the developer shall rectify defects to the satisfaction of the CoP Director of Technical Services.

3.3 STREET LIGHTING

Street lighting designs are approved by Power Water Corporation (PWC). Refer to Part 2 Section 4.

The developer shall submit a copy of design drawings approved for construction by PWC to the CoP, including the Certificates of Street Lighting Compliance.

PWC will inspect works during construction for compliance of materials/fittings used, installation methods and quality of works. A defects list (if applicable) will be forwarded to CoP with all defects to be rectified by the Developer.

Developer shall provide certification that the constructed lighting conforms to the Australian Standards and lighting categories approved by CoP.

Developer prepares “As Constructed” drawings in accordance with PWC requirements/standards and submits to both PWC and Council.

3.4 PATHWAY AND OPEN SPACE LIGHTING

Pathway and open space lighting designs are approved by the CoP – refer Part 2 Section 4.

The following inspection regime shall be followed:

- Consultant and electrician inspect works during construction for compliance of materials/fittings used, installation methods and quality of works. A defects list (if applicable) will be prepared by CoP.
- A night time site inspection is to be undertaken once the park lights are operational by the Developer's Consultant to confirm the lights are fit for the intended purpose, and the inspection report shall be submitted to CoP;
- All defects to be rectified by the Developer.
- Developer prepares "As Constructed" drawings in accordance with CoP requirements and standards and submits these to CoP.

3.5 ENVIRONMENTAL PROTECTION

This section outlines obligations of a Developer to manage construction in a manner sensitive to the environment of the development site and surrounding areas.

3.5.1 Fencing

The Developer shall carry out all fencing detailed on the Works Plan as well as the fencing of NO GO Areas, open space areas and special purpose sites within their development area. Fencing shall be completed before clearing operations commence.

Fencing of construction sites and areas of vegetation/habitat to be protected shall be undertaken in accordance with NT Worksafe requirements.

3.5.2 Control of Fires

All people within the Northern Territory are required to comply with the Bushfires Act and the Fire Brigade Act.

The CoP does not permit the use of fire within Palmerston. If burning off is considered necessary, approval must be obtained from the NT Fire Department and the CoP must be notified.

Fire breaks are to be included adjacent all new developments to the approval of CoP and the NT Fire Department. In all instances, fire breaks shall allow for full access by fire appliance vehicles.

3.5.3 Clearing Master Plan

All areas of a development which are intended to be cleared shall be identified on a Master Plan. The Master Plan shall be submitted to CoP for review and consideration before any clearing or construction works are commenced. It shall also be accompanied by a report detailing the reasons for any nominated clearing.

Developers shall not clear areas that are not subject to specific construction activities (especially on residential lots).

The CoP may identify significant trees within nominated road reserves which shall not be removed.

3.5.4 Notice to Clear

The developer shall notify CoP of any clearing works in advance.

In general, clearing will not be permitted immediately before or during the wet season on long or steep slopes or erodible soils or if there is a risk of significant erosion.

Developers should note that there are no disposal sites for cleared vegetation within the City of Palmerston.

All cleared vegetation shall be mulched. Mulched materials shall be reused as appropriate.

3.5.5 Preservation of Ground Cover

The existing ground cover of grasses, creepers, and the like is to be retained to provide a protective cover on the soil surface in all areas not subject to construction activity.

3.5.6 Weed Management Requirements

Land managers, including Councils, developers and their contractors are legally responsible for the prevention of spread and the control of declared weeds in accordance with the Weeds Management Act. A list of declared species, and species Weed Management Plans can be found at http://www.lrm.nt.gov.au/weeds/legislation . Key declared weeds in the CoP include gamba grass, mission grass, grader grass, thatch grass, olive hymenachne, mimosa and salvinia.

3.5.6.1 Weed Hygiene Measures

The main methods for ensuring that weeds are not spread by people and machinery are:

i. clean machines when moving from a site where weeds are present.
Where weeds are present, clean vehicles and plant equipment with high pressure water, compressed air or with a stiff brush and leaf blower before moving to a new site. Check clean down area after rain and treat emerging weeds if necessary.

ii. Don't use or move materials contaminated with weed seeds.
The use or movement of soil or vegetation waste contaminated with weed seeds is prohibited under the Weeds Management Act without a permit. If there are weeds present above ground there will also be seeds in the soil. Collect and dispose of the soil by burying or stockpiling in an accessible area, and then control any germinating weeds. Specify to the suppliers that imported fill and topsoil must be free of weeds.

iii. Avoid travelling through weeds that are seeding
The easiest way to prevent weed spread is to identify flowering or seeding weeds and avoid driving through them. Weed control on or adjacent to roads or thoroughfares prior to seeding will reduce the probability of weed spread.

3.5.7 Clearing

Clearing shall only be carried out using an approved scrub rake within surveyed and clearly delineated road reserves, essential access roads, easements, building sites and fill areas.

Generally, Clearing shall not be carried out unless absolutely necessary for construction works. Private land which is not required to be excavated or filled should be left uncleared.

A Start-up meeting will be held on site with the Project Manager and Contractor to clarify vegetation clearing and erosion and sediment control works required prior to, and immediately after, clearing activity.

3.5.8 Protection of Nesting Sites

Trees shall generally not be cleared unless absolutely necessary as part of the development of road reserves or areas of earthworks. Where it is proposed to clear established trees the Developer shall liaise with CoP and obtain approval to clear.

When considering tree removal, the following guidelines apply:

- Recognition that trees provide habitat for bird life is acknowledged and is included in the criteria to be evaluated when considering removal.
- Where public safety is not compromised dead trees (hardwood) in parks may be retained.
- Where public safety and the health and appearance of a tree is not compromised dead hollow branches may be retained in park or street trees.
- Prior to any tree removal, the tree is to be examined and if active nesting is in progress, the tree will not be removed until the birds have flown unless a public danger exists or removal is resolved by CoP.

3.5.9 Disposal of Debris

All timber and debris resulting from the clearing operation together with all fallen timber shall be chipped and if suitable, dispersed on landscaped areas as mulch material or used in erosion and sediment control measures.

There is no facility available in the City of Palmerston for the disposal of debris.

3.5.10 Dust Control

Dust control is essential in all cleared areas and will be the responsibility of the Developer. Suppression of dust shall be achieved through the use of water. Other methods of dust suppression may include:

- Limiting the area of soil disturbance at any given time;
- Promptly replacing topsoil;
- Programming works to minimise the life of soil stockpiles;
- Minimising traffic movements on exposed surfaces;
- Limiting vehicular traffic to less than 25kmph and 15kmph in urban areas;
- Maintaining exposed soil surfaces in a moist condition;
- Promptly revegetating exposed soils;
- Installing windbreaks (shade cloth).

Where dust or mud is deposited on public roads adjacent to construction sites, Developers shall clean all spilt material on a daily basis using approved methods (to avoid washing sediment into storm water system).

3.5.11 Topsoil

Unless otherwise directed the depth of the soil stripped shall be to the bottom of the dark organic grass root zone (A Horizon) and generally shall be a minimum of 100mm. Grass shall be stripped together with the topsoil.

Stripped topsoil shall be stockpiled separately from other materials. Disturbed areas shall be grassed or revegetated using approved material that supports plant life.

Topsoil shall be stockpiled in mounds in areas approved by the CoP and may be used on areas requiring grassing. Stock piles should be monitored and kept weed free and shall be watered regularly or covered to control dust. All drainage paths shall be diverted around any topsoil or other stockpiles. Stockpiles shall be a maximum of 1.5 metres high.

3.5.12 Erosion and Sediment Control

The site works and surrounding areas shall be protected by the implementation of the approved Erosion and Sediment Control Plan.

3.5.13 Conservation of Vegetation

The operation of construction equipment can compromise the vegetation selected for retention.

The Developer shall ensure that all groups and individual plants marked for retention are adequately fenced or barricaded around the drip line (i.e. beyond the root zone). Work in line with the Erosion and Sediment Control Plan to determine no go areas, site access and controls. In particular, the following objectives shall be met:

- Developers must liaise with CoP and DLPE to determine vegetation that should remain or plants that must be relocated. Some species of plants are rare or endangered and have management plans in place (e.g. the Cycad – refer to DLPE Management Plan). These species may need to be relocated by an experienced horticulturist at the direction of CoP and DLPE.
- All significant and native trees must be protected during all phases of site development and construction in accordance with Australian Standard AS 4970-2009 Protection of trees on development sites. These trees or groups of trees/shrubs must be identified on the plans and then marked in the field by brightly coloured construction tape or bunting.
- Their location must be verified by a CoP representative before any site works are allowed to be commenced. A sign-off procedure on a specified form to acknowledge the taping has taken place and is accurately located must then follow, with copies of the signed form being held by the contractor and the CoP.
- In the case of trees that are close to construction activity additional tree protection may be required, including the erection of temporary fencing to a height of 1.5 metres.

- For new plantings, excavate all planting holes to the satisfaction of Council with a backhoe. Holes excavated with augers are not acceptable. Remove all excavated material from the site and dispose of this material at an agreed location.
- Use approved topsoil for backfill and plant trees to the satisfaction of Council. Fertilise in accordance with the industry standard specification and mulch with approved organic mulch.

Works must comply with the requirements of AS4970 Protection of Trees on Development Sites.

3.5.14 Conservation of Habitat

The Developer shall ensure that the areas identified for conservation in the Landscape Master Plan are protected to adequately conserve critical habitat.

During construction all weeds shall be eradicated or controlled and the area rehabilitated to CoP satisfaction.

3.5.15 Grassing of Disturbed Areas

Existing bare or disturbed areas and those areas which may be disturbed by the Developer to such an extent that soil erosion of those areas is considered possible by the CoP, shall be grassed prior to the wet season.

The intention of the grassing is to provide a "rough" grass cover on these areas during the wet season to reduce runoff and prevent surface erosion. This is an interim measure only and the areas shall be appropriately landscaped by the Developer.

3.5.16 Movement of Vehicles

The Developer shall ensure that the movement of vehicles and earthmoving equipment within the development area is restricted to pre-defined access corridors including cleared road reserves or a limited number of essential access tracks.

Employees of the Developer and sub-contractors shall be instructed to use nominated access tracks and not to traffic indiscriminately across the subdivision, especially across areas nominated to contain remnant vegetation.

The Developer shall erect temporary fencing to prevent access on to areas being grassed.

3.6 LANDSCAPING

Landscaping works shall be completed in accordance with the approved Landscape design drawings and specifications.

All areas disturbed by construction shall be grassed as a minimum treatment.

The developer is responsible for all construction and establishment works including the cost of temporary irrigation and water for the establishment of landscaped areas.

3.6.1 Reuse of Site Materials

For sustainability and site management reasons every effort should be made to recycle and re-use materials on site during the construction period. In particular, the following objectives should be achieved:

- Existing site materials such as vegetation and soils shall be assessed for potential reuse.
- Woody vegetation should be chipped and stockpiled for later use as mulch or sediment and erosion control measures.
- Site topsoil can be tested and improved for later reuse in grassing works. Stockpiled soil must be weed free and should be placed in small mounds not exceeding 1.5m in height. If stockpiled over the wet season, ensure sediment fencing contains the stockpile. Protect site stockpiles from contamination by sub-grade materials and fill.
- Excess fill materials can be re-used as a base for mounding in parks or where screening mounds are required in the subdivision (e.g. along busy sub-arterial roads).

4.0 ENGINEERING ISSUES

Where a significant deviation from the engineering conditions of the site, or the approved design, occurs or is proposed, the CoP Director of Technical Services is to be consulted in the formulation of engineering solutions to the issues.

In some instances additional technical advices (such as geotechnical engineers advices) may be requested as an input to the formulation of acceptable engineering solutions.

4.1 AS CONSTRUCTED RECORD DRAWINGS

Construction information shall be recorded progressively during the development construction.

As constructed drawings shall be produced upon completion of the construction of any development. These drawings shall show the actual finished levels and position of all new infrastructure constructed as part of the development.

The Developer shall seek CoP approval for any significant change/s from the approved design/drawings.

4.2 DRAWING PRESENTATION

Final construction drawings as approved and signed by CoP shall be used as a base for the As Constructed Drawings. The information on the drawings shall be revised to match the actual position and level of all infrastructure constructed on site.

The Developer shall seek CoP approval for any significant change/s from the approved design/drawings.

4.3 SURVEY

A licensed surveyor shall be engaged by the developer to undertake all survey necessary to produce accurate As Constructed Drawings. All surveys are to be on the following datum:

HORIZONTAL Australian Map Grid (AMG 94) based on the AMG coordinates of the Permanent Survey Mark Control Network.
VERTICAL Australian Height Datum (AHD).

5.0 APPLICATION FOR COMPLETION

5.1 CONDITIONAL ACCEPTANCE AND HANDOVER

CoP shall require the following prior to signing the Conditional Certificate of Acceptance and Handover of Works:

1) An engineer's certificate certifying that:
   a) the works referred to date, from their personal knowledge and in the exercise of their professional discretion, have been fully and wholly constructed in accordance with previously submitted detailed drawings and specifications; and
   b) as constructed drawings signed by Certifying Engineer with test certificates.

2) An Omissions Guarantee being an unconditional bank guarantee 1.25 times the value of outstanding works including but not limited to landscaping, footpaths and driveways, is required. The value of outstanding works determined by Council will be based on actual construction rates to be provided by the Developer and agreed to by the Director of Technical Services.

5.2 RELEASE OF TITLES

Applications for the release of titles with respect to the works servicing any portion of the development area shall be supported by the following information. The information is to be delivered to the Director of Technical Services,

(a) In relation to that part of the development area, a full set of As Constructed drawings in accordance with Section 4. Constructed assets including reduced level information on lot boundary corners intersections and all service easements.

The drawings shall be signed by the Professional Engineer responsible for the construction.

(b) A signed Engineer's Certificate which certifies that:
   (i) the works referred to, from their personal knowledge and in the exercise of their professional discretion, have been fully and wholly constructed in accordance with as constructed detailed drawings and specifications; and
   (ii) the works referred to in those drawings have been constructed in accordance with those drawings.

(c) All testing certificates shall be provided.

(d) Funds in lieu of construction - if CoP has agreed to undertake work at a later point in time funds as calculated by CoP shall be provided. Such works could include but not be limited to:
   (i) Footpaths.
   (ii) Access strips.
   (iii) Landscaping.

(iv) Bicycle paths.
(v) Fencing.
(vi) Public art.

(e) Payment of Council fees:

(f) development fees applicable in accordance with CoPs current fees and charges at the time of development;
(i) full supervision (if applicable);
(ii) any fees relating to Part 2 Section7.2.2.

A checklist for the information requirements for handover at release of titles is included in **Appendix C**.

Acceptance of park and landscaped areas fall under the following 3 possibilities:

5.2.1 Acceptance of Park and or Landscape as Practically Complete by CoP

1. Park Title to be released in Council's name.
2. Council to issue acknowledgement of practical completion.
3. Park and Landscape works to be placed into a 12 month maintenance period.
4. Where the Developer seeks to undertake the maintenance for a longer period, an application is to be provided to Council.
5. A permit/ agreement shall be created which identifies the Developer's obligations. If the Developer fails to meet these obligations then Council reserves the right to terminate the permit. If the permit is terminated then Council will accept all maintenance responsibilities.

5.2.2 Acceptance when the Park and or Landscape is NOT Practically complete: The works shall be bonded.

1. Park Title to be released in Council's name.
2. The outstanding works shall be bonded.
3. The value of the bond shall be for 150% of the value of the outstanding works.
4. If the Developer provides documentation for tendering and contract of the outstanding works then the bond can be reduced to 125% of the value of the works.
5. A Permit for working on Council land will be required from Council which will contain conditions. Conditions include (but are not limited to):

- Timelines shall be established for completing the works.

- a statement included in the agreement to the affect that: “Council reserves the right to cash in the bond if the Developer fails to meet their obligations in relation to completing the works within the specified time, and that Council may undertake any works with the bond money to complete the said works.

5.2.3 The Park and/or Landscape is clearly identified as a separate Stage under the Development Application/Permit.

1. The title for the park and landscaping is not ready for release and remains with the Developer
2. The park and landscaping will be dealt with at a later stage.

5.3 DEFECTS LIABILITY PERIOD

The definition of Defects Liability Period as contained in AS4000, General Conditions of Contract shall apply.

The Defects Liability Periods are:

- 3 years for roads, pathways, drainage and lighting works, and;
- 1 year for all Parks, playground equipment, landscaping furniture and landscaping works.

The developer shall provide security payment for these periods in the form of cash or unconditional bank guarantees. Separate unconditional bank guarantees for both civil and landscape works shall be to the value of 10 % of the actual final construction costs of all assets handed to CoP including all variations plus GST.

The developers will be held responsible for future problems caused by unforseen groundwater seepage problems on all CoP infrastructure. It is the Developer’s responsibility to guarantee that adequate measures are taken to ensure that potential subsoil drainage problems do not occur.

Any works or portions of works that are defective and rectified after the defects liability period has commenced will be subject to an extension of the full period or any part thereof to take effect from the date the defect is rectified as determined by the Director of Technical Services.

CoP may use the security deposit at any time and at its discretion to rectify any defects identified by CoP.

5.3.1 Release from Defects Liability Period

On completion of the defects liability period the developer shall apply to Council in writing for a Certificate of Defects Clearance. The works servicing any part of the development area shall remain under the defects liability period until all defects have been rectified and a Certificate issued.

Where the Council holds a security deposit, with reference to the development, the Certificate, together with any unused component of the security deposit will be forwarded to the developer once the defects have been completed by the Developer and signed off by the CoP Director of Technical Services.

Defects that are rectified will be subject of an additional defects liability period of the balance of the 3 year period.

6.0 HANDOVER

Submissions of documents at the time of handover of assets to be taken over by the CoP shall include the following, but is not limited to:

- Hand over certificate forms;
- Quality Control record documents including:
    - All test records;
    - All completed lot checklists;
    - All Non conformance reports, including rectification records;
- Developer to provide detailed schedule of asset quantities handed over to Council at the end of each stage. The asset list id to be broken down by road names and open space lot numbers, and in a format approved by CoP.
- CCTV reports and vision copies for stormwater system;
- Payments for works in lieu of construction;
- Payments for bonded works.

A checklist for the information requirements for handover at release of titles is included in **Appendix C**.

6.1 Payments for Works in Lieu of Construction

The CoP may, at its discretion, accept payments for works in lieu of construction.

The acceptance of payment in lieu of construction is acceptable in the instance of pathways and driveways in road reserves of residential areas.

The valuation of the payment in lieu of construction shall be 125% of the estimated construction cost of the works to be deferred, as determined by an estimate prepared independent of the Developer.

6.2 Bonded Works

The CoP may, at its discretion, accept payments of bonds against works yet to be completed at particular milestones, for example creation of titles.

The valuation of the payment in lieu of construction shall be 125% of the estimated construction cost of the works to be deferred, as determined by an estimate prepared independent of the Developer.

6.3 Safety of Outstanding Works

Where the CoP has, at its discretion, accepted bonds as security against works yet to be completed at particular milestones, the safety of the works remains the responsibility of the developer.

The Public Liability insurance held by the developer for the works shall be amended to indemnify the City of Palmerston against claims arising from the incomplete works.

6.4 Asset Data

Handover documentation shall include summaries of the assets to be handed to Council at the completion of the Handover Approvals process.

Data summary sheets are included in **Appendix C**.

The data forms in an editable electronic form (MS Excel) can be obtained from the Director of Technical Services upon request.

PART 4 STANDARD DRAWINGS

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PART 4 STANDARD DRAWINGS

1.0 INTRODUCTION

Standard drawings exist for many elements of the infrastructure for a new development. In most cases the applicable NT Government Department of Infrastructure standard drawings are accepted by the City of Palmerston.

The use of standard drawings from other entities shall first be approved by CoP.

2.0 STANDARD DRAWINGS

The following list of standard drawings is provided for reference.

The latest version of the standard drawing shall be obtained from the entity directly to ensure the latest version of the standard is being used. In most cases the drawings are available from the entities' web site.

CITY OF PALMERSTON

Drawing Reference	Title
3598-001	Typical Crossover & Kerb Details
3598-002	Service Allocations
3598-003	Minor Road
3598-004	Local Access Road
3598-005	Secondary Collector
3598-006	Primary Collector
PCC-A2	Typical Planting Details
PCC-A3	Tree Planting and Pathways
PCC-A4	Revegetation Planting
PCC-A5	Typical Verge Alignment
PCC-A6	Grassing
PCC-A7	Sign Details
PCC-A8	Standard Gate

PCC-A9	Standard Bollard
PCC-B1	Telemetry Controller Cabinet
PCC-B2	Solar Panel Housing

DEPARTMENT OF INFRASTRUCTURE

Drawing Reference	**Title**
CS-1005	STANDARD STORMWATER MANHOLES AND INLET PITS
CS-1006	STANDARD DRAWING SIDE ENTRY PITS TYPE 1
CS-1007	STANDARD DRAWING SIDE ENTRY PIT DETAILS TYPE 1
CS-1008	STANDARD DRAWING STANDARD GRATED SIDE ENTRY PIT
CS-1010	STANDARD CATCH DRAIN AND LETTER BOX PIT
CS-1100	STANDARD STORMWATER CULVERT ENDWALLS AND PIPE LAYING DETAILS
CS-1203	STANDARD KERB PROFILES
CS-1204	STANDARD WHEELCHAIR AND CYCLE CROSSINGS
CS-1205	STANDARD VEHICLE ACCESS TYPES

Alternative standard drawings shall be considered. Consult with the CoP Director of Technical Services for approval of the use of alternative standards.

PART 5 APPENDICES

APPENDIX A

CITY OF PALMERSTON

TYPICAL CROSSOVER & KERB DETAILS

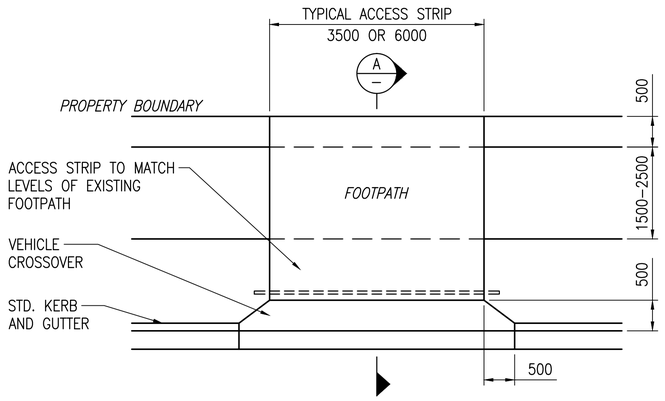
SERVICE ALLOCATIONS

MINOR ROAD

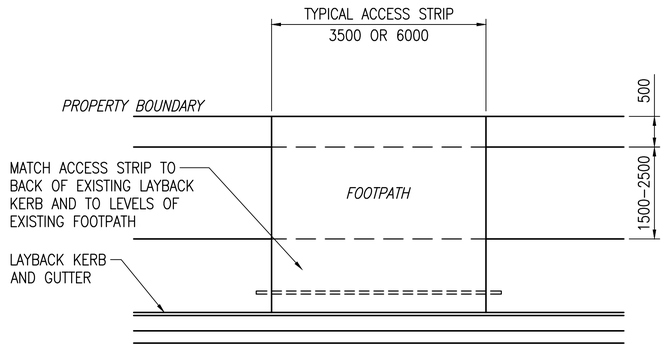
LOCAL ACCESS ROAD

SECONDARY COLLECTOR

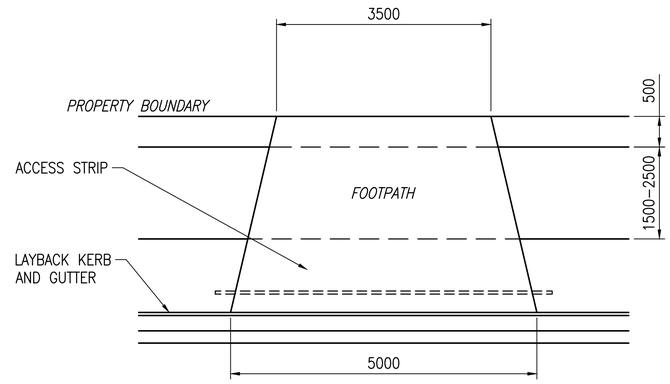
PRIMARY COLLECTOR



VEHICLE CROSSOVER AND ACCESS STRIP
UPRIGHT KERB AND GUTTER
1:50



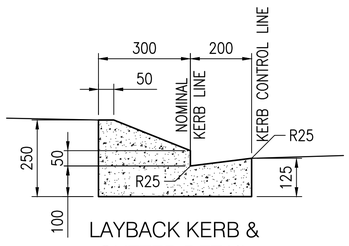
ACCESS STRIP
LAYBACK KERB
1:50



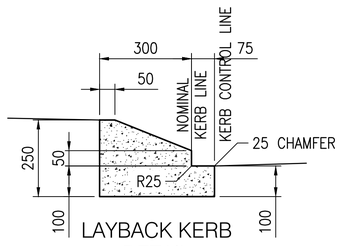
TAPERED VEHICLE CROSSOVER AND ACCESS STRIP
LAYBACK KERB
1:50

NOTES:

1. ALL WORKS WITHIN THE COUNCIL RESERVE MUST OBTAIN A PERMIT, MINIMUM 48 HOURS PRIOR TO CONSTRUCTION.
2. THE FINISHED SURFACE LEVEL OF THE DRIVEWAY MUST CONFORM TO THE DESIGN VERGE PROFILE/LEVEL.
3. PRIOR TO INSTALLATION OF DRIVEWAY SAWCUT AND REMOVE ANY EXISTING FOOTPATH OR KERB AND GUTTER AND INSTALL 10mm EXPANSION JOINT.
4. INSTALL 50mm DIAMETER PVC CONDUIT UNDER PROPOSED DRIVEWAY AT BACK OF KERB FOR FUTURE IRRIGATION LINES. NOMINAL 300 COVER AND EXTENDING 300 PAST THE EDGE OF DRIVEWAY. (ALLOW FOR DRIVEWAY WINGS WHERE REQUIRED).
5. MATCH NEW DRIVEWAY HEIGHT TO EXISTING FOOTPATH LEVEL AND TO NEARBY EXISTING SERVICE PITS.
6. SUBGRADE TO BE COMPACTED TO A DEPTH OF 150mm TO 95% MMDD.
7. WORKS SHALL COMPLY WITH ALL RELEVANT AUSTRALIAN STANDARDS.
8. UNLESS SPECIFIED OTHERWISE ALL DIMENSIONS SHOWN ARE IN MILLIMETRES (mm).
9. CONCRETE TO BE 25MPa.



LAYBACK KERB &
GUTTER DETAIL
1:10



LAYBACK KERB
DETAIL
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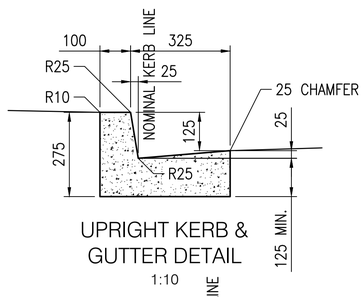

UPRIGHT KERB &
GUTTER DETAIL
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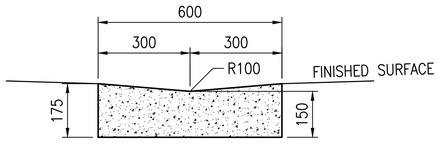
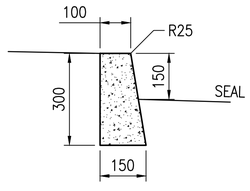
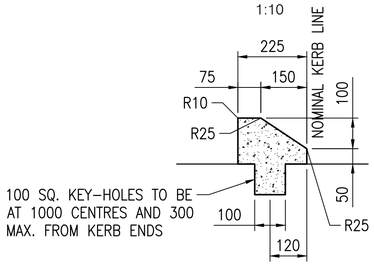


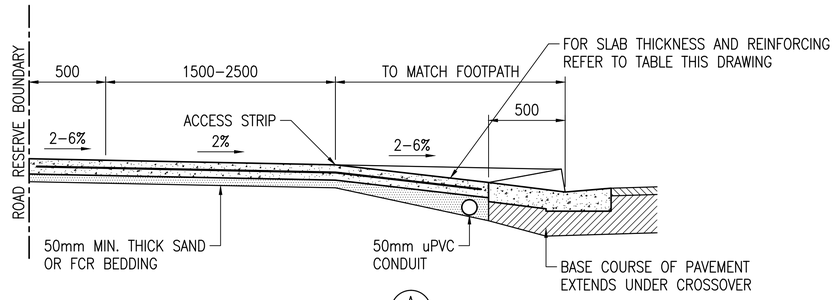
CONCRETE INVERT
DETAIL
1:10



UPRIGHT KERB
ONLY DETAIL
1:10



KEYED MEDIAN
KERB DETAIL
1:10



SECTION A–A
1:20

SLAB THICKNESS AND REINFORCING

USE	THICKNESS	REINFORCING
RESIDENTIAL	100mm	SL72
COMMERCIAL	125mm	SL82
INDUSTRIAL	150mm	SL92

STANDARD COUNCIL APPROVAL STAMP

PERMISSIONS TO USE FOR CONSTRUCTION PURPOSES
ROADWORKS AND STORMWATER DRAINAGE.

SIGNED _____ DATE _____

DIRECTOR OF TECHNICAL SERVICES
CITY OF PALMERSTON

This permission to use is given on the basis that the Developer and/or Consultant is not absolved from full responsibility for the correctness and accuracy of the design and/or documents associated. This permission is valid for a period of two years from the date of signed approval.

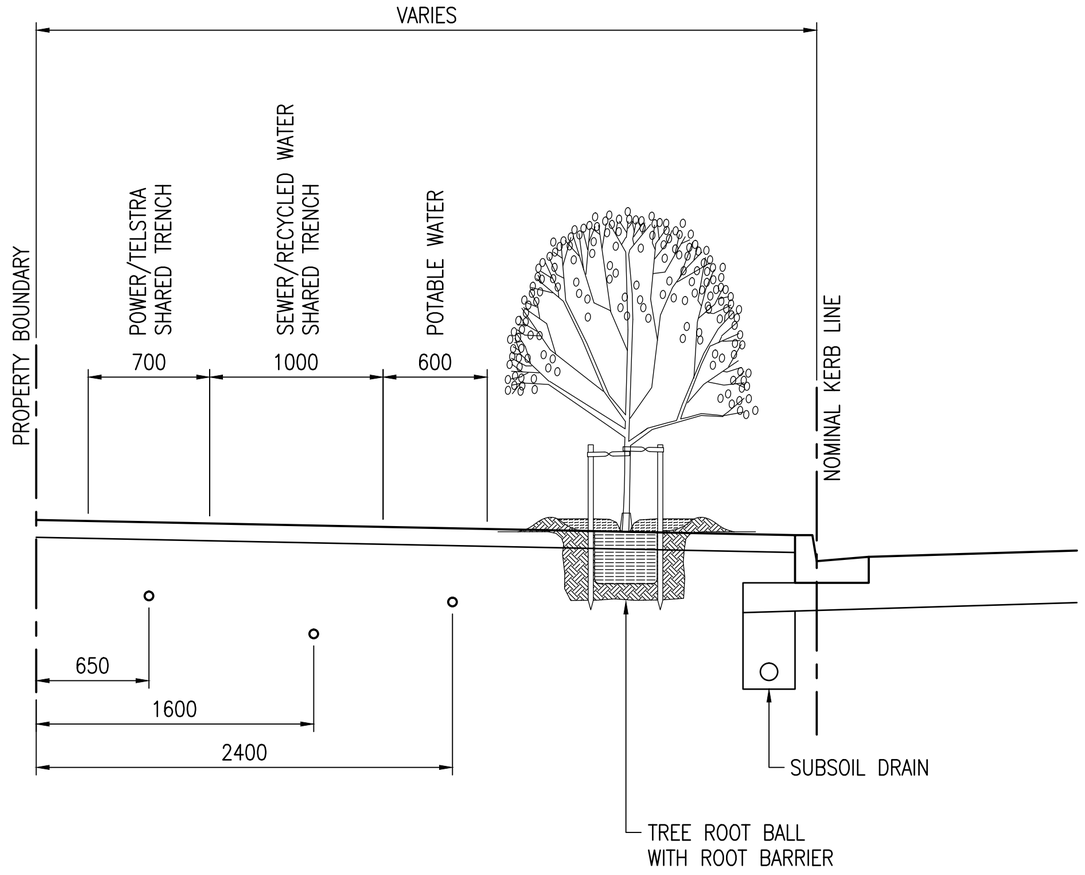
CITY OF PALMERSTON
SUBDIVISION GUIDELINE
TYPICAL CROSSOVER & KERB DETAILS

3598-001

21/10/2013

SCALE AS SHOWN

FCG ACAD No. 3598-001.dwg



SERVICE ALLOCATIONS
1:25

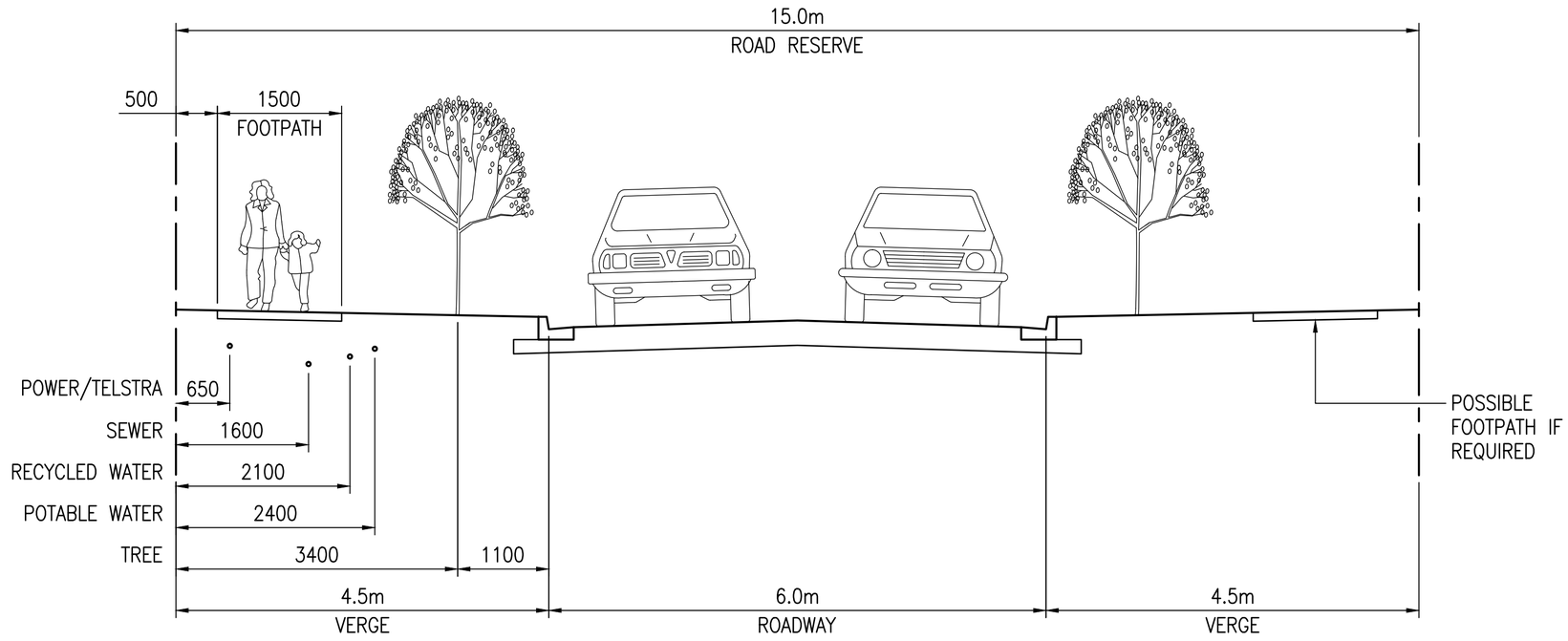
CITY OF PALMERSTON
SUBDIVISION GUIDELINE
SERVICE ALLOCATIONS

3598-002

21/10/2013

SCALE AS SHOWN

FCG ACAD No. 3598-002.dwg



MINOR ROAD
1:50

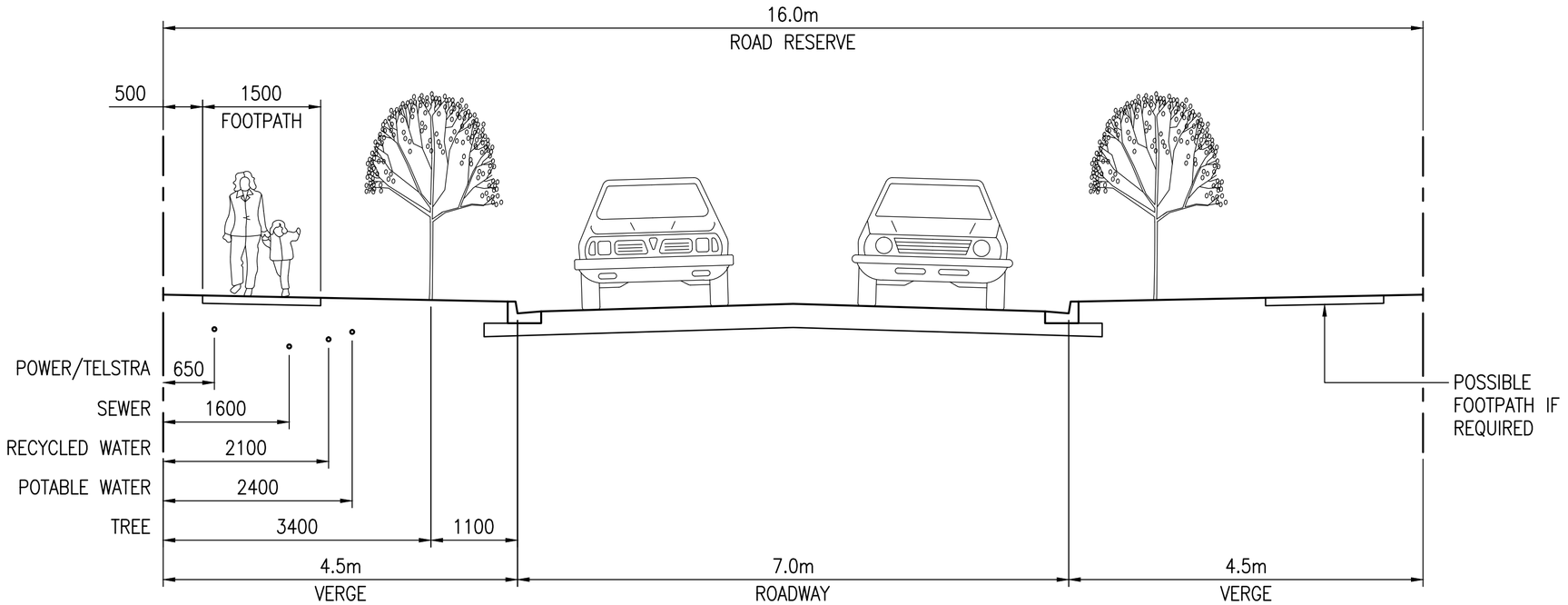
CITY OF PALMERSTON
SUBDIVISION GUIDELINE
MINOR ROAD

3598-003

22/10/2013

SCALE AS SHOWN

FCG ACAD No. 3598-003.dwg



LOCAL ACCESS
1:50

CITY OF PALMERSTON
SUBDIVISION GUIDELINE
LOCAL ACCESS

3598-004

22/10/2013

SCALE AS SHOWN

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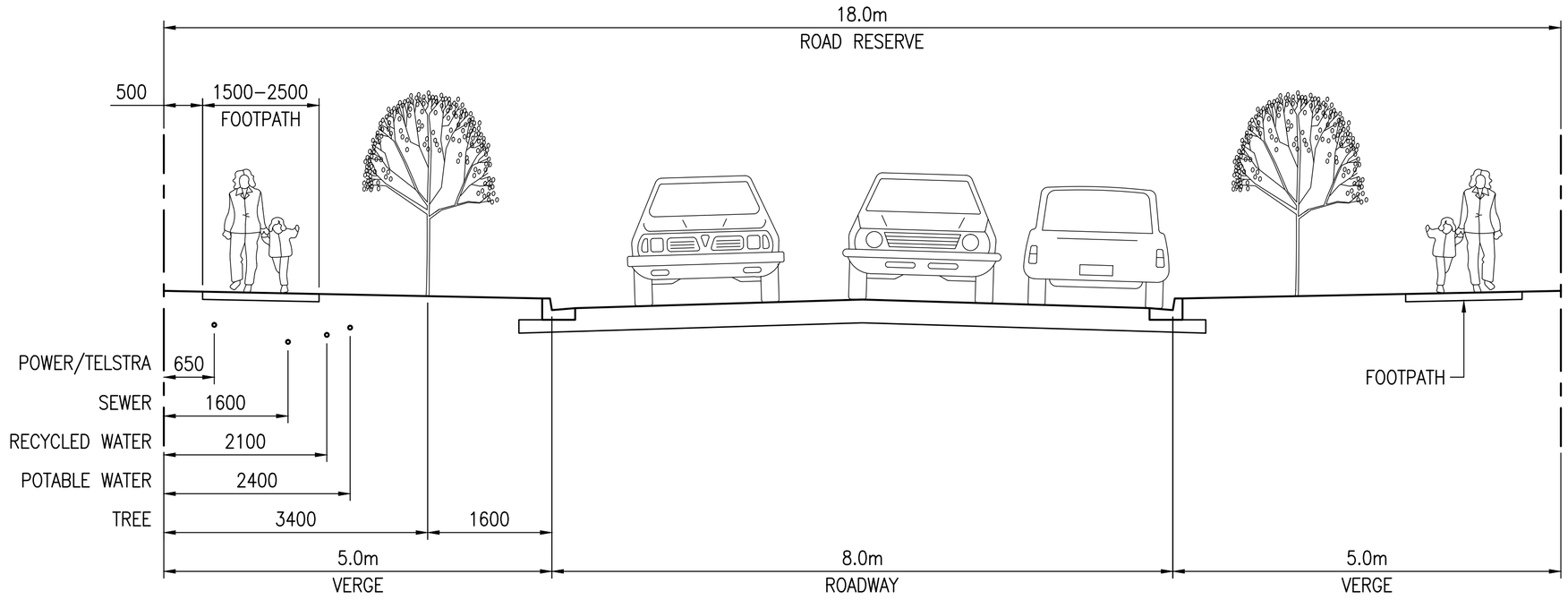


SECONDARY COLLECTOR
1:50

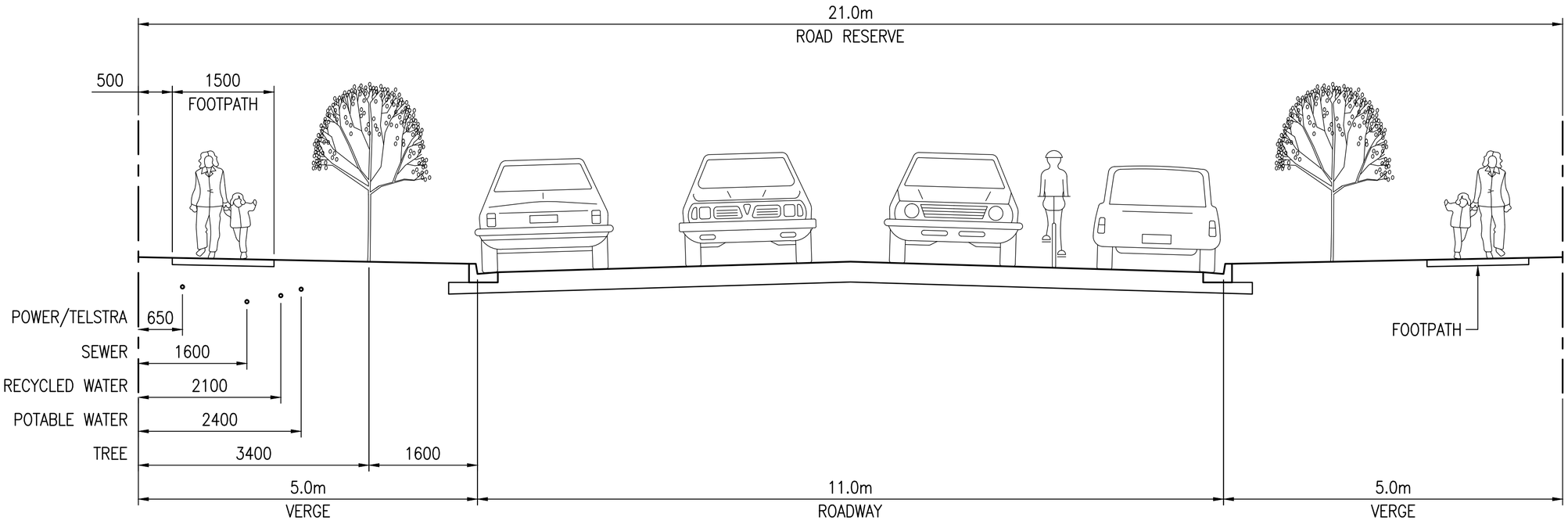
CITY OF PALMERSTON
SUBDIVISION GUIDELINE
SECONDARY COLLECTOR

3598-005

22/10/2013

SCALE AS SHOWN

FCG ACAD No. 3598-005.dwg



PRIMARY COLLECTOR
1:50

CITY OF PALMERSTON
SUBDIVISION GUIDELINE
PRIMARY COLLECTOR

3598-006

22/10/2013

SCALE AS SHOWN

FCG ACAD No. 3598-006.dwg

APPENDIX B

CITY OF PALMERSTON

STREET NAME SIGN DETAIL

G5-1 - Regulatory 150mm Extrusion - D/Sided + Logo
850mm x 150mm
100mm / 50mm Letter Height + 15mm Approx for Suburb Name

100mm x 125mm - Stickers (Logo)
3 Colours on Clear

city of PALMERSTON

Kellogg Brown & Root Pty Ltd

KBR

Kellogg Brown & Root Pty Ltd
ABN 91 007 660 317

DEV103-C-DWG-006

APPENDIX C

CITY OF PALMERSTON HANDOVER FORMS

- HANDOVER CHECKLIST
- TEST REPORT CHECK LIST
- COUNCIL CONDITIONAL CERTIFICATE OF ACCEPTANCE HANDOVER ON MAINTENANCE SAMPLE
- DEVELOPMENT ASSET SUMMARY – ROADS
- DEVELOPMENT ASSET SUMMARY –DRIVEWAYS
- DEVELOPMENT ASSET SUMMARY – SIGNS
- DEVELOPMENT ASSET SUMMARY – STORMWATER
- DEVELOPMENT ASSET SUMMARY – FURNITURE
- DEVELOPMENT ASSET SUMMARY – OPEN SPACE PATHWAYS

Titles Release Check List

Development: . Development Stage: _____

Yes	No

#	ITEM	Issued by Consultant	Received and Agreed by Council
1.	**Engineers Certification** – Including defects and omissions		
2	**As constructed drawings** – to include road names		
2a	Hard Copy A3		
2b	Electronic		
3	**Test Results** – All individual test results shall identify the stata/layer and low test results shall be justified. See Test result Check List.		
4	**Final Survey Plan** – *Including Easements*		
5	**Fees & Charges**		
5a	Development Costs		
5b	0.75% Construction Fee		
5c	Funds In Lieu Of Construction (Driveways etc)		
5d	Bond for Outstanding Works		
5e	10% 3 Year Defects Civil Works Bank Guarantee		
5f	10% 1 Year Defects Landscaping Bank Guarantee		
6	**Development Permit**		
7	**Titles Release Forms**		
7a	Certificate of Acceptance & Handover		
7b	Conditional Certificate		
7c	Authority to Release		
8	**Other**		

Test Report Check List

Development: _____ Development Stage: _____

Consultant: _____ Prepared By: _____

Test reports shall clearly identify the chainage and depth / strata tested. Plans shall be provided to show this.

Testing shall be conducted in accordance with the NTG Specification including lot testing.

A completed Test Report Check List shall be supplied for every stage at prior to titles release.

Feature	Test Result/Report	Number of Tests
Asphalt	Cores sampling and testing for Density, Grading, Air voids, Bitumen content etc.	
	Layer thickness	
	Laying Temperature	
Base Course	Particle Size Distribution	
	Plasticity Index and Linear Shrinkage	
	California Bearing Ratio	
	Density	
	Pavement moisture prior to sealing	
	Layer thickness	
Sub base	Particle Size Distribution	
	Plasticity Index and Linear Shrinkage	
	California Bearing Ratio	
	Density	
	Later Thickness	
Sub grade	Plasticity Index and Linear Shrinkage	
	California Bearing Ratio	
	Density	
Select fill	Particle Size Distribution	
	Plasticity Index and Linear Shrinkage	
	Density	
	California Bearing Ratio	
Lot fill	Density	
	California Bearing Ratio	
	Plasticity Index and Linear Shrinkage	
Service Trench Back Fill	California Bearing Ratio	
	Density	
	Plasticity Index and Linear Shrinkage	
Bitumen	Spray sheets and Dips	
Spray seal	Application and Spread rates.	
Concrete	Compressive Strength	
	Slump	
Aggregate	Flakiness Index	
	Average least Dimension	
	Misshapen Particles	
Subsoil Drainage Media	Particle Size Distribution	
Other		

Roads Summary

Pavement															Kerbs							Islands						
Road Name	Road #	Chainage From: (m)	Chainage To (m)	Length (m)	Pavemant Width (m)	Pavement Area (m)	Cost per sq.m ($)	Cost ($)	Asphalt Thickness (mm)	Chip Seal Thickness (mm)	Basecourse Thickness (mm)	Subbase Thickness (mm)	Subgrade Thickness (mm)	Fill Thickness (m)	Kerb & Gutter (m)	Cost per m	Cost	Layback and Mountable Kerb (m)	Cost per m	Cost		Kerb (m)	Cost per m	Cost	Concrete Slab (sqm)	Cost per m	Cost	Concrete Slab Thickness (mm)

<u>**Driveways and Pathways in Roads**</u>

											A				B	
Lot Number	Zone (SD, MD, Etc)	Road Name	Road Number	Number of Driveways	Driveway Width (m)	Verge Width (m)	Pathway Width (m)	Pathway Area (m)	Driveway Area (m)	Concrete Rate (sqm) $	Cost of Driveway (sqm) $	Kerb Type	Kerb Knockout (driveway width + 1.2m for kerb transition)	Kerb Knockout Rate (m)	Cost of Kerb Knockout $	Total Cost of Driveway (A + B)

Sign Summary

Sign			Post				
Sign Number	Sign Type	Sign Size (A, B , C)	Post (50mm) (1.2m)	Post (50mm) (2.5 m)	Post (other)	Unit Cost ($)	Total cost ($)
R1-1A	Stop						
R1-2A	Giveway						
R1-3A	Roundabout						
R2-3A	Keep Left						
R4-1A	Speed Limit						
D4-1-2A	Hazard Marker						
D4-1-2B	Hazard Marker						
	Hazard Marker						
	Hazard Marker						
Street Name							
Blue Sign							

Stormwater

Location				Side Entry Pit Numbers											Stormwater Pipe Length											Subsoil Drainage				Concrete Invert					Headwall	Cost
Road / Park Name	Road #	Chainage From: (m)	Chainage To (m)	Side Entry Pit (1 bay)	Side Entry Pit (2 bay)	Side Entry Pit (3 bay)	Side Entry Pit (4 bay)	Side Entry Pit (5 bay)	Side Entry Pit (other)	Letter Box Pit	Other	Ccst per no	Cost		375 mm (m)	450 mm (m)	500 mm (m)	600 mm (m)	700 mm (m)	900 mm (m)	1200 mm (m)	1500 mm (m)	Other mm (m)	Cost per m	Cost	Subsoil Drainage (m)	Cost per m	Cost	Depth (m)	Concrete Invert Width (m)	Concrete Invert Thickness (mm)	Cost per m	Cost	Concrete Invert Length (m)	Description	

Road Furniture Summary

Note: Park and Open Space furniture should not be included in the Road Furniture Summary

Location	Bin Type	Bin Size	Bench	Bollard	Other	Description	Value $

Pathways in Parks and Openspace

Lot Number	Park Name	Length of Pathway (m)	Width of Pathway (m)	Concrete Thickness (mm)	Pathway Area (m)	Concrete Rate $	Value of Pathway $