NORTHERN TERRITORY

SUBDIVISION DEVELOPMENT GUIDELINES

May 2025

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ABOUT THESE GUIDELINES

USE OF THIS DOCUMENT

These Guidelines are for developers, planners, engineers, technical consultants and contractors involved in Subdivision design and construction in the Northern Territory. They apply to all Subdivisions regardless of land use zoning, locality, size and existing site conditions. Given the variable context of Subdivisions in the Northern Territory, it is acknowledged that some elements of these Guidelines will not always be required and the Developer should consult with the Relevant Authorities to confirm expectations for their Subdivision.

These Guidelines have been prepared by the Northern Territory Government Department of Lands, Planning and Environment involving significant engagement with Developers, Contractors, Consultants, NT Government agencies, Regulatory Authorities, Local Authorities, Service Authorities and other stakeholders.

These Guidelines provide best practice engineering design and construction standards for important Public Infrastructure such as streets and pathways, public open space and landscaping, stormwater drainage, and utility services. They set out the minimum standards required by Relevant Authorities to facilitate clearance of Development Permit conditions imposed on a Subdivision by the Northern Territory Development Consent Authority; the approval authority under the *Planning Act 1999 (NT)*.

SCOPE EXCLUSIONS

Limited guidance is provided on subdivision planning processes. For detailed requirements, the Developer must refer to the Planning Scheme.

Planning, design, construction and handover of all works within Northern Territory Government (NTG) Controlled Road Reserves must be undertaken in accordance with the Department Logistics and Infrastructure, Performance and design Standards for Northern Territory Roads. Where Subdivision streets intersect with NTG controlled roads, the Developer must consult with NTG to agree on the extent of NTG ownership and approvals, and confirm the design basis to be applied.

Planning, design, construction and handover of utilities including water, sewer, electrical and communications infrastructure must be undertaken in accordance with the applicable Service Authority's requirements. General guidance is provided within this document; however, all such works must be undertaken to the satisfaction of the applicable Service Authority.

This document does not address entry statements or promotional signage for Subdivisions. The Developer must liaise with the Relevant Authorities to inform themselves of all requirements relating to these matters.

This document does not address commercial matters including, but not limited to, fees which may be imposed by Relevant Authorities for review/approval of documentation, issuing of permits, site inspections, acceptance of assets, security bonds etc. The Developer must liaise with the Relevant Authorities to inform themselves of applicable expenses.

STRUCTURE OF THESE GUIDELINES

The Northern Territory Subdivision Development Guidelines comprises four parts, which must be read in conjunction. These are as follows:

- Part 1 - The Guidelines (this document);
- Part 2 - Reference Documents;
- Part 3 - Standard Drawings; and
- Part 4 - Standard Specifications.

PRECEDENCE

In the event of an inconsistency, conflict, discrepancy, error, or omission between or among the provisions of these Guidelines and the Reference Documents above, the Developer must immediately notify the Relevant Authority for direction on how to remedy such inconsistency, conflict, discrepancy, error, or omission.

DISCLAIMER

Reasonable efforts have been made to ensure that material in these Guidelines is accurate and up to date at the date of publication, however, these Guidelines in no way constitute the provision of professional advice, and should not be relied upon as or in substitution for independent professional advice.

The Territory and each Relevant Authority does not guarantee, and accepts no legal liability whatsoever arising from or connected to, the accuracy, reliability, currency or completeness of any material contained in these Guidelines, Standard Drawings, Standard Specifications, any Reference Document, Base Standard or any linked website. Developers must seek and rely upon appropriate independent professional advice for all aspects of any Subdivision or Development Works.

SCHEDULE OF VARIATIONS

For variations to these Guidelines imposed by Relevant Authorities, refer to Section 14 - Schedule of Variations, available online via the Northern Territory Subdivision Development Guidelines Online Platform.

INFORMATION

These Guidelines are available electronically in PDF from the Northern Territory Subdivision Development Guidelines Online Platform.

For further information regarding these Guidelines contact:

Northern Territory Subdivision Development Guidelines Management Committee
c/o Department of Lands, Planning and Environment
GPO Box 1680
Darwin NT 0800

or

Submit your inquiry through the Northern Territory Subdivision Development Guidelines Online Platform www.ntlis.nt.gov.au/sdg-online/.

Version 2.3 - May 2025

THESE GUIDELINES APPLY TO THE FOLLOWING AUTHORITIES AND ASSSET OWNERS:

THESE GUIDELINES DO NOT YET APPLY TO THE FOLLOWING LOCAL GOVERNMENT AREAS:

Please contact these councils for confirmation of the subdivision development standards that apply.

OTHER PROPONENTS AND CONTRIBUTORS TO THESE GUIDELINES:

NORTHERN TERRITORY SUBDIVISION DEVELOPMENT GUIDELINES

May 2025

CONTENTS

LIST OF FIGURES

LIST OF TABLES

DEFINITIONS

Definitions	
AAPA	Aboriginal Areas Protection Authority – the authority established under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* for the management of Sacred Sites records and the issue of Authority Certificates under that Act.
Adjacent Land	Land adjacent to but not forming part of the Development Site upon which any works in relation to a subdivision development are, or are to be, undertaken.
Areas of Significance	Include (but are not limited to) important public facilities such as hospitals, police stations, fire stations, cyclone shelters, schools, shopping centres and medical clinics.
As-Constructed Drawings	Detailed drawings showing the completed works and any variation to the approved Construction Drawings carried out during the construction phase, signed and certified as complete and accurate by: • a Certifying Engineer having undertaken appropriate regular inspections and having made appropriate enquiries in respect of the state of completion of the relevant component of Public Infrastructure; and • the Developer. Detailed requirements for the format of As-Constructed Drawings is provided in the Standard Specification for Subdivisions (Refer Part 4).
As-Constructed Survey	Detailed survey plans recording any variations between the approved Construction Drawings and as-constructed works, signed and Certified as complete and accurate by: • a Licensed Surveyor who is currently registered under the provisions of Part IV of the *Licensed Surveyors Act 1983 (NT)*.; and • the Developer. Detailed requirements for the format of As-Constructed Survey is provided in the Standard Specification for Subdivisions (Refer Part 4).
AS/NZS	Australian Standard / New Zealand Standard
Authorised Connection	An approved connection between Public Infrastructure constructed (or to be constructed) as part of a subdivision development and any existing Public Infrastructure owned, or to be owned, by a Relevant Authority (e.g. a connection to an existing power, water or sewer main).
Average Daily Traffic	Average Daily Traffic (ADT) is the unadjusted average number of vehicles passing in both directions at a specified location of a roadway (i.e. the total volume of vehicle traffic on a street for a year divided by 365 days). ADT is a useful and simple measurement of how busy a street is, used primarily in transportation planning and engineering.
Base Standards	The minimum design and construction standards, and the requirements under them. Set out in Part 2 - Reference documents.

Definitions	
Business Day	A day other than a Saturday, Sunday or public holiday in the place in which the Development Site is situated, also excluding: • 27th, 28th, 29th, 30th and 31st December; and • any day officially registered by Bureau of Meteorology on 'Cyclone Warning' in the place in which the Development is situated.
CCTV Inspection	Closed Circuit Television camera inspection on underground pipes, culverts and/or conduits to report on obstructions and/or defects. Carried out by a suitably qualified CCTV Operator, experienced with undertaking conduit inspections and reporting in Australia.
Certification	A written acknowledgment by a Certifying Engineer that the design and/ or construction of each component of Development Works has been completed in accordance with the requirements of all relevant laws and approvals, these Guidelines, all Base Standards and any other relevant documentation. Approved deviations from these requirements should be clearly stated. The Term "Certified" has a corresponding meaning.
Certifying Engineer	A Consultant and/or their duly authorised representative(s) appointed by the Developer to undertake design and/or construction Certification associated with each component of the Development Works. The Certifying Engineer must be an independent, professional engineer who is competent in the relevant component of the Development Works. The Certifying Engineer must be a Chartered Professional Engineer, unless noted otherwise. The Certifying Engineer, or their employing organisation, must hold an appropriate level of Professional Indemnity Insurance for the component of the Development Works being Certified.
Clearance Letter	A letter issued by a Relevant Authority advising that the relevant works required as a condition of a Development Permit have been completed to the satisfaction of the Relevant Authority.
Completion Certificate	A letter prepared, signed, and submitted to a Relevant Authority by the Certifying Engineer certifying that a component of the Development Works has been completed in accordance with the requirements of all relevant laws and approvals, these Guidelines and all Base Standards; and there are no outstanding work elements or uncorrected and/or unsatisfactory work. This document should include a listing of all design variations, construction non-conformances (with approvals obtained for corrective actions) and other non-compliances.
Consultant	Any person or entity appointed or engaged by the Developer to undertake various planning, design, construction, and/or Certification activities associated with a subdivision development, including the employees, agents or representatives of those Consultants.

Definitions	
Construction Cost	The actual cost to construct a component of the Development Works, as reported and certified by the project manager or a quantity surveyor engaged by the Developer. Typically reported for assets to be handed over to Relevant Authorities and should reflect the replacement value of the assets. Individual Relevant Authorities may have their own Asset Valuation forms and processes to be used by the Developer.
Construction Drawings	'Issued For Construction' Drawings, approved for use by a Relevant Authority pursuant to Section 2.5 of these Guidelines.

Construction Report	A consolidated report containing all construction information relevant to the Development Works, including as a minimum:
	• a description of the Development Works and construction program;
	• copies of all relevant permits, approvals and/or Clearance Letters obtained for the Development Works, including approved mix designs;
	• details of all actions taken in respect of meeting conditions imposed by relevant permits, approvals and/or Clearance Letters;
	• a statement of compliance with environmental protection measures;
	• a register of design changes made during construction to the approved Construction Drawings, including copies of approval by the Certifying Engineer and Relevant Authority.
	• photographs of key construction phases;
	• a summary of all inspections and testing carried out, identifying:
	  ○ non-conforming works removed and replaced;
	  ○ nonconforming works where it has been reworked and retested; and
	  ○ non-conforming works where corrective actions have been approved.
	• a summary of compliance testing results in a table format, demonstrating compliance with the required test frequencies in the Standard Specification for Subdivisions (Refer Part 4); and
	• copies of full inspection and testing records, including NATA endorsed certificates for all conformance testing as set out in the approved Inspection and Test Plan(s) and the Standard Specification for Subdivisions (Refer Part 4). Inspection and Test Plan(s) must be signed to confirm the release of Inspection Points and be supported with lot testing plans for easy identification of testing locations.

Contractor	Each person or entity bound by a contract with the Developer to execute the Development Works (including that person or entity's employees, agents, subcontractors or representatives) on behalf of the Developer.
Crime Prevention Through Environmental Design	Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach to managing the design of built and natural environments to prevent crime. The NT Government provides guidance via the *Community Safety Design Guide*.
Defect	Any item of work or materials which is incomplete, defective, deficient, unsafe, failing, non-complying or not Fit For Purpose in respect of any component of Public Infrastructure constructed as part of or in connection with any Development Works. This includes errors and omissions from design and/or construction works. Includes Major Defects and Minor Defects, as defined separately.

<table>
<tr><th colspan="2">Definitions</th></tr>
<tr><td>Defects Liability Period</td><td>Means the period of time the Developer is liable for any Defect occurring in relation to Public Infrastructure to be handed over to the Relevant Authority, commencing on the Practical Completion Date for that component of Public Infrastructure and expiring at the end of the relevant period defined below:
<table>
<tr><th>Type of Development Works</th><th>Initial Defects Liability Period</th><th>Extended Defects Liability Period for the Development Works subject of rectification works</th></tr>
<tr><td>Public Infrastructure, excluding Soft Landscaping</td><td>24 months</td><td>24 months from the date of completion of the rectification works</td></tr>
<tr><td>Soft Landscaping (as per Section 6), including grassing, planting and irrigation.</td><td>12 months</td><td>12 months from the date of completion of the rectification works</td></tr>
<tr><td>Any defect caused or contributed to by groundwater seepage</td><td>36 months</td><td>36 months from the date of completion of the rectification works</td></tr>
</table></td></tr>
<tr><td>Design Documentation</td><td>Technical specifications, plans, drawings, calculations, reports and other documents required to satisfactorily detail all aspects of the Development Works.</td></tr>
<tr><td>Design Report</td><td>A report describing the intent, criteria, assumptions, and considerations involved in the design that is to be submitted for approval by the Relevant Authority.</td></tr>
<tr><td>Developer</td><td>The owner of the land the subject of a subdivision development, including the Developer's Representative(s).</td></tr>
<tr><td>Developer's Representative</td><td>A person or entity (and each of their employees, agents, Contractors, subcontractors and consultants) appointed, authorised or otherwise engaged by the Developer to act on their behalf in communications with any Relevant Authority or Regulatory Authority for the purpose of or in connection with undertaking a component of the Development Works.</td></tr>
<tr><td>Development Application</td><td>An application for approval of a proposed Subdivision lodged pursuant to the Planning Act 1999 (NT).</td></tr>
<tr><td>Development Consent Authority</td><td>Has the meaning given to it in the Planning Act 1999 (NT)</td></tr>
<tr><td>Development Permit</td><td>Any permit issued by a Development Consent Authority, pursuant to the Planning Act 1999 (NT).</td></tr>
</table>

Definitions	
Development Site	The parcel or parcels of land (including any part of any parcel) on which Development Works are being, have been or are to be undertaken and includes: • Land Under Development; • Adjacent Land for the time and to the extent of any works on Adjacent Land; and • Any other land affected by External Works for the time and to the extent of any works on that land.
Development Works	All and any works that are to be undertaken on the Development Site, or Adjacent Land, and any External Works, as part of or in furtherance of the Subdivision (including works to complete the conditions of any Development Permit, or any conditions necessary to satisfy the requirements of any Relevant Authority or Regulatory Authority).
Dilapidation Report	A report on the condition of existing infrastructure at a given point in time. Typically completed on existing Public Infrastructure prior to Development Works commencing, recording any existing damage and the state of any particular assets that may be affected by the Development Works.
Dry Season Base Flows	Low flows resulting from groundwater seepage due to drawdown of the wet season groundwater table, or irrigation in urban catchments.
External Works	All Development Works external to the Development Site (including, but not limited to, any works on Adjacent Land) and necessary for proper subdivision or development including, but not limited to, the construction, reconstruction or upgrade of Public Infrastructure, private infrastructure, or public or privately owned lands affected by, or having effect on, the proposed Subdivision.
Fit For Purpose	Appropriate, and of the necessary standard and quality, for its intended use or purpose.
Guidelines	Means all four parts of this document, being: Part 1 – Design Guidelines Part 2 – Reference Documents Part 3 – Standard Drawings Part 4 – Technical Specifications
Inspection and Test Plan	Any plan, approved by each Relevant Authority, setting out the minimum inspection and testing requirements for Public Infrastructure to demonstrate conformance with the Standard Specification and the requirements of each Relevant Authority.
Inspection Point	Any component of the Public Infrastructure requiring inspection by the Certifying Engineer and/or Relevant Authority to demonstrate conformance with the Standard Specification and the requirements of each Relevant Authority.
Kerb Ramp Crossing	A road crossing for pedestrians between two AS1428.1 kerb ramps which is not marked with line marking.
Land Supply	Land with the potential for providing serviced allotments, identified through strategic plans with constraints to be resolved (e.g. tenure, environmental factors)

Definitions	
	and trunk enabling infrastructure to be delivered, through the Integrated Strategic Land-use and Infrastructure Planning (ISLIP) process, before land is released for development.
Land Under Development	Land in the hands of Developers, to be subdivided and serviced with reticulated utilityinfrastructure connections through the Subdivision development process, to produce Titled Land to market.
Lawful Point of Discharge	An approved connection between stormwater drainage Public Infrastructure constructed (or to be constructed) as part of a Subdivision and any existing Public Infrastructure owned, or to be owned, by a Relevant Authority.
Local Authority	The council constituted under the *Local Government Act 2008 (NT)* in respect of the area in which the Development Site is situated.
Major Defects	Defects which prohibit safe operation of Public Infrastructure and/or safe use of public areas, or cause significant loss of amenity.
Master Services Plan	Means a Rural Master Services Plan or an Urban Master Services Plan.
Minor Defects	Defects which do not prohibit safe operation of Public Infrastructure and/or safe use of public areas, and do not cause significant loss of amenity.
Northern Territory Government Controlled Roads	The roads, including Road Reserves, under the care, control and management of the Northern Territory Government and its relevant Department(s).
Northern Territory Land Suitability Guidelines	The document by that name referenced in the Planning Scheme.
Nuisance	Any interference with a public or private right including, without limitation, any hazard, annoyance, interference, harm, loss (including expense) or damage caused by dust, fumes, heat, sound, vibration, escape of gases or liquids causing damage to land or other property or interfering with the use and enjoyment of them.
Pedestrian Crossing	Formalised pedestrian crossing marked by parallel white stripes on the road (also known as a Zebra Crossing).
Planning Scheme	The Northern Territory Planning Scheme under the *Planning Act 1999 (NT).*

Practical Completion	In relation to each component of the Development Works intended to be handed over to a Relevant Authority, when:
	• The Developer has provided the Relevant Authority with all items required under Section 13 - Practical Completion, Defects, Securities, Handover and Acceptance; and
	• The Relevant Authority is satisfied that the works are complete in accordance with these Guidelines and the Design Documentation except for Minor Defects which:
	  ○ do not individually or in the aggregate prevent the Development Works from being used for their intended purpose;
	  ○ are of the type that the Relevant Authority is satisfied there are reasonable grounds for not promptly rectifying them; and

Definitions	
	○ can be rectified without affecting the convenient use of the works or any other affected Public Infrastructure.
Practical Completion Date	The date that Practical Completion has been achieved, as Certified by a Relevant Authority in a Practical Completion Letter.
Practical Completion Letter	A letter issued by a Relevant Authority to the Developer for a component of the Development Works acknowledging Practical Completion has been reached. This marks the commencement of the Defects Liability Period for that component of the Development Works.
Project Specific Requirements	Means any variation of the requirements of the Standard Specification documented using the template provided and submitted to, and approved in writing by, each Relevant Authority in respect of a particular Subdivision.
Public Infrastructure	Any infrastructure currently, or proposed to be, owned and maintained by a Relevant Authority. Includes any component of the Development Works that is intended to be handed over to and accepted, and thereafter owned and maintained, by a Relevant Authority.
Registered Member	Means a person or entity that has applied for and been allocated a user ID and password in respect of the online version of these Guidelines.
Regulatory Authority	Any governmental, semi-governmental, public, statutory or judicial body, entity, department or authority responsible for exercising statutory powers, rights or other authority under any legislation, subordinate legislation, or other legislative instrument in force from time to time in the Northern Territory and, for each component of Public Infrastructure, means any such body that regulates the design, construction, use, discharge to or from the infrastructure (whether or not that body will or is intended to own that Public Infrastructure upon completion of a Subdivision). Regulatory Authorities include, but are not limited to, the Development Consent Authority and the Power and Water Corporation in its capacity as regulator for electricity, water, and sewerage infrastructure.
Relevant Authority	Means, for a component of Public Infrastructure constructed as part of the Development Works, any governmental, semi-governmental, public, statutory body, statutory corporation or government owned corporation, entity, department or authority that is intended to accept handover of, own and maintain that Public Infrastructure after Practical Completion. Includes Service Authority and Local Authority as applicable.
Request for Amendment	Means a request by a stakeholder for an amendment to these Guidelines (other than in relation to Section 14 - Schedule of Variations), pursuant to the requirements of Section 1.8.
Request for Variation	Means a request by a Relevant Authority or Regulatory Authority for a new or amended Variation in Section 14 - Schedule of Variations, pursuant to the requirements of Section 1.7.
Road Reserve(s)	Means any area of land reserved or dedicated, or to be reserved or dedicated, to the Northern Territory of Australia or a Local Authority as a road or street under the *Control of Roads Act 1953 (NT)*, *Local Government Act 2008 (NT)*, or the *Planning*

Definitions	
	Act 1999 (NT) and includes a road reserve in respect of a street as referred to in these Guidelines.
Rural Master Services Plan	Means a plan or plans showing the locations of all proposed water, sewer, electrical, gas, communications and associated infrastructure. Rural Master Services Plans must include locations of all proposed bores and septic systems, and all constrained land, demonstrating feasible bore and septic locations for every lot in the proposed Subdivision having regard to all constraints and all required separations. Rural Master Services Plans must have all of the features and details depicted on the example Rural Master Services Plan at Part 3.
Sacred Site	Any site that is sacred to Aboriginals or is otherwise of significance according to Aboriginal tradition, and includes any land that, under a law of the Northern Territory, is declared to be sacred to Aboriginals or of significance according to Aboriginal tradition.
Security Bond	Cash or a monetary guarantee lodged or to be lodged by the Developer in accordance with Section 13.4.
Service Authority	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Standard Drawings	The Standard Drawings, as referenced in Part 3 of these Guidelines.
Standard Specification	A document that specifies the minimum technical standards for construction of Development Works, as referenced in Part 4 of these Guidelines.
Subdivision	Has the meaning given to it in the *Planning Act 1999 (NT)*.
Subdivision Masterplan	A plan featuring the requirements as outlined in Section 2.3 for all stages of the Development Works.
Titled Land	Land available to the end consumer, allowing building construction to commence.
Trade Waste	Has the meaning given to it in the *Water Supply and Sewerage Services Act 2000 (NT)*.
Urban Master Services Plan	Means a plan showing the locations of all proposed water, sewer, electrical, gas, communications and associated infrastructure. Urban Master Services Plans must have all of the features and details depicted on the example Urban Master Services Plan at Part 3.
Waterway	Has the meaning given to it in the *Water Act 1992 (NT)*.

GLOSSARY

AAPA	Aboriginal Areas Protection Authority
ADT	Average Daily Traffic
AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
ARRB	Australian Road Research Board
BAS	Building Advisory Services
BPESC	Best Practice Erosion and Sediment Control
CBR	California Bearing Ratio
COP	Code of Practice
CPESC	Certified Professional in Erosion and Sediment Control
CPTED	Crime Prevention through Environmental Design
DAS	Development Assessment Services
DCA	Development Consent Authority
DCP	Developer Contribution Plan
DLPE	Department of Lands, Planning and Environment
DLI	Department of Logistics and Infrastructure
EIA	Environmental Impact Assessment
ERA	Environmental Risk Assessment
ESCP	Erosion and Sediment Control Plan
EY	Exceedances per Year
ICEG	Indigenous Community Engineering Guidelines
IECA	International Erosion Control Association
ISO	International Organisation for Standardisation
LTO	Land Titles Office
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
NATA	National Association of Testing Authorities
NBN	National Broadband Network
NEMA	National Electrical Manufacturer's Association
NT EPA	Northern Territory Environment Protection Authority
Planning Scheme	NT Planning Scheme
OWMS	On-site Wastewater Management System
QUDM	Queensland Urban Drainage Manual
SEP	Side Entry Pit
TIA	Traffic Impact Assessment
VPD	Vehicles per Day
WPZ	Wellhead Protection Zones
WSAA	Water Services Association of Australia
WSUD	Water Sensitive Urban Design

PART 1

DESIGN GUIDELINES

1 INTRODUCTION

(a) These Guidelines provide the technical framework for the design and construction of new Public Infrastructure for Subdivisions in the Northern Territory of Australia (NT).

(b) These Guidelines have been developed as a reference for Developers and their planners, design engineers, Consultants and Contractors. They set out a range of minimum design and construction standards accepted by Relevant Authorities and Regulatory Authorities. These Guidelines also set out a model for productive early engagement with Relevant Authorities and Regulatory Authorities.

(c) These Guidelines assume technical subdivision design will be undertaken by suitably qualified professionals and therefore do not restate in full the technical design and construction principles included in the Base Standards.

1.1 PURPOSE

(a) This document provides a clear and concise approach to design, construction and maintenance requirements for Subdivisions. These Guidelines represent the required standard of design and construction of Public Infrastructure to facilitate the handover of such infrastructure to Relevant Authorities. These Guidelines aim to:

(i) consolidate the Subdivision design guidelines, reference documents, standard drawings and technical standards of Relevant Authorities and Regulatory Authorities responsible for Public Infrastructure in a single location.

(ii) balance the requirement to provide robust Public Infrastructure with an appropriate life expectancy and the need for cost effective, affordable Titled Land.

(iii) coordinate infrastructure delivery across catchments, networks and precincts throughout the Northern Territory.

(iv) promote best practice safety and environmental management.

(v) encourage engagement of Relevant Authorities and Regulatory Authorities early in the design process.

(b) These Guidelines are intended to be read in conjunction with the Planning Scheme, NT and Commonwealth legislation, all Base Standards and other relevant approved policies.

(c) These Guidelines are subject to all laws (and any legislative instruments under them) in force in the Northern Territory and do not in any way limit the operation of those laws or instruments. Despite anything in these Guidelines, Developers and their designers, planners, Consultants and Contractors must comply with all laws in force in the Northern Territory.

1.2 FUNCTION

(a) These Guidelines apply to Subdivisions under the *Planning Act 1999 (NT)*. Development Permits issued under the *Planning Act 1999 (NT)* may include conditions relating to the requirements for the design, construction and maintenance requirements of Public Infrastructure outlined in these Guidelines. Clearance of Development Permit conditions issued under Part V of the *Planning Act 1999 (NT)* will rely on Relevant Authorities and Regulatory Authorities being satisfied that:

(i) Public Infrastructure has been designed in accordance with these Guidelines and relevant Base Standards;

(ii) Public Infrastructure is Fit For Purpose and constructed in accordance with the approved Design Documentation, Standard Drawings and Standard Specification; and

(iii) the requirements of Section 13. Practical Completion, Defects, Securities, Handover and Acceptance have been met.

(b) Design and construction of Subdivisions in accordance with these Guidelines will facilitate the efficient handover of Public Infrastructure to Relevant Authorities.

(c) These Guidelines are broken into the following four parts.

(i) Part 1 – Design Guidelines that establish the key principles for the design of Subdivision Public Infrastructure (this document).

(ii) Part 2 - Reference Documents that are relevant to Public Infrastructure design, construction and maintenance from Relevant Authorities and Regulatory Authorities.

(iii) Part 3 – Standard Drawings that set out specific design and/or construction requirements for the delivery of Public Infrastructure.

(iv) Part 4 – Technical Specifications that provide standards for the construction of Public Infrastructure.

1.3 PLANNING AND INFRASTRUCTURE CONTEXT

(a) The Department of Lands, Planning and Environment has developed an integrated approach to planning and infrastructure delivery for Land Supply in the Northern Territory. Figure 1 and Figure 2 provide a framework for the steps required, from regional planning to completion of liveable neighbourhoods supported by services and social infrastructure.

(b) The identification of Regional, Sub-Regional, District and Neighbourhood planning stages facilitates an orderly progression from high level planning through to detailed planning of enabling infrastructure down to the neighbourhood level.

(c) At the regional level the Planning Scheme sets out Regional Land Use Frameworks for Darwin, Alice Springs, Katherine and Tennant Creek.

(d) At the Sub-Regional level planning studies provide a detailed guide for land use within a region supported by detailed land suitability and infrastructure investigations. Sub-Regional planning includes provision for social infrastructure such as schools, medical centres, post office, library, local courthouse, and police and emergency services headquarters. Associated enabling infrastructure includes sub-arterial roads, wastewater treatment plants, power zone substations and elevated water tanks.

(e) The Planning Scheme includes Area Plans for urban areas, Litchfield and major remote towns. Enabling infrastructure for a district includes power distribution lines, trunk sewer, water main and collector streets and social infrastructure includes facilities such as a school, football oval, fire station, doctor's clinic and library. Neighbourhood planning is at the level of individual suburbs and streets and requires enabling infrastructure such as power, water, sewerage, communications and local streets. Neighbourhood social infrastructure includes shops, parks and playgrounds.

(f) The stages in the overall development process are outlined in Table 3 which indicates that the development of a subdivision, the subject of these Guidelines, is dependent on significant prior planning and enabling works being undertaken before land is development ready.

1.4 WHEN TO USE THESE GUIDELINES

(a) These Guidelines will apply to the planning, design and construction of all Subdivisions that require consent under the *Planning Act 1999 (NT)*, where these Guidelines are the adopted standard of any Relevant Authority or Regulatory Authority. A list of authorities and asset owners that these Guidelines apply to is included on Page IV of this document.

(b) The Planning Scheme establishes provisions for the assessment of Development Applications relating to Subdivision, including minimum lot sizes, general layout, the provision of open space etc. and must be read in conjunction with these Guidelines and the requirements of Relevant Authorities. The requirements of the Planning Scheme prevail to the extent of any inconsistency with these Guidelines.

(c) All subdivisions, whether of zoned or unzoned land, require a Development Permit.

(d) Common types of Subdivision that occur in the Northern Territory and considered by these Guidelines include:

(i) Residential (and mixed use) – subdivisions of predominantly residential lots often developed as planned suburbs, which may include commercial, community and open space lots. Typical zones include Zone FD (Future Development), Zone LR (Low Density Residential), Zone LMR (Low-Medium Density Residential), Zone MR (Medium Density Residential), Zone HR (High Density Residential) and Zone CL (Community Living). May also include non-residential zones such as Zone C (Commercial), Zone TC (Tourist Commercial), Zone CP (Community Purposes) or other zones.

(ii) Rural – subdivisions of large rural lots, often located on the fringes of Residential areas. Typical zones include Zone RR (Rural Residential), Zone RL (Rural Living) and Zone R (Rural). May also include other zones such as Zone H (Horticulture) or Zone A (Agriculture).

(iii) Industrial – subdivisions of large lots serviced to provide for the needs of manufacturing, treatment, storage or processing of goods, equipment and materials. Typical zones include Zone LI (Light Industry), Zone G (General Industry) and Zone DV (Development). May include zones such as Zone SC (Service Commercial) or others.

(e) To the extent that Development Permit conditions require clearance by, or the construction of any Public Infrastructure to the standards or requirements of, any Relevant Authority or Regulatory Authority, those Authorities will have regard to these Guidelines as well as to the broader context in which the relevant Subdivision is proposed to take place.

1.5 GREENFIELD AND BROWNFIELD SUBDIVISIONS

(a) Greenfield Subdivisions occur on land that has not previously been developed to any significant extent, typically taking the form of new residential or industrial estates. In the absence of prior development, it is often necessary for the Developer to establish external Public Infrastructure (or headworks) to service the Development Site based on the highest density of land use allowable under the proposed zoning and Planning Scheme. Greenfield Subdivisions typically involve the provision of new streets, pathways, driveways, public open space (where applicable), soft landscaping, stormwater drainage, utility infrastructure (water, wastewater, electrical, communications), and lighting.

(b) Brownfield Subdivisions typically involve re-subdivision of land that has already been developed and may include the subdivision or consolidation of residential/mixed use, industrial, or rural zoned land. This type of Subdivision often occurs following a successful rezoning application, which allows for a change in land use to facilitate higher density living. Brownfield Subdivisions may therefore require the provision of new or upgraded Public Infrastructure to support the proposed change in land use and density of living.

1.6 SUBDIVISION WORKS INCONSISTENT WITH THESE GUIDELINES

(a) These Guidelines are not intended to limit innovation and high quality outcomes. Developers are encouraged to engage with the Relevant Authorities and Regulatory Authorities to seek approval for:

(i) introducing new elements of Public Infrastructure that provide a demonstrated improvement in terms of environmental impact, amenity, lifespan, efficiency, or cost; and/or

(ii) project-specific variations from these Guidelines to address a specific constraint or opportunity.

1.7 VARIATIONS TO THESE GUIDELINES

(a) As much as possible these Guidelines seek to promote consistency across Relevant Authorities and their jurisdictions. However, there are clear differences between the Relevant Authorities and the jurisdictions in which they operate that necessitate certain variations.

(b) Variations to these Guidelines and associated documents for each Relevant Authority are set out in Section 14 – Schedule of Variations.

(c) Relevant Authorities may add to, delete or amend their sections of the Schedule of Variations from time to time by submitting a Request for Variation via the Subdivision Development Guidelines Online Platform. Refer Part 2: Reference Documents for Variation and Amendment Flow Chart and Checklists.

(d) Registered Members will be notified of adjustments to Section 14 – Schedule of Variations by email and noticeboard.

1.8 AMENDMENTS TO THESE GUIDELINES

(a) From time to time, amendments to these Guidelines may be required to address, among other things:

(i) Changes in legal and regulatory requirements;

(ii) Changes in community expectations;

(iii) Advances in industry best practice;

(iv) Adjustments to environmental, economic, and/or social objectives; and

(v) Addition or cancellation of Reference Documents.

(b) Requests for Amendment must be submitted via the Subdivision Development Guidelines Online Platform. Refer Part 2: Reference Documents for Variation and Amendment Flow Chart and Checklists.

(c) Amendments can only be sought by Local Government Authorities, the Local Government Association NT (LGANT), NTG Agencies, Service Authorities, Property Council of Australia, the Urban Development Institute of Australia NT (UDIA) and the Civil Contractors Federation NT (CCFNT). Amendments proposed by individuals must be endorsed and submitted by one of the above entities or any other relevant industry representative body.

(d) Requests for Amendment must be made in respect of the general or global application of these Guidelines, noting that the following requests will not be considered:

(i) departures from or variations to these Guidelines on a project-specific basis; and

(ii) changes to the standards set out in the Reference Documents, which are the remit of the Relevant Authorities and Regulatory Authorities.

(e) Registered Members will be notified of adopted Amendments to these Guidelines including associated Reference Documents, Standard Drawings, and Technical Specifications, by email and noticeboard.

1.9 INTERPRETATION

(a) In These Guidelines:

(i) a reference to a person includes a body corporate;

(ii) “including” and similar words are not words of limitation;

(iii) a reference to a statute or other law includes regulations, by-laws and other instruments under it and consolidations, amendments, re-enactments or replacements of any of them;

(iv) a reference to any document or instrument not set out in these Guidelines includes any variation or replacement of it;

(v) a reference to any document or instrument included in these Guidelines means the document set out in Part 2, Part 3 or Part 4 (as the case may be);

(vi) a reference to clauses, sections, parts, annexures or schedules is a reference to the clauses, sections, parts, annexures or schedules of these Guidelines; and

(vii) a reference to any authority, association or body whether statutory or otherwise must, if that authority, association or body ceases to exist or is re constituted, re named or replaced or its

powers or functions are transferred to any other authority, association or body, be thereafter taken to refer respectively to the authority, association or body established or constituted in its place or as nearly as may be succeeding to its powers or functions.

(b) Part 1 of these Guidelines is to be read in conjunction with all Reference Documents, Standard Drawings and Technical Specifications. Where there is any inconsistency, conflict, discrepancy, error, or omission between Part 1 of these Guidelines and any Reference Document, Standard Drawing or Technical Specification the Developer must notify the Relevant Authority for direction.

Hierarchy of integrated land use and infrastructure planning

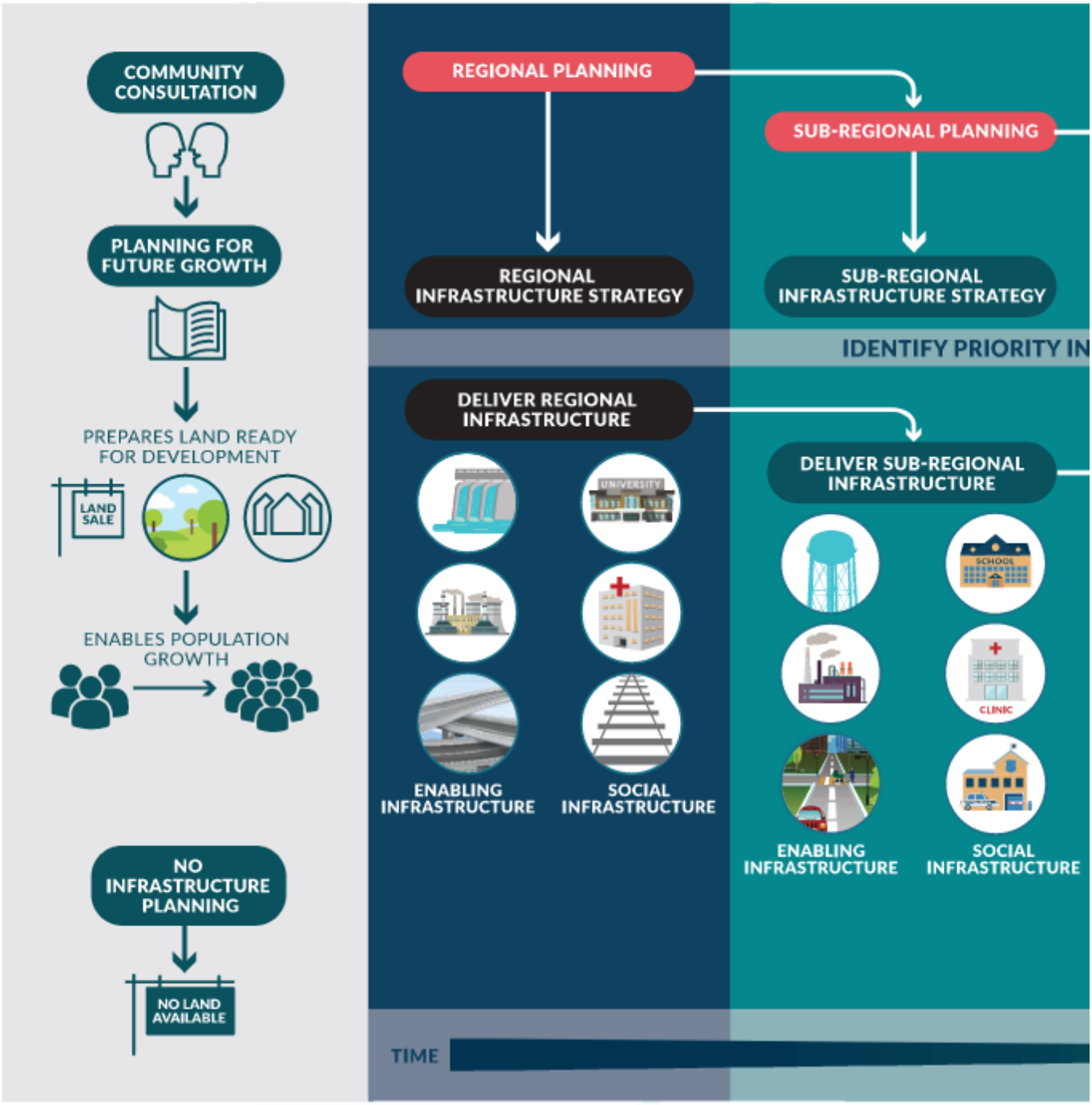


Figure 1 – Integrated Land use and Infrastructure Planning

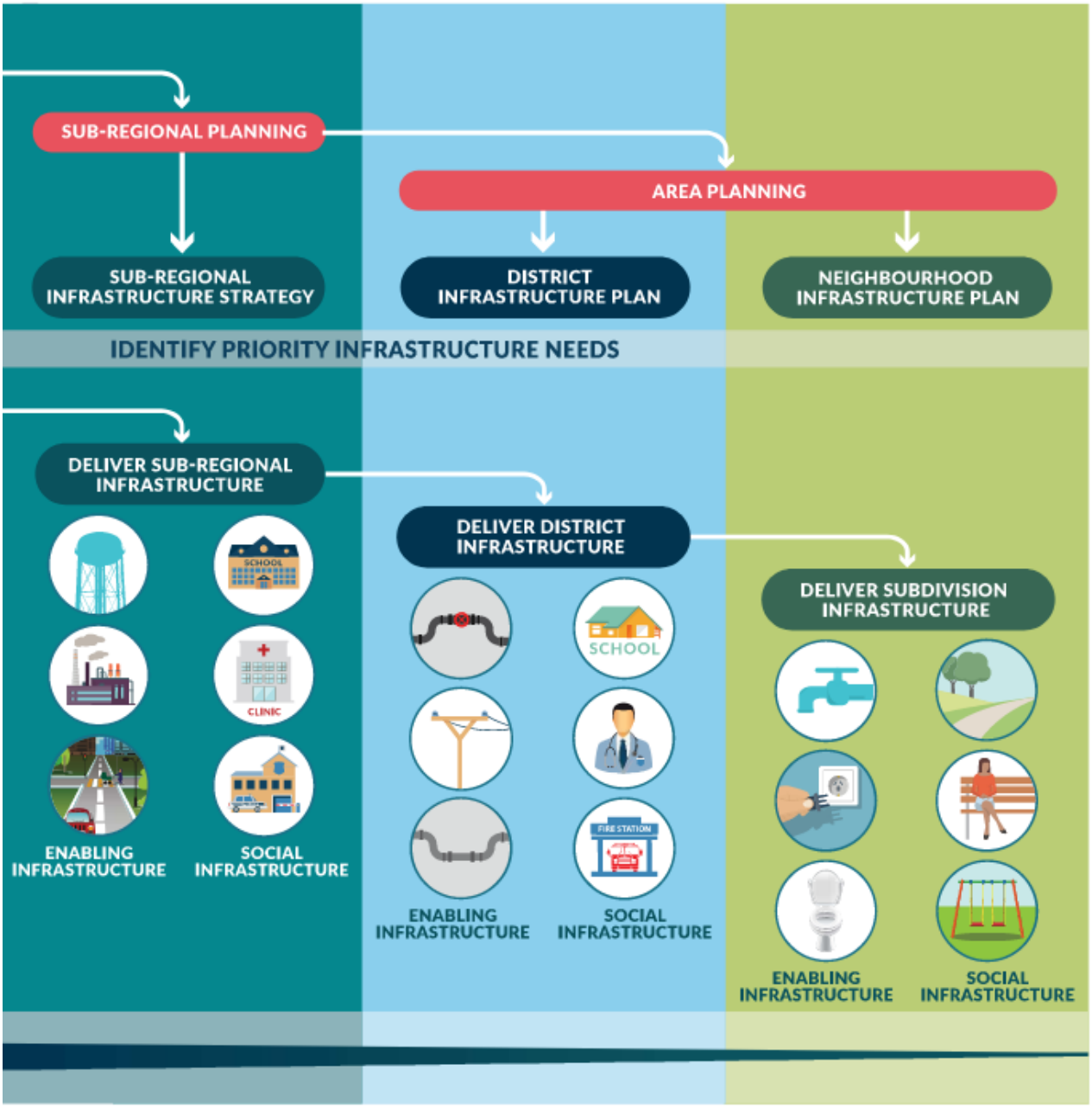


Figure 1 – Integrated Land use and Infrastructure Planning (Continued)

Hierarchy of Enabling Infrastructure

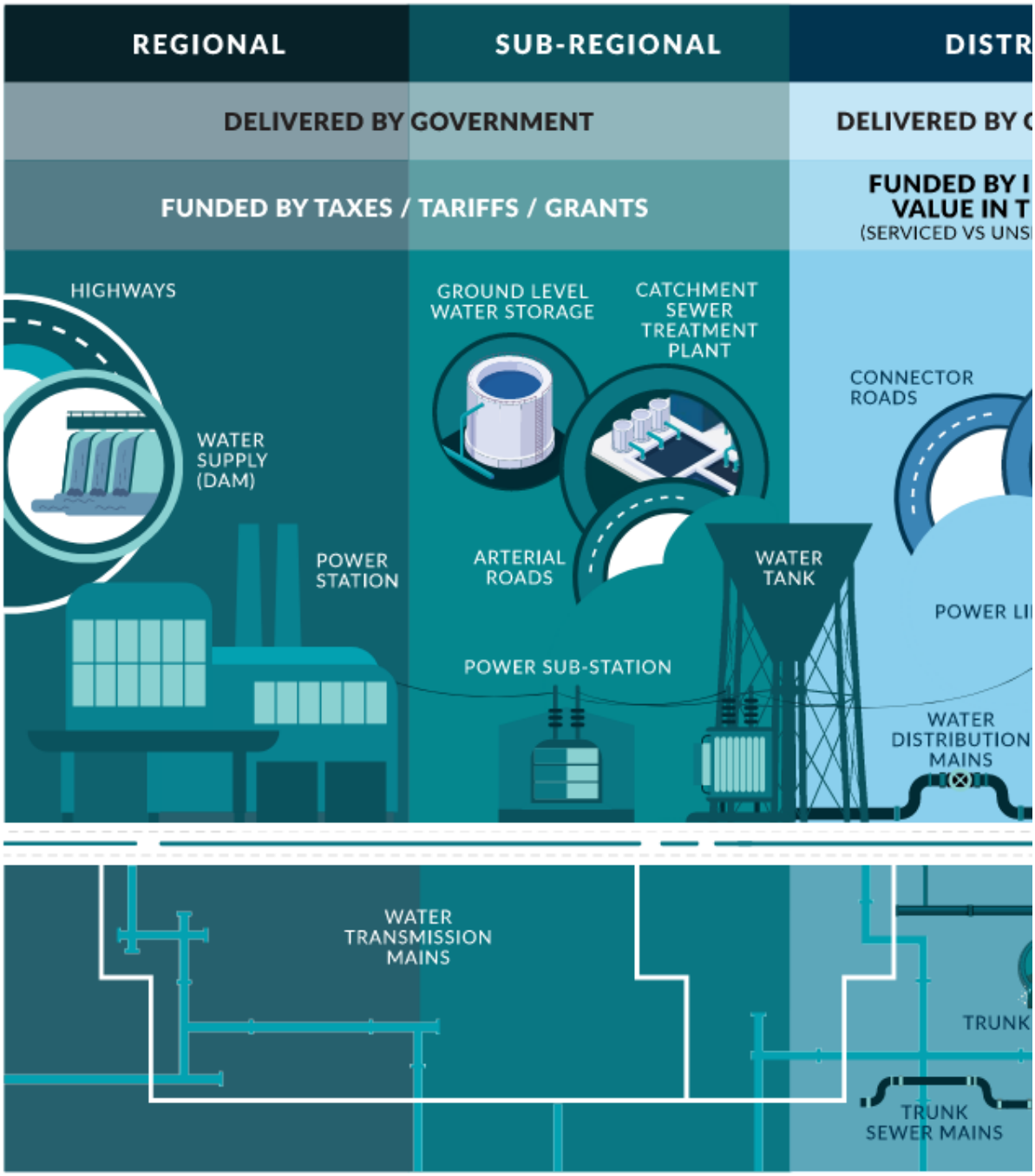


Figure 2 – Hierarchy of Enabling infrastructure

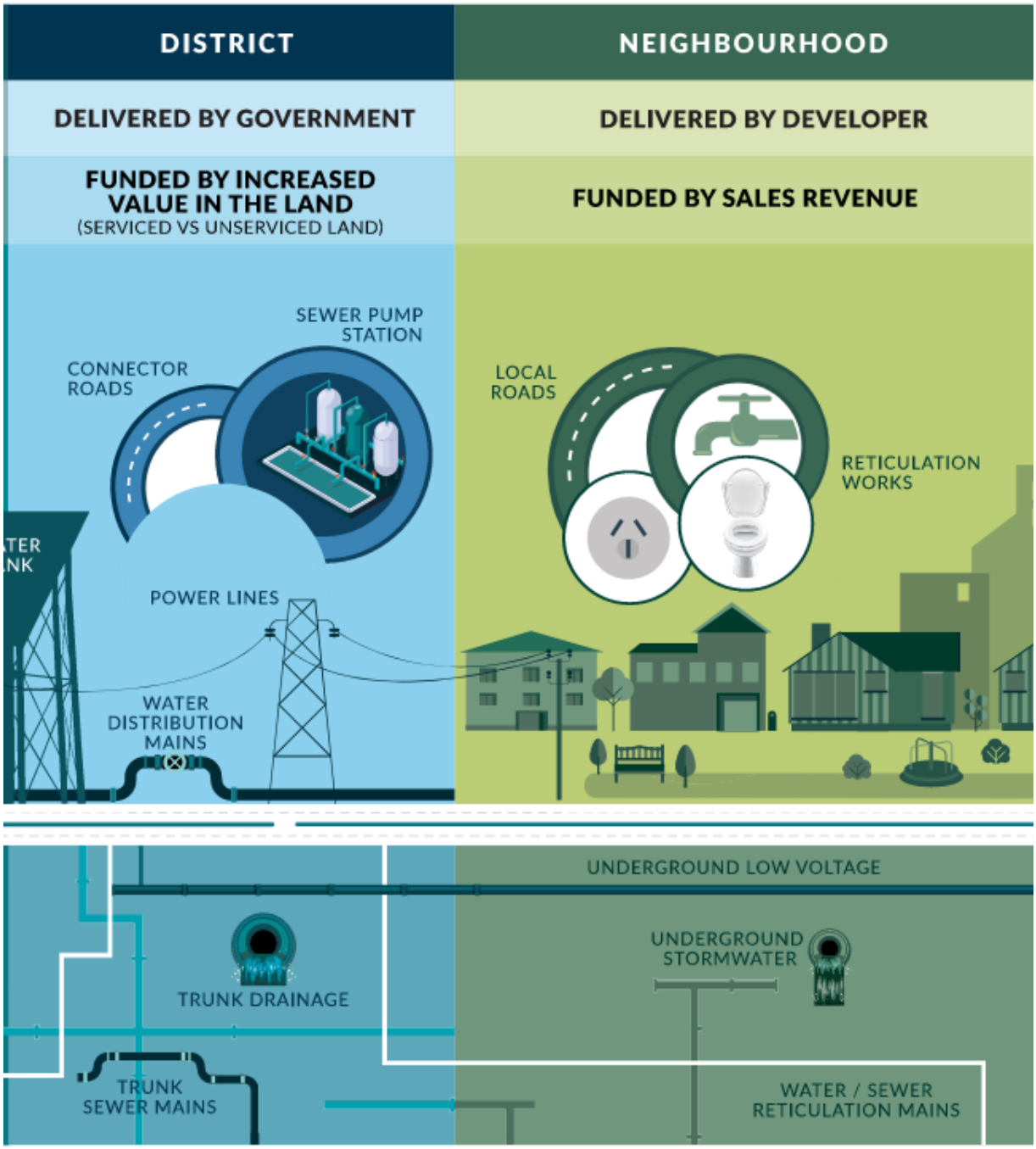


Figure 3 – Hierarchy of Enabling Infrastructure (Continued)

2 BEST PRACTICE DESIGN IN THE NORTHERN TERRITORY

2.1 SUBDIVISION TYPE AND INFRASTRUCTURE

(a) Depending on both the Subdivision land use zoning and locality, a Subdivision is expected to meet varying infrastructure requirements. This is nominated via Infrastructure Categories in Table 1. While all best endeavours have been made to provide an exhaustive list of localities, the Relevant Authority should be consulted to confirm applicable Infrastructure Categories where a locality is not listed.

(b) Typical infrastructure expectations for each Infrastructure Categories are provided in Table 2.

Table 1 – Subdivision Infrastructure Categories

Proposed Land Use Zoning (Refer Planning Scheme for Detail)	Localities (Refer Figure 4)	Infrastructure Categories
Residential / Mixed Use[1]	Darwin, Jabiru, Katherine, Litchfield, Nhulunbuy (Gove), Palmerston	Category A (Set 1)
Industrial	Alice Springs, Tennant Creek	Category A (Set 2)
	Adelaide River, Ali Curung, Alpurrarulam, Ampilatwaja, Angurugu, Batchelor, Beswick, Borroloola, Daguragu, Elliott, Galiwinku (Echo Island), Gapuwiyak (Lake Evella), Gunbalanya (Oenpelli), Hermannsburg, Kalkarindji (Wave Hill), Kintore, Lajamanu, Maningrida, Mataranka, Milikapiti (Snake Bay), Milingimbi, Milyakburra (Bickerton Island), Minyerri, Ngukurr, Numbulwar, Papunya, Pine Creek, Raminginning, Santa Teresa, Ti Tree (Pmara Jutunta), Timber Creek, Umbakumba, Wadeye, Wagait, Wurrumiyanga (Nguiu), Yirrkala, Yuendumu.	Category B
	Acacia Larrakia, Amanbidji (Kildirk), Amoonguna, Areyonga, Arlparra, Atitjere (Hart Range), Belyuen, Bulla, Barunga, Binjari, Bulman, Canteen Creek (Owaitilla), Engawala, Eva Valley (Manyallaluk), Finke (Aputula), Gunyangara (Marngarr, Ski Beach), Haasts Bluff (Ikuntji), Imangara (Murray Downs), Imanpa, Jilkminggan (Duck Creek), Kaltukatjara (Docker River), Kybrook Farm, Laramba, Minjilang (Croker Island), Mt Liebig, Nauiyu (Daly River), Newcastle Waters, Nganmarriyanga (Palumpa), Nyirripi, Orrtipa Thurra, Peppimenarti, Pigeon Hole, Pirlangimpi, Rittarangu, Robinson River, Tara, Titjikala, Urlampe, Wallace Rockhole, Warruwi, Weemol, Willowra, Wilora, Wutunugurra (Epenarra), Yarralin, Yuelamu.	Category C
Rural Zones[2]	Alice Springs, Darwin, Jabiru, Katherine, Litchfield, Nhulunbuy (Gove), Palmerston, Tennant Creek	Category D
	All other Localities	Category E

1. Mixed Use includes Commercial Zones, Recreation Zones and Other Zones as defined in Part 3 of the Planning Scheme.

2. Rural Residential (RR) allotments residing in Residential / Mixed Use Subdivisions are to be provide with the same infrastructure category as the associated Residential/Mixed Use areas (Category A, B, or C).

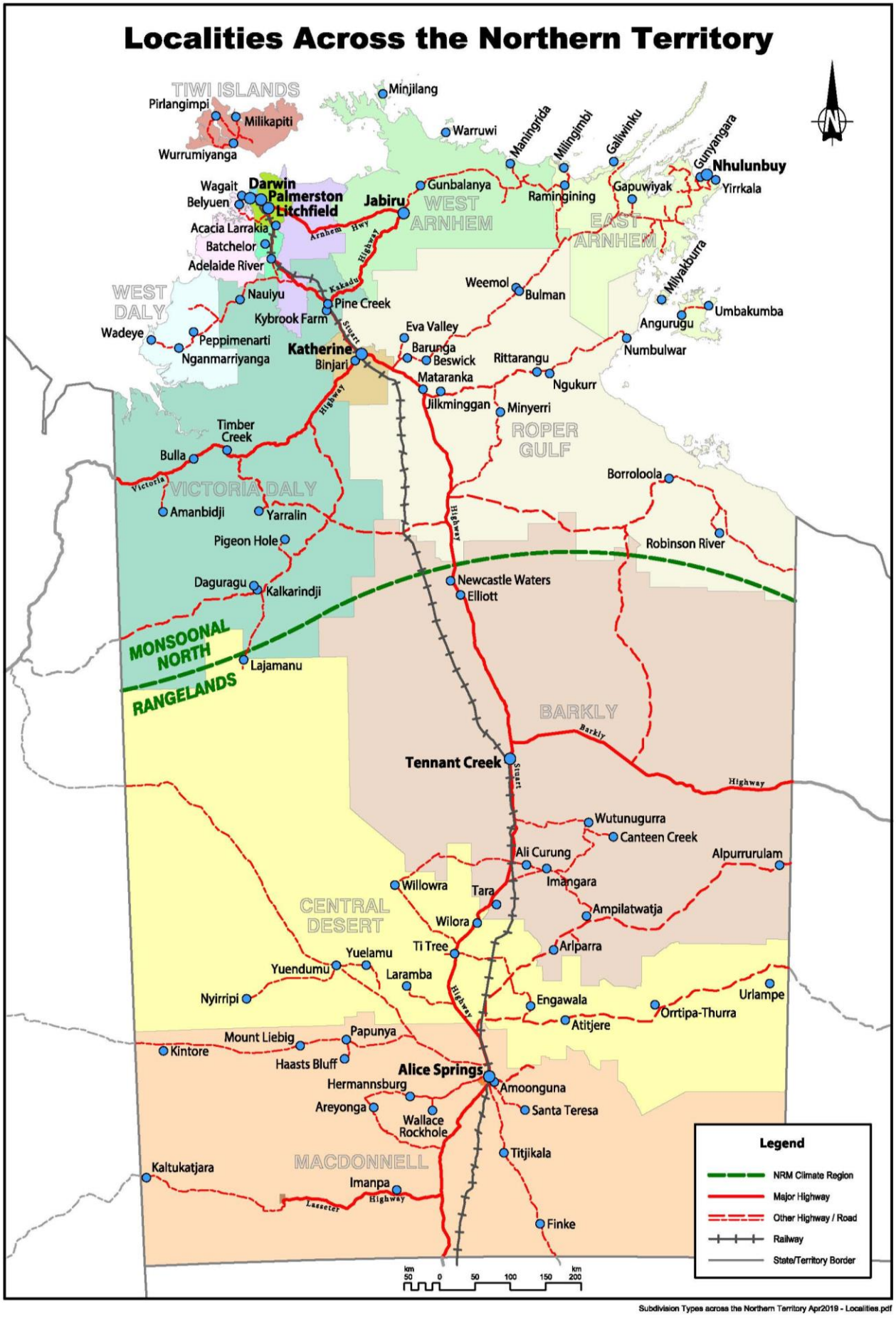


Figure 4 – Localities Across the Northern Territory

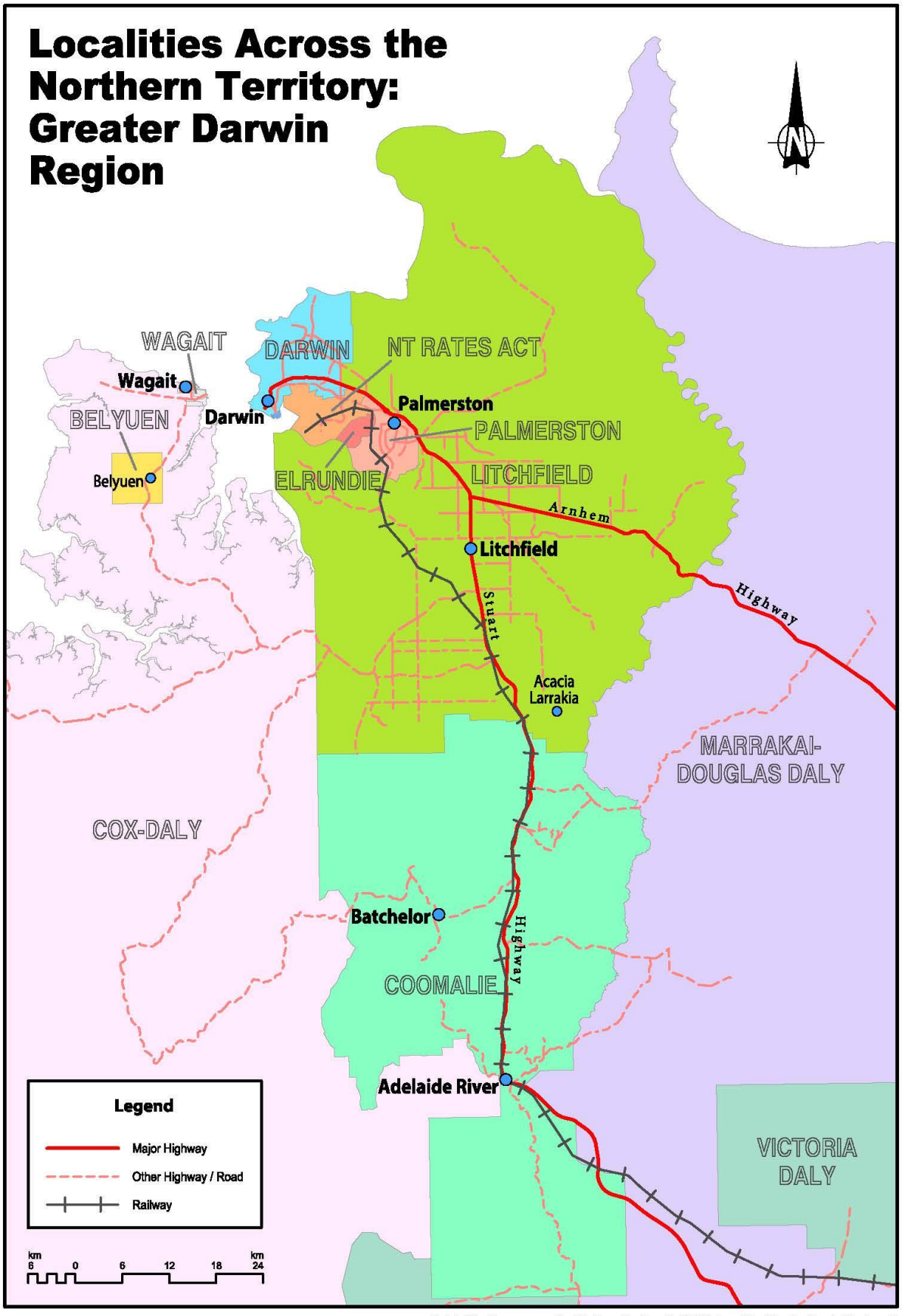


Figure 5 – Localities Across the Northern Territory: Greater Darwin Region

Table 2 – Typical Public Infrastructure Expectations					
Public Infrastructure	Infrastructure Categories				
	Category A	Category B	Category C	Category D	Category E
Street Cross-Section	Sealed carriageway. Kerb and gutter. Verges with utilities and underground drainage.	Sealed carriageway. Kerb and gutter. Table drains. Utility and footpath corridors.	Sealed carriageway. Shoulders generally, kerbing at intersections. Table drains. Utility and footpath corridors.	Sealed carriageway. Shoulders. Table drains. Utility and footpath corridors.	
Pavement Structure	Fine crushed rock pavement. Asphalt wearing course.	Natural gravel pavement. Spray seal.		Natural Gravel or Fine crushed rock pavement. Spray seal / Asphalt wearing course.	Natural gravel pavement. Spray seal.
Driveways	Concrete	Spray seal or concrete		Spray seal or concrete	
Pathways	Concrete footpaths and shared paths	Spray seal or concrete footpaths	Footpath corridors only[1]	Footpath corridors only[1]	
Public Open Space and Soft Landscaping	Planting and Grassing within Road Reserves. Public Open Spaces, where applicable.	Grassing of streetscape, including batters and table drains. Public Open Spaces, where applicable.		Grassing of streetscape, including batters and table drains.	
Stormwater Drainage	Underground pit/pipe network[3].	Kerbed discharge into aboveground open drain network.	Aboveground open drain network.	Aboveground open drain network.	
Water Supply	Reticulated water.			Reticulated water where available, otherwise on-site bore.	
Wastewater Management	Reticulated sewer.	Reticulated sewer where available, otherwise on-site wastewater management.			
Electrical	Underground[2].	Overhead.			
Lighting	Streetlights with stand- alone poles.	Streetlights mounted to overhead power poles.		Flag lighting where required by Relevant Authority.	

1. Footpaths may be required for Infrastructure Category C and D, subject to local planning objectives.

2. Overhead Electrical may be suitable in Industrial Subdivisions, subject to approval by the Relevant Authority.

3. Aboveground open drain networks may be required in some project specific circumstances where topography is very flat, subject to approval by the Relevant Authority.

2.2 DESIGN AND DEVELOPMENT PROCESS

(a) These Guidelines recommend a pathway for Subdivision design and engagement between Developers and the various Relevant Authorities and Regulatory Authorities. Early engagement with stakeholders allows for identification of the broader context, constraints, opportunities and potential risks which apply to a Subdivision. This early identification allows for changes with minimal impact to cost, meanwhile building confidence between the Developer and the Relevant Authorities about the project outcomes.

(b) The ability to accommodate design changes without significantly impacting cost is highest at the start of the project and decreases as the project progresses. Figure 6 represents this relationship in reference to the design phases.

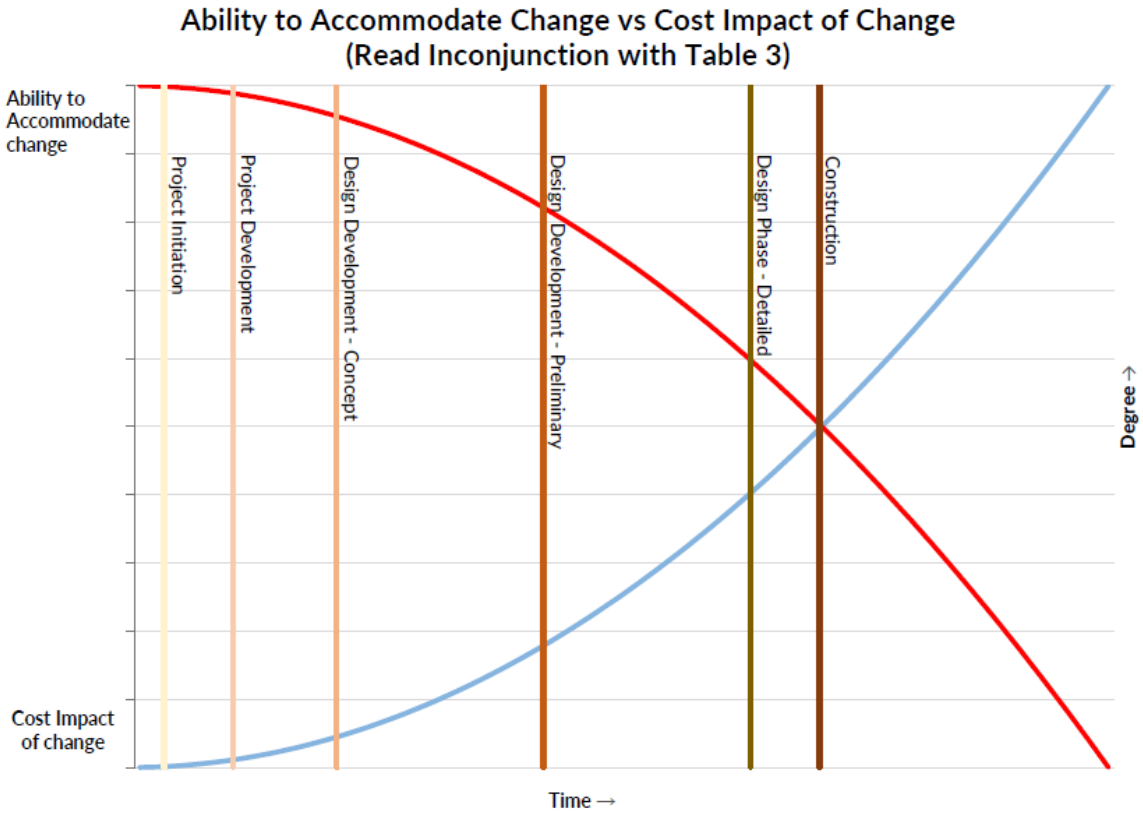


Figure 6 – Ability to Accommodate Change vs. Cost Impact of Change

(c) Table 3 establishes a recommended Subdivision planning, design and approvals process that seeks to provide an increasing level of certainty commensurate with design maturity. The process identifies the increasingly comprehensive investigations required to identify land use constraints and opportunities, and methods to resolve them through engagement with Relevant Authorities and Regulatory Authorities.

(d) These Guidelines assume that the zoning of the land is appropriate for a proposed Subdivision. Where the zone of the land is not appropriate, an application to rezone will be required and can be considered as a separate application, or as a concurrent application with the Subdivision development proposal. A similar process as outlined at Table 3 below may be considered to prepare a rezoning application to demonstrate the capability of the land to support a proposed rezone.

(e) Advice on proposals to change land use zones can be provided by Lands Planning at:

Contacts		
Address Level 1, Energy House 18-20 Cavenagh Street, Darwin	Email: planning.ntg@nt.gov.au	Phone: (08) 8999 8963

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**
PROJECT INITIATION	Compile all necessary information to make an informed decision about proceeding with a Development Application. It is recommended that the Developer engages a Planner for support with the Subdivision process. The Developer may also book a meeting to get advice from either a Development Assessment Services (DAS) Planner, or the Development Consent Authority (DCA), in relation to preparing an application. Once a decision is made to proceed with a Subdivision, prepare a Draft Subdivision Masterplan and document project constraints, risks and opportunities. It is recommended that the Developer book a Pre-Application Planning Forum meeting, via the Development Assessment Online portal, to obtain early guidance from Relevant Authorities in relation to a proposal, which may assist the Developer in compiling the necessary information to make an informed decision on whether they choose to progress towards preparing further supporting documentation. **Milestones:** Meet with a DAS Planner or DCA (Optional). Develop a Subdivision Masterplan and supporting documents on project constraints, risks and opportunities. Pre-Application Planning Forum Meeting (Optional).	Prepare a Draft Subdivision Masterplan, as outlined in Section 2.3, including: • Locality of Development Site • Existing land use zoning and any re-zoning requirement. • Proposed Public Infrastructure classification to be adopted (Refer Table 1). • Proposed lot sizes. • Proposed land use, including public open space areas and mixed use precincts. • Indicative street network and hierarchy, including planned bus routes. • Indicative stormwater management practices including flow directions and assigned areas for stormwater quality treatment devices. • Indicative servicing arrangements, including identification of existing infrastructure. • Proposed staging of the works (if applicable). • Evidence of compliance with Area Plans provided under the Planning Scheme (if applicable). • Overview of any project constraints, risks and opportunities.

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**

PROJECT DEVELOPMENT	Update the Subdivision Masterplan and conduct Subdivision Suitability Assessments.
	Once the Subdivision Masterplan and Suitability Assessments are completed, it is recommended that the Developer consult with the Relevant Authorities to seek advice on any particular constraints, risks and opportunities. This information can be used to support the Development Application.
	Prepare a Development Application and submit to Development Assessment Services for conditional approval to proceed with the proposed Subdivision.
	Prior to submission, it is recommended that the Developer book a Pre-Application Planning Forum meeting, via the Development Assessment Online portal, to present the Subdivision proposal and receive preliminary advice from Relevant Authorities on any particular constraints, risks and opportunities. This information can be used to assist the Developer to prepare a Development Application.
	Once the Development Application is submitted, it will be put on exhibition and distributed to the various Relevant Authorities and Regulatory Authorities for comment which may inform permit conditions. Typically each Relevant Authority will request any works, to be handed over to them, are completed to their satisfaction in accordance with these Guidelines.
	Once satisfied with the Development Application and comments received, the DCA will issue the Developer with a Development Permit including conditions to be met. This will include 'Conditions Precedent' which need to be signed off prior to commencing construction works, as well as 'General Conditions' which must be met to facilitate Part V Clearance.
	
	Milestones:
	Subdivision Masterplan updated.
	Subdivision Suitability Assessments completed.
	Pre-Application Briefing held (optional).
	Development Application submitted.
	Development Permit issued, with listed Conditions imposed upon the Subdivision.
		Conduct Subdivision Suitability Assessments, as outlined in Section 3, considering:
		• Land Suitability
		• Environmental Risk
		• Aboriginal Areas Protection Authority (AAPA) certificates
		• Heritage Assessments
		• Contaminated Land
		• Biting Insect Constraints
		• Land Use Separation Zones
		• Well-head Protection Zones
		• Pre-feasibility Infrastructure Capacity Assessment
		Update Subdivision Masterplan, as outlined in Section 2.3. In addition to the information presented in the project initiation phase, the Draft Subdivision Masterplan must include:
		• Site constraints imposed by Subdivision Suitability Assessments and how they are intended to be resolved.
		• Refined street network and hierarchy design, supported by a separate Traffic Impact Assessment/Statement if applicable (Refer Section 4.3). Identify the following:
		  ○ bus routes/stops and associated catchment areas;
		  ○ emergency/service vehicle access provisions or limitations;
		  ○ allotment access arrangements;
		  ○ formalised parking; and
		  ○ footpath / shared path networks.
		• Refined extent of Open Space and Landscaping provisions, supported by a separate Public Open Space Masterplan if applicable (Refer Section 5.2 0).
		• Refined stormwater drainage layouts, supported by a separate Part 1 Stormwater Management Plan (Refer Section 7.1.1).
		• Proposed servicing arrangements, supported by a separate Servicing Strategy Report, including:
		  ○ Concept Master Services Plans, with proposed easements/reserves and Authorised Connections;
		  ○ Scope of headworks required, as agreed with the Relevant Authorities;
		  ○ Identification of design basis/criteria, assumptions, modelling methodology and boundary conditions including allowances for future development and redundancies; and
		  ○ Identification of the need and scope for detailed site investigations to support servicing designs.

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**
DESIGN DEVELOPMENT - CONCEPT	Advance documentation to a "concept" design. Consult with the Relevant Authorities and Regulatory Authorities to confirm the design basis and scope of work to be undertaken, including review of associated project constraints, risks and opportunities. Where possible, Development Permit Conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Consultation with Relevant Authorities to discuss Development Permit conditions and agree on a design basis and scope of work to be undertaken. Clearance Letter(s) obtained for Development Permit Conditions progressively. Concept Design Documentation complete.	Concept street network and hierarchy design in response to Relevant Authority review and addressing TIA recommendations. Concept pedestrian/cycle routes, including proposed pathway widths and provisions for high activity areas (schools/commercial/activity centres etc.) Concept public open space strategies and soft landscaping treatments, including CPTED strategy measures integrated / implemented. Concept stormwater design layouts and details, supported by a separate Part 2 Stormwater Management Plan (Refer Section 7.1.2). Concept utilities and lighting servicing plans, including identification of design criteria, assumptions, and modelling methodology.
DESIGN DEVELOPMENT - PRELIMINARY	Advance design documentation to a "Preliminary" design. It is recommended that the Developer seeks advice and comments from Relevant Authority(s) and Regulatory Authority(s) on progression of design to resolve emerging issues. Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. It is recommended that the Developer commences enquiry with the Place Names Committee for the naming of places and/or streets. **Milestones:** Consultation with Relevant Authorities to progressively agree on design decisions and resolve any emerging issues (optional). Clearance Letter(s) obtained for Development Permit Conditions progressively. Preliminary Design Documentation complete. Note: A formal preliminary design milestone may not be required for all Subdivisions, depending on the context. However, it is recommended that the steps outlined be followed for all Subdivisions.	Preliminary engineering design drawings for all streets, stormwater drainage/quality, utilities and lighting servicing works including advanced plans, cross-sections, details and levels. Landscaping design drawings for all public open spaces and community Public Infrastructure including parks, playgrounds and other equipment, shade structures footpaths / cycle paths etc. Preliminary Design Report detailing all design parameters and outcomes to ensure the requirements of all Relevant Authorities and Regulatory Authorities are met. The official naming of a place in the Northern Territory occurs under the Place Names Act 1967. A place can be a street, park, building or other public infrastructure. The Act establishes the Place Names Committee to consider place naming requests and make recommendations to the Minister, who is responsible for approving names. The requirements for a place naming request depend on the type of place to be named, where the place is located, the nature of the preferred name, and who owns, or will own, or manage the place. Consultation for place naming requests is the responsibility of the Developer and names and requests must meet the NT Place Naming Guidelines (and referenced policies and standards). Detail on how to develop a place naming request is available at www.placenames.nt.gov.au.

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**
DESIGN DEVELOPMENT - DETAILED	Advance design documentation to a "Detailed" design and obtain Certification from the Certifying Engineer(s). Once design documentation is complete and Certified, the Developer must submit the documentation to the Relevant Authority(s) and Regulatory Authority(s) for a detailed review. Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Consultation with Relevant Authorities to progressively agree on design decisions and resolve any emerging issues (optional). Clearance Letter(s) obtained for Development Permit Conditions progressively. Detailed Design Documentation completed, Certified and submitted to the Relevant Authority(s) and Regulatory Authority(s) for detailed review.	Detailed Design Documentation must include drawings, technical specifications and Design Reports including calculations and modelling data to the satisfaction of the Relevant Authority(s) and Regulatory Authority(s). The scope of design documentation to be developed must meet the minimum requirements of Section 2.4 "Detailed Design Documentation Requirements".
DESIGN DEVELOPMENT - APPROVALS	Consider and address comments received from the detailed design development phase reviews. Where Detailed Design Documentation is amended, it must be Certified by the Certifying Engineer(s) and resubmitted for final 'Permission to Use' as outlined in Section 2.5 "Review and Approval Process". Where possible, Development Permit conditions should be progressively signed off with Clearance Letters issued from the Relevant Authorities and Regulatory Authorities. **Milestones:** Design Documentation completed. When satisfied, the Relevant Authority and/or Regulatory Authority(s) will provide permission to use the documentation for construction, subject to any conditions required. Clearance Letter(s) obtained for Development Permit Conditions progressively.	Final Design Documentation must be presented to the Relevant Authority and/or Regulatory Authority(s), accompanied by a letter from the design consultant summarising the changes requested and how those changes have been incorporated. Once Stormwater and Landscaping designs have been approved by the Relevant Authority(s), and where required by the Development Permit, submit an Erosion and Sediment Control Plan detailing mitigation and management plans for the construction and post-construction phases.

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**
CONSTRUCTION PRELIMINARIES	Prior to commencing works on site, all Conditions Precedent must be addressed with Clearance Letters issued by the Relevant Authorities and Regulatory Authorities. Following receipt of all design approvals and prior to commencement of construction works, the Developer must prepare a series of plans for approval by the Relevant Authority(s). The Developer must also hold a pre-commencement meeting with all Relevant Authority(s) to address key issues. **Milestones:** Clearance Letter(s) obtained for all Development Permit Conditions Precedent. Developer obtains all necessary approvals and permits from Relevant Authority(s). Commencement of Construction.	A Dilapidation Report must be prepared to assess the condition of existing Public Infrastructure. All necessary insurances must be obtained, as required by the Relevant Authority. The following plans must be submitted as a minimum: • Construction Environmental Management Plan, including Erosion and Sediment Control Plan (Refer Section 7.10.3). • Weed Management Plan, including pre-construction survey of declared weeds, identified management actions, and weed spread prevention measures. • Construction Traffic Management Plans addressing parking, construction access, vehicle routes and restrictions etc. • Traffic Management Plans, including Permit(s) to Work in Road Reserves. • Safety Management Plans • Inspection and Test Plans A Community Consultation Plan may also be required.
CONSTRUCTION	Construction activities commence. Developer to obtain all necessary permits, approvals and clearances for each component of the Development Works as works progress. Developer must undertake all Process and Conformance Testing, as per approved Inspection Test Plan(s). **Milestones:** Inspection Points signed off. Construction Works Complete.	Provide no less than 48 hours' notice to Relevant Authority(s) and Certifying Engineer for Inspection Points, as identified in the Standard Specification for Subdivisions (Refer Part 4). Provide 10 Business Days prior written notice of the date upon which the Developer estimates it will complete construction of each component of the Development Works intended to be handed over to that Relevant Authority.
PRACTICAL COMPLETION	The works have been completed in accordance with the requirements of all laws and approvals, these Guidelines, all relevant Base Standards, and the requirements of any Relevant Authority and/or Regulatory Authority. The Developer submits Practical Completion documentation to the Relevant Authority(s). The Relevant Authority(s) undertake an inspection of the completed works, to determine Practical Completion has been achieved. The Developer issues Security Bond(s) to the Relevant Authority(s). **Milestones:** Practical Completion Letter(s) and Clearance Letter issued by each Relevant Authority(s). Commencement of Defects Liability Period.	Practical Completion documentation to include: • Completion Certificate, including certificates of compliance; • Construction report, including CCTV Inspection of underground stormwater networks; • As-constructed drawings in PDF and CAD Format, including As-Constructed Survey files identifying all works as-constructed including depth and position of underground services; • Register of non-conformances and changes from the approved design, including evidence of Certification by the Certifying Engineer and approval by the Relevant Authority. • Register of assets to be handed over, including Construction Cost and Dilapidation Reports; and • All manuals, warranties and other documents required for the use, operation and maintenance of all services and systems forming part of the Development Works. Issue Security Bond(s) to Relevant Authority(s).

Table 3 — Design, Construction and Handover Process		
	GUIDANCE NOTES	**TYPICAL DETAIL**
LAND TITLES	Developer to apply to Development Assessment Services (DAS) for Part V approval. The Developer's Licensed Surveyor lodges the Survey Plans of the Subdivision to the Surveyor General for approval. Developer to apply to Land Titles Office for concurrence of Survey Plan(s) and associated Land Titles. **Milestones:** Part V Clearance issued by DAS. Land titles issued by Land Titles Office. Approved Survey Plan(s) issued by Surveyor General's Office.	Provide Clearance Letter(s) from each Relevant Authority. Survey Plan(s) must be endorsed by a Licensed Surveyor registered under the Licensed Surveys Act 1983 NT, and must comply with the Survey Practice Directions, and Plan Drawing Standards as issued by the Surveyors Board of the NT; and other requirements as specified by the Surveyor General. Provide approved Survey Plan(s) and relevant Land Titles Office forms.
DEFECTS LIABILITY PERIOD	Developer is responsible for maintenance of Soft Landscaping and rectifying any Defects associated with all of the Development Works for the nominated Defects Liability Period. **Milestones:** Completion of Defects Liability Period.	Maintain Landscaping Works in a healthy condition for the associated Defects Liability Period. Developer to repair, replace or otherwise make good any Defect(s) which occur during the Defects Liability Period in respect of each component of the Development Works.
HANDOVER	One month prior to completion of the Defects Liability Period, including any extensions applied due to rectification works undertaken, Developer to apply for handover and release of security bonds to the Relevant Authority(s). Relevant Authority(s) to undertake a Final Inspection to confirm there are no outstanding Defects. **Milestones:** Relevant Authority(s) accepts Handover of the Development Works. Relevant Authority(s) release Security Bond(s) to Developer.	Nil.

2.3 SUBDIVISION MASTERPLAN

(a) The Developer must prepare a Subdivision Masterplan and submit it with each Development Application.

(b) For staged Subdivisions, the Subdivision Masterplan must:

  (i) identify proposed staging and the extent of Public Infrastructure to be provided within each stage; and

  (ii) be updated with each completed stage to reflect the Public Infrastructure constructed and required amendments to future stages.

(c) A Subdivision Masterplan provides a central document for integrated planning and design of Public Infrastructure including streets and pathways, public open space and soft landscaping, stormwater drainage, lighting and utilities. It is also used to establish the context of the Subdivision with respect to its relationship with existing Public Infrastructure and/or planned development areas surrounding the Development Site.

(d) The objectives of the Subdivision Masterplan are to ensure:

  (i) compliance with requirements of the Planning Scheme and these Guidelines;

  (ii) adequate information is provided during project initiation and project development phases to identify potential issues as early as practicable, and aid ease of assessment for proposed Subdivisions;

  (iii) Subdivisions provide effective and economical Public Infrastructure that integrates well with existing and/or planned regional Public Infrastructure;

  (iv) External Works are planned and delivered to service the full regional development potential to avoid future rework; and

  (v) Subdivisions are appropriately planned to manage interfaces between stages and/or external Development Sites in a coordinated, safe and efficient manner.

(e) The Subdivision Masterplan must include:

  (i) Existing land use zoning and locality.

  (ii) Proposed land use, including public open space areas and mixed use precincts.

  (iii) Proposed Public Infrastructure classification to be adopted (Refer Table 1).

  (iv) Site constraints imposed by Subdivision Suitability Assessments and how they have been considered and addressed.

  (v) Street network and hierarchy, including:

    (A) bus routes/stops and associated catchment areas;

    (B) emergency/service vehicle access provisions or limitations;

    (C) allotment access arrangements;

    (D) formalised parking;

    (E) footpath/shared path networks; and

    (F) connectivity of streets and pathways with existing/proposed Public Infrastructure surrounding the Development Site.

  (vi) Open Space and Soft Landscaping provisions, supported by a separate Public Open Space Masterplan if applicable (Refer Section 5.2).

  (vii) Stormwater management practices including catchments, flow directions and assigned areas for stormwater quality treatment devices.

  (viii) Proposed Servicing arrangements, including identification of existing Public Infrastructure and scope of External Works required.

  (ix) Proposed staging of the works (if applicable).

  (x) Evidence of compliance with Area Plans provided under the Planning Scheme (if applicable).

(f) The Subdivision Masterplan must demonstrate how the Developer intends to resolve issues arising from:

(i) the Developers objectives;

(ii) Site Suitability Assessments (Refer Section 3);

(iii) these Guidelines; and

(iv) Statutory/Regulatory requirements.

2.4 DETAILED DESIGN DOCUMENTATION REQUIREMENTS

(a) All engineering documents must be submitted for a detailed review to the Relevant Authority(s) and/or Regulatory Authority(s), as applicable. All Design Documentation must be presented in accordance with current standard engineering practice and provide evidence of having been Certified to comply with all laws and approvals, these Guidelines, all Base Standards and any other relevant documentation.

(b) The documents submitted for review must include the items identified under Section 2.4.1, unless otherwise agreed with the Relevant Authority(s) and/or Regulatory Authority(s) that certain documents are not applicable due to project-specific context.

(c) The Developer must consult with the Relevant Authority(s) to confirm documentation standards which may be applicable, such as drawing formats and numbers.

2.4.1 DOCUMENTS TO BE SUBMITTED

(a) Site investigation reports, including the following as a minimum:

(i) Land Suitability Assessment

(ii) Environmental Risk Assessment

(iii) AAPA Certificates / Clearances

(iv) Engineering Survey / Service Locations

(v) Geotechnical Investigation

(vi) Traffic Impact Assessment

(vii) Infrastructure Capacity Assessments

(b) Detailed design drawings, including the following as a minimum:

(i) Locality plan and index of drawings

(ii) Proposed allotment plans, illustrating zones, lot sizes and building setbacks

(iii) Proposed access management plans, illustrating safe and clear access/crossover locations and extents

(iv) Site grading plans, illustrating contours before and after the development

(v) Street set out plans, longitudinal sections, cross sections, and intersection details

(vi) Stormwater drainage set out plans and longitudinal sections, illustrating catchment boundaries, hydraulic grade lines, subsoil drainage, allotment drainage provisions, major storm (1% AEP) controls, easements/reserves, lawful point(s) of discharge, and discharge to natural environment

(vii) Erosion and Sediment Control Plans

(viii) Landscaping Plans, including shared paths/footpaths, pedestrian linkages, park furniture, and recreation equipment

(ix) Irrigation Plans

(x) Water supply plans

(xi) Sewerage plans

(xii) Power supply (HV/LV) plans, including single line diagrams

(xiii) Street and public open space lighting plans

(xiv) Master services plans, showing staging (where applicable)

(c) Specifications in the form of Project Specific Requirements, if required to supplement the Standard Specification.

(d) Design Reports, including the following as a minimum:

(i) A summary of all design aspects describing the intent, criteria, assumptions, and considerations involved in the design.

(ii) Confirmation of compliance with the requirements of these Guidelines, specifically identifying any aspects of the development where the criteria set out in these Guidelines have not been met, including detailed reasons for varying from these Guidelines.

(iii) Detailed calculations for all Public Infrastructure including but not limited to traffic management, streets, pathways, pavements, stormwater drainage, stormwater quality, erosion and sediment control, utilities and lighting.

(e) Design of the following subjects must be addressed in one or more Design Report(s), submitted to the Relevant Authority(s) for approval:

(i) Development and Suitability Assessments

(ii) Earthworks Design

(iii) Stormwater Drainage Design, including:

(A) Design Basis

(B) Catchment Plans

(C) Hydrological Modelling Inputs/Outputs and Calculations

(D) Hydraulic Modelling Inputs/Outputs and Calculations

(E) Impacts on External Catchments

(F) Drainage Easements / Reserves

(G) Drainage infrastructure for minor/major stormwater management, including allotment drainage provisions and subsoil drainage

(H) Flow paths, extents and depths for the Major (1% AEP) Storm Event

(I) Flow Attenuation Devices

(J) Authorised Connections / Discharge to the Natural Environment

(K) Stormwater Quality Management

(L) Water Sensitive Urban Design

(M) Erosion and Sediment Control

(iv) Streets and Pathways Design

(A) Traffic Impact Assessment

(B) Street Network Design

(C) Geometrical Street Design

(D) Turn Path Diagrams

(E) Shared Paths and Footpaths

(F) Driveways / Access Points

(G) Noise Attenuation

(H) Pavement Design

(I) Traffic Control Devices

(J) Street Furniture

(K) Road Safety Audits

(v) Landscaping, Open Space and Irrigation Design

(vi) Street and Park Lighting Design

(vii) Utility designs, in accordance with the requirements of the Service Authority(s):

(A) Water

(B) Wastewater

(C) Electrical

(D) Communications

(viii) Lighting for both Road Reserves and Public Open Space

(ix) Structural Design, including entry statements, retaining walls, park furniture, shade structures etc.

(x) CPTED and Safety in Design. The Safety in Design assessment must comply with legal and regulatory requirements, identify hazards and provide a risk assessment including mitigation measures adopted. It must address all risks including, but not limited to, those associated with streets, drains, safety fencing and other potential issues.

2.5 REVIEW AND APPROVAL PROCESS

(a) The Developer must consult with the Relevant Authority(s) and Regulatory Authority(s) to confirm specific requirements relating to required forms, fees, time frames and submission requirements including required documentation formats.

(b) The Relevant Authority(s) and Regulatory Authority(s) will review all the submitted Design Documentation and provide comments which must be considered and addressed in the final Design Documentation.

(c) Final Design Documentation must be presented to the Relevant Authority and/or Regulatory Authority(s), accompanied by a letter from the Certifying Engineer summarising changes undertaken since the initial review.

(d) When satisfied, the Relevant Authority and/or Regulatory Authority(s) will provide permission to use the Design Documentation for construction, subject to any conditions required. Permission to use Design Documentation for construction does not imply that the Relevant Authority and/or Regulatory Authority(s) accepts any responsibility for the technical adequacy of the Design Documentation. The Developer is accountable and responsible for the adequacy of the Design Documentation.

3 SUBDIVISION SUITABILITY ASSESSMENTS

(a) This section covers assessments to be undertaken prior to commencing the civil design of a subdivision.

(b) The complete analysis of the Development Site is critical to identify opportunities and constraints of a site and determine the development capability.

3.1 LAND SUITABILITY ASSESSMENT

(a) Land Suitability Assessment is the consideration of land constraints to determine the most suitable economic use of land while also reducing potential environmental and social risks. The Planning Scheme requires a land suitability assessment addressing the Northern Territory Land Suitability Guidelines for proposals to subdivide rural land, unzoned land and lots of 1ha or greater.

(b) A Land Suitability Assessment addresses:

(i) drainage;

(ii) on-site wastewater management (where no reticulated sewer available);

(iii) erosion risk;

(iv) soil salinity;

(v) acid sulfate soils;

(vi) storm tide/surge flooding; and

(vii) riverine flooding.

(c) More detailed requirements relating to Subdivisions, on storm tide/surge flooding, riverine flooding, and on-site wastewater management, is covered under Section 7. Stormwater Drainage and Section 9. Wastewater Management.

3.2 ENVIRONMENTAL RISK ASSESSMENT

(a) The NT Environment Protection Authority (NT EPA) is responsible for regulating Environmental Impact Assessment (EIA) of proposed developments in the NT under the *Environmental Assessment Act 2019 (NT)*.

(b) EIA processes are defined by the subordinate Environmental Assessment Administrative Procedures (the Procedures), and are administered by the Environment Division of the Department of Environment, Parks and Water Security, for the NT EPA. The *Guide to the Environmental Impact Assessment Process in the Northern Territory* provides guidance on the process.

(c) The primary purpose of the EIA process is to provide for appropriate examination of proposed projects that may cause significant environmental impact. The EIA process provides Government, Developers and public stakeholders with the information needed to consider and make decisions on matters that could significantly affect the environment. It enables environmental issues to be considered in a balanced way with other aspects involved in determining the acceptability of a proposed action. It ensures that unnecessary and unacceptable harm to the environment can be avoided. The EIA process helps ensure that potential environmental impacts and potential risks are addressed at an early stage early in the planning and design of a proposed action, and proposals are designed in accordance with the principles of ecologically sustainable development.

(d) The *Environmental Assessment Act 2019 (NT)* applies to public and private projects including environmentally significant land uses and development decisions. The requirement for EIA may also apply in situations where a project, previously the subject of assessment, is subsequently altered in such a way that is likely to result in a significant effect on the environment.

(e) The Developer must undertake an Environmental Risk Assessment (ERA) in accordance with the *Environmental Risk Assessment Subdivision Guidelines*.

(i) The Developer must identify environmental values for the Development Site and assess what environmental risks result from the proposed Subdivision design. Where the Subdivision design is unable to mitigate risks to environmental values, the Developer must undertake a formal ERA.

(ii) An ERA is undertaken to identify the key environmental issues with the Subdivision. The risk assessment process is the initial step in demonstrating compliance with the *Environmental Assessment Act 2019 (NT)*.

(f) Where risks in the ERA cannot be mitigated to "low", a Notice of Intent is to be prepared and submitted to the NT EPA in accordance with *Referring a Proposal to the NT EPA*. Referral criteria for Subdivisions are defined in *Environmental Assessment Guidelines - When a Notice of Intent is not required for development proposals under the Planning Act*. The NT EPA will decide whether a detailed Environmental Impact Assessment is required under the *Environmental Assessment Act 2019 (NT)*.

3.3 ABORIGINAL AREAS PROTECTION AUTHORITY CERTIFICATE

(a) The Aboriginal Areas Protection Authority (AAPA) is an independent statutory authority established under the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* with responsibility for the protection of Aboriginal Sacred Sites on land and sea across the Northern Territory.

(b) All Sacred Sites in the NT are protected by the *Northern Territory Aboriginal Sacred Sites Act 1989 (NT)* as well as the *Aboriginal Land Rights (Northern Territory) Act 1976 (Cth)*, both of which create offences and penalties for entering on, remaining on, damaging or desecrating Sacred Sites.

(c) Any Development Works that disturb the landscape can potentially impact Sacred Sites.

(d) To avoid impacting Sacred Sites, anyone proposing to use or work on land in the Northern Territory may apply to AAPA for an Authority Certificate to cover their proposed activities. An Authority Certificate will identify the location of Sacred Sites within an area and set conditions for their protection.

(e) Compliance with an Authority Certificate provides legal protection for any damage caused to Sacred Sites.

(f) An application for an Authority Certificate should be made during the Project Initiation or Project Development phases of a Subdivision.

3.4 HERITAGE

(a) The Regulatory Authority in relation to heritage objects and places, and the Department of Lands, Planning and Environment (Heritage Branch).

(b) The Department of Lands, Planning and Environment (Heritage Branch) administers the *Heritage Act 2011 (NT)*, the NT Heritage Register and the NT Archaeological Sites Database.

(c) All Aboriginal and Macassan archaeological objects and places are automatically protected under the *Heritage Act 2011 (NT)*. The *Heritage Act 2011 (NT)* also protects other objects and places that have been declared a heritage object or place in accordance with the Act.

(d) All Developers must comply with the *Heritage Act 2011 (NT)* and in doing so, should conduct a search of the Heritage Register and contact the Heritage Branch prior to commencing any works, whether on greenfield or infill Development Sites for advice on:

(i) whether there are any known Aboriginal or Macassan archaeological objects or places on or in the vicinity of the proposed Development Site;

(ii) the likelihood of these places existing on or adjacent to any particular Development Site and the potential requirements for archaeological/heritage surveys prior to any construction or clearing activities; and

(iii) any steps needed to ensure compliance with the *Heritage Act 2011 (NT)* (and protection of any heritage objects or places) on or adjacent to a Development Site.

3.5 CONTAMINATED LAND

(a) Contaminated land is land (including the water and air on, above or under the land) which contains a pollutant in a concentration above naturally occurring levels, which is causing a risk to human health or environment; or has the potential to cause a risk to human health or environment in the future if not managed appropriately. In the Northern Territory, contaminated land is regulated by the Northern Territory Environment Protection Authority (NT EPA) through the *Waste Management and Pollution Control Act 1998 (NT)* and through input into the development approvals process controlled under the *Planning Act 1999 (NT)*. The *Northern Territory Contaminated Land Guideline* provides further details.

(b) An assessment of site contamination is triggered when a subdivision proposal is likely to result in a more sensitive or intensive use of the land, or where the development of the land itself may disturb or otherwise expose contamination. This is not limited to a change in zoning, although a change in zoning is indicative of a change in use.

(c) The *Northern Territory Contaminated Land Guideline* will provide the Developer with a greater understanding of the processes that trigger an assessment, the reasons why an assessment is necessary, and where a contaminated site Accredited Auditor may be required to independently review the investigation or remediation.

(d) Where a site contamination assessment is required, Developers must:

  (i) Undertake an assessment of site contamination in accordance with *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM Guidelines); and

  (ii) contact each Relevant Authority responsible for any component of Public Infrastructure that may come into contact with, or otherwise be affected by any relevant contaminant prior to Public Infrastructure design. Certain contaminants may lead to additional requirements, or differing requirements, including in respect of material standards for Public Infrastructure.

3.6 BITING INSECT CONSTRAINTS

(a) The Regulatory Authority in respect of biting insect constraints and biting insect management plans is the NT Health, Medical Entomology. Developers should contact Medical Entomology prior to lodging a Development Application for advice in respect of potential biting insect issues or constraints.

(b) The *Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the NT*, provides direction on subdivision development requirements in relation to biting insects.

(c) A Subdivision must comply with the following biting insect requirements:

  (i) there must be an urban exclusion buffer zone between urban residential development and significant and uncontrolled sources of biting insects. Areas with the potential for significant biting insect constraints are shown in the Darwin Regional Land Use Plan 2015. The urban exclusion biting insect buffer zone is typically 1.6km from significant breeding areas, but can potentially be reduced, depending on the outcome of baseline biting insect investigations, and biting insect rectification or control measures; and

  (ii) rural residential, industrial and commercial land uses and Public Infrastructure such as main roads, lakes, open drains and drainage basins are permissible within an urban exclusion buffer zone.

3.7 LAND USE SEPARATION ZONES

(a) The development, growth and evolving character of a locality can bring together land uses which are incompatible due to the external effects of one land use over another. Conflict can arise because of off-site emissions such as noise, dust, vibration, smoke or fumes and odour.

(b) Land use planning within subdivisions must comply with the NT EPA Guidelines for *Recommended Land Use Separation Distances*. This includes the exclusion of activities which principally involve human occupation of buildings or facilities within Power and Water Corporation 'Odour Management Zones' surrounding sewage treatment plants.

3.8 WELLHEAD PROTECTION ZONES

(a) Wellhead Protection Zones (WPZ) are identified by Power and Water Corporation as a planning tool used to manage development around ground water production bores or associated groundwater recharge areas. Power and Water Corporation standards define methods for determination and implementation of WPZs.

(b) Subdivisions within a WPZ will require careful planning in relation to the placement of on-site effluent treatment facilities, and may require specific consideration of effluent treatment systems.

(c) Subdivisions with the potential to negatively impact water quality or water yield will need to be actively managed, or in some instances may be excluded, to mitigate undesirable impacts on yield and contamination of groundwater supplies.

3.9 PRE-FEASIBILITY INFRASTRUCTURE CAPACITY ASSESSMENTS

(a) Prior to commencing design of Public Infrastructure as part of any Subdivision, Developers must contact all Relevant Authorities to discuss whether there is capacity in existing Public Infrastructure networks to support the proposed Subdivision, or if additional works, expansions or upgrades will be required as a condition of development. This is a key requirement as the requirement for such additional work can impact upon project feasibility.

(b) Existing Public Infrastructure networks to be considered include, but are not limited to:

- (i) traffic impact assessment for existing road/street network, including public transport availability
- (ii) stormwater drainage network capacity and identification of discharge constraints
- (iii) reticulated water supply availability and capacity, or aquifer capacity for groundwater extraction (bores)
- (iv) reticulated sewerage availability and capacity, or land capability for on-site wastewater management systems
- (v) electrical supply availability and capacity
- (vi) communications availability and capacity
- (vii) street lighting availability and performance

(c) For Subdivisions proposing to extract groundwater for water supply, the Developer must:

- (i) consult with the Relevant Authority to seek information on resource availability, and confirm the scope of capacity assessments required;
- (ii) identify any constraints on groundwater availability, including those due to existing Water Allocation Plans or Water Management Zones applicable across the Development Site;
- (iii) demonstrate the groundwater source quality is suitable for human consumption; and
- (iv) demonstrate the potential impact of the proposed Subdivision's water usage, on existing groundwater resource users and groundwater dependent ecosystems, is within an acceptable level.

4 STREETS AND PATHWAYS

4.1 GENERAL

(a) Streets and Pathways are the backbone of any Subdivision, providing transport infrastructure to connect the community to points of interest within the Subdivision as well as the regional road network. Streets also provide public corridors for utilities and aid the delivery of essential services.

(b) By considering street network hierarchy and layouts early during the design and masterplan processes, opportunities can often be encountered to optimise lot yields and servicing arrangements while also balancing the need to provide a user friendly shared user environment of high amenity for vehicles, cyclists and pedestrians.

(c) Streets also provide opportunities to apply landscaping treatments and build a sense of character for a Subdivision. This is discussed further under Sections 5 and 6.

(d) The objectives of this section are to:

  (i) communicate a street network design philosophy to inform Subdivision masterplanning;

  (ii) define a street hierarchy for Subdivisions, and establish a guide for its application;

  (iii) set design parameters for streets, pathways and associated Public Infrastructure; and

  (iv) identify mandatory requirements for design documentation and approvals.

(e) The Relevant Authorities for streets and pathways are:

  (i) the Local Authority in relation to streets and pathways to be handed over to and accepted by the Local Authority; and

  (ii) Department of Logistics and Infrastructure in relation to streets/roads and pathways to be handed over to and accepted by the Northern Territory Government.

4.2 STREET NETWORK DESIGN PHILOSOPHY

(a) The street network must be designed, with the following key considerations incorporated into the proposed network layout.

4.2.1 ACCESSSIBILITY

(a) Network connectivity should facilitate access to all areas of the Subdivision with minimal turning movements at intersections or junctions.

(b) Street network layout must ensure convenient and safe access to all allotments for vehicles, cyclists and pedestrians.

(c) Each new allotment must have individual, unconstrained access.

  (i) A right of way easement servicing a single lot may be acceptable, subject to approval by the Relevant Authority.

  (ii) A right of way easement servicing multiple lots will not be accepted. Existing right-of-way easements currently serving a single lot cannot be used for additional accesses to new lot(s).

(d) Battle axe allotments are not permitted, unless otherwise approved by the Relevant Authority. Where approved, battle axe access leg widths and lengths must conform to the requirements of the Planning Scheme.

(e) Culs-de-sac are not preferred and must only be used where approved by the Relevant Authority. Where approved for use, appropriate Road Reserve boundaries and truncations must be applied as agreed with the Relevant Authority.

(f) All allotments within a Subdivision must have trafficable access/egress to or from a Sub-arterial/Arterial Road during all storm events up to and including the 1% AEP Storm Event. Trafficable access/egress will be deemed sufficient where:

  (i) street/road geometry is sufficient to cater for emergency vehicle access; and

  (ii) flows within vehicle travel paths comply with the 'Major Storm Criteria' listed under Table 26 — Major Storm Flow Criteria.

(g) The current and future needs of emergency vehicles and public transport, including carriageway widths, bus embayments and turning paths must be provided for.

(h) The current and future needs of service vehicles, including convenient access to maintain Public Infrastructure and utilities must be provided for.

4.2.2 INTERSECTIONS

(a) Wherever possible, streets must intersect at 90 degrees. Where this is not achievable, street must not intersect at an angle of less than 70 degrees.

(b) Cross streets (4-way intersections) should be avoided where practicable, and only provided where controlled by traffic lights or a roundabout. Traffic lights are preferred as roundabouts do not favour pedestrian movements. Uncontrolled cross streets are not permitted. The choice of traffic control treatment method must be to the requirement and satisfaction of the Relevant Authority, and is site specific.

(c) All intersections must be designed with sufficient lanes and control types to accommodate predicted traffic flows, have suitable geometry for relevant design vehicle turning paths, and provide sight distances as required by Austroads design guidelines.

(d) All intersections must include appropriate traffic management infrastructure to prevent traffic undertaking illegal turning movements.

(e) All intersections must be designed to continue the grade of the through road or higher order road as the gradient through the intersection.

4.2.3 ALLEYWAYS

Alleyways solely for pedestrian movement are prohibited. Alleyways are different to 'Pedestrian Linkage Corridors' as defined in Table 22 — Public Open Space Hierarchy.

4.2.4 DESIRED SPEED ENVIRONMENT

(a) Operating speeds in Subdivisions must be agreed with the Relevant Authority and typically conform to the following requirements:

  (i) Residential Zones have a maximum speed limit of 50km/hr and are typically not sign-posted, except where required to denote the commencement of a 'built-up area', or where lower speeds are warranted (e.g. school zones).

  (ii) Commercial/Mixed Use Zones are typically sign-posted at 40 to 60km/hr.

  (iii) Rural and Industrial Zones are typically sign-posted at ≥60km/hr.

(b) Desired operating speeds may be lower than the limits identified under clause 6.4.1(a) to provide a safer shared user environment for pedestrians and cyclists, particularly on lower order streets in Residential Zones.

(c) Design of the streetscape environment should consider use of geometrical design elements and landscaping features to influence driver behaviour to encourage desired operating speeds. Use of traffic control/calming devices, such as speed bumps or chicanes, to control driver speeds should be avoided where practicable. However, these types of devices may be desired and justified in special circumstances (e.g. near a Pedestrian Crossing for school children).

4.2.5 BUS ROUTES AND BUS STOPS

(a) It is recommended that the Developer consults with the Relevant Authority for Public Transport during the project initiation phase to identify requirements for bus routes, bus stop locations and associated street furniture (e.g. bus shelters, seats, bins, timetable totems etc.).

(b) For staged subdivisions, interim bus routes must be agreed with the Relevant Authority and temporary turnarounds may be required to facilitate public transport servicing the Subdivision prior to completion of the ultimate street network.

(c) Design of bus routes, bus stop locations and associated street furniture for interim and permanent development must be approved by the Relevant Authority.

4.2.6 STAGED WORKS

(a) Design of all streets and pathways must consider interface with future development to ensure there are no unreasonable constraints imposed on future design and construction works which could hinder the economic viability and/or safe delivery of future development.

(b) Where future streets are planned to connect with the Subdivision street network the intersection must be designed and constructed with a terminating stub to facilitate future connection. Construction must extend to the end of the gazetted Road Reserve and incorporate appropriate signage and safe turn-around areas where required by the Relevant Authority.

4.3 TRAFFIC IMPACT ASSESSMENT/ STATEMENT

(a) An understanding of the traffic impact of a proposed development is essential to design both the internal layout and external integration with the surrounding street/road networks, and for assessment by the Relevant Authorities.

(b) Typically a full Traffic Impact Assessment (TIA) is required for any Subdivision that will generate in excess of 100 vehicle trips in peak hour; and a Traffic Impact Statement (TIS) is required for any Subdivision that will generate between 10 and 100 vehicle trips in peak hour.

(c) The requirement for a TIA or TIS will generally be imposed as Condition Precedent of a Development Permit if applicable. Where it is reasonably foreseeable that a Subdivision will trigger a TIA or TIS, it is recommended that the Developer undertake the assessment during the project development phase, prior to submitting a Development Application, to inform development of the Subdivision Masterplan and assist with review of the Development Application by the Development Consent Authority.

(d) A TIA/TIS must be developed in accordance with *Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development*, and address the following as a minimum:

  (i) Predicted traffic generation from the various land uses proposed in the Subdivision;

  (ii) Distribution of the predicted traffic generation onto the proposed internal street network and the external street/road network;

  (iii) Recommended minimum street hierarchy and street cross sections consistent with assigned traffic flows;

  (iv) Network permeability and connectivity, including for vehicles, pedestrians and cyclists;

  (v) Intersection (including property entrances) performance and configurations necessary to cater for assigned vehicle traffic flows and for the safe and efficient movement of pedestrians, cyclists and other street users;

  (vi) Provision for public transport and other transport modes, such as pedestrians and cyclists.

(e) Where the proposed subdivision incorporates a school site, consideration must also be given to specific access and controls for staff and students.

(f) A TIA/TIS may be referred to various affected Relevant Authorities for comment and the Developer must be mindful of this when preparing the TIA/TIS.

4.4 NOISE ATTENUATION

(a) Where the proposed Development Site is adjacent to Primary Collector, Sub-Arterial and/or Arterial roads, the impact of traffic noise must be assessed by a suitably qualified Consultant and noise attenuation measures implemented as required.

(b) Where traffic generated by the proposed Subdivision introduces noise for existing and/or proposed allotments, as determined by the Traffic Impact Assessment/Statement, a noise management plan including all attenuation measures must be prepared in accordance with relevant Australian Standards.

4.5 STREET HIERARCHY

(a) The Street Hierarchy of a Subdivision street network provides a range of alternative street types which can be applied in different contexts depending on the required function of a street in terms of shared user priorities. The Street Hierarchy is defined in Table 4.

Table 4 – Street Hierarchy

Classification	Description
Laneway	Laneways must only be used in conjunction with Primary Collector streets in urban environments to facilitate indirect rear access for allotments fronting onto streets with Annual Daily Traffic > 5,000 vehicles per day. Laneways must only be used for Category A Public Infrastructure (Set 1 only) and are subject to approval by the Relevant Authority. Where approved, Laneways must comply with the requirements of Section 4.6.8. Laneways are not Alleyways, which are prohibited as described in Section 4.2.3.
Minor Street/ Cul-de-sac	Minor streets are predominantly used for residential access with direct lot access. In Residential / Mixed Use Zones, minor streets accommodate shared pedestrian, cyclist, and vehicular movements. In Rural Zones, minor streets are predominantly used for vehicular movements, with the provision of corridors to allow for pedestrian movements and future footpaths. Culs-de-sac are not preferred and must only be used where approved by the Relevant Authority.
Access Street	Access streets are predominantly used for residential access with direct lot access, while also providing linking transport infrastructure to Secondary and Primary Collector streets. In Residential / Mixed Use Zones, Access Streets accommodate shared pedestrian, cyclist and vehicular movements with a greater focus on vehicle movement than Minor Streets with wider carriageways to provide for on-road shared parking. In Rural and Industrial Zones, Access Streets are predominantly used for vehicular movements, with limited catering to pedestrian and cyclist movements.
Secondary Collector	Secondary Collector streets service and link neighbourhoods and activity centres and typically form part of the public transport network. In Residential / Mixed Use Zones, Secondary Collector streets accommodate predominantly vehicle movements with provision of formalised on-street parking and additional footpaths to support increased pedestrian and cyclist activity off-carriageway. These streets consist of mostly residential frontage with direct access but can accommodate commercial developments also. In Rural and Industrial Zones, Secondary Collector Streets are predominantly used for vehicular movements, with limited infrastructure to cater for to pedestrian and cyclist movements.
Primary Collector	Primary Collector streets are similar to Secondary Collector streets but typically accommodate higher traffic volumes and serve as the linking infrastructure to the sub-arterial/arterial road network. In Residential / Mixed Use Zones, direct lot access is restricted and central medians are required to provide staged pedestrian crossings due to high traffic volumes. These streets may be supported with Laneways to facilitate lot frontage to activate the streetscape while providing indirect lot access. In Rural and Industrial Zones, direct lot access is permissible and central medians are only applied where necessary to support traffic control objectives.
Sub-Arterial and Arterial Roads	Sub-Arterial and Arterial Roads service large volumes of commuter traffic at a regional level and do not typically form part of Subdivision development.

(b) The following sections nominate design criteria for Street Hierarchy relative to the Infrastructure Categories applicable to the Subdivision, as defined in Table 1.

(c) Refer to Part 3 - Standard Drawings for illustration of the typical street cross-sections described as follows.

4.5.1 DESIGN CRITERIA – CATEGORY A

(a) Infrastructure Category A utilises urban street cross-sections typically comprising:

(i) sealed carriageways with asphalt wearing surface;

(ii) kerb and gutter with underground stormwater systems; and

(iii) formal landscaped verges and medians, with underground services.

(b) Street Hierarchy Selection can be guided by Table 5 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 5 – Street Hierarchy Selection Criteria – Category A

Zoning	Street Type	Max Annual Daily Traffic Volumes (vpd) [1]	Typical No. of Dwellings [1]	Typical Street Length (m) [1]
Residential/ Mixed Use	Laneway (Set A Only)	n/a	10	140
	Minor Street/ Cul-de-sac [2]	150	25	200
	Access Street	3,000	60	600
	Secondary Collector	5,000	300	As approved
	Primary Collector	10,000	400	As approved
Industrial	Access Street	n/a	50	1,000
	Collector	n/a	>50	As approved

Table Notes:

1. Selection criteria are not always directly proportional and street hierarchy selection may be governed by any of the three criteria, depending on context. Annual Daily Traffic is a 'maximum' value and must not be exceeded. Number of Dwellings and Street Length are typical guide values only, but generally at least one of the two will be compliant with the listed values.
2. Minor Street/Cul-de-sac must only be used where access is to Single Dwellings (LR/LMR Zones).

(c) Two set types are provided for Infrastructure Category A; Set 1 and Set 2 as identified in Table 1. Set 1 is to be used, unless the Relevant Authority has nominated otherwise in Section 14 - Schedule of Variations.

(i) Design Criteria for Set 1 is outlined in Table 6.

(ii) Design Criteria for Set 2 is outlined in Table 7.

Table 6 – Street Hierarchy Design Criteria – Category A – Set 1								
Zoning Type	**Street Hierarchy**	**Reserve Width (Minimum)** [5]	**Carriageway Width (Minimum)**	**Central Median**	**Verge Width (Minimum)**	**Formalised Parking Lanes** [3]	**Footpath** [4]	**Lot Access**
Residential/ Mixed Use [1]	Laneway	6.25m [2]	2 x 3m	None	None	None	None	Direct access
	Minor Street/ Cul-de-sac	15m	2 x 3m	None	2 x 4.5m	None	1 x 1.5m	Direct access
	Access Street	16m	2 x 3.5m	None	2 x 4.5m	None	1 x 1.5m	Direct access
	Secondary Collector	21.6m	2 x 3.5m	As Required	2 x 5m	2 x 2.3m	1 x 1.5m 1 x 2.5m	Direct access
	Primary Collector	24.6m	2 x 3.5m	3m	2 x 5m	2 x 2.3m	2 x 2.5m	Access via rear laneway where ADT > 5000
Industrial	Access Street	21m	2 x 5.5m	As Required	2 x 5m	None	1 x 1.5m	Direct access
	Collector	23m	2 x 6.5m	As Required	2 x 5m	None	1 x 1.5m	Direct access

Table Notes:

1. Street Hierarchy for Residential/mixed Use Zoning also applies to Rural Residential (RR) allotments residing in Residential/Mixed Use Subdivisions.
2. Laneway Reserve Widths may need to be widened to accommodate street lighting, landscaping treatments, garbage collection, and/or to improve passive surveillance.
3. Formalised Parking Lanes are in addition to the minimum Carriageway Width specified. Formalised parking requirements must be confirmed with the Relevant Authority for Secondary and Primary Collector Roads.
4. On-street Cycle Lanes should also be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities, considering exposure based warrants.

5. Road Reserve widths are 'minimum'. Appropriate pavement widening, with line marking, must be included at all intersections and horizontal curves to enable turning of design vehicles. Minimum verge widths must not be compromised, unless approved by the Relevant Authority.

Table 7 – Street Hierarchy Design Criteria – Category A – Set 2

Zoning Type	Street Hierarchy	Reserve Width (Minimum) [4]	Carriageway Width (Minimum)	Central Median	Verge Width (Minimum)	Formalised Parking Lanes [2]	Footpath [3]	Lot Access
Residential / Mixed Use [1]	Minor Street/ Cul-de-sac	15.5m	2 x 3.75m	None	2 x 4.0m	None	1 x 1.5m	Direct access
	Access Street	17m	2 x 4.5m	None	2 x 4.0m	None	1 x 1.5m	Direct access
	Secondary Collector	20m	2 x 5.5m	As Required	2 x 4.5m	None	1 x 1.5m 1 x 3.0m	Direct access
	Primary Collector	22m	2 x 6.5m	As Required	2 x 4.5m	None	1 x 1.5m 1 x 3.0m	Via approval
Industrial	Refer Category A - Set 1							

Table Notes:

1. Street Hierarchy for Residential/mixed Use Zoning also applies to Rural Residential (RR) allotments residing in Residential/Mixed Use Subdivisions.
2. Formalised Parking Lanes are in addition to the minimum Carriageway Width specified. Formalised parking requirements must be confirmed with the Relevant Authority for Secondary and Primary Collector Roads.
3. On-street Cycle Lanes should also be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities, considering exposure based warrants.
4. Road Reserve widths are 'minimum'. Appropriate pavement widening, with line marking, must be included at all intersections and horizontal curves to enable turning of design vehicles. Minimum verge widths must not be compromised, unless approved by the Relevant Authority.

4.5.2 DESIGN CRITERIA - CATEGORY B AND C

(a) Infrastructure Category B utilises a mixed urban/rural street cross-section typically comprising:

(i) sealed carriageways with spray seal wearing surface;

(ii) kerb and gutter to contain pavements and convey stormwater into table drains in a controlled manner; table drains and service corridors in lieu of formal verges, including provision of a footpath and landscaping treatments; and

(iii) a mix of underground/overhead services.

(b) Infrastructure Category C utilises a rural street cross-section typically comprising:

(i) sealed carriageways with spray seal wearing surface;

(ii) shoulders (no kerbing) and table drains to convey stormwater;

(iii) table drains and service corridors in lieu of formal verges, with footpath corridors (no footpaths) and grassed landscaping treatments only; and

(iv) a mix of underground/overhead services.

(c) Street Hierarchy Selection can be guided by Table 8 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 8 – Street Hierarchy Section Criteria – Category B and C

Zoning	Street Type	Typical Max Annual Daily Traffic Volumes (vpd)	Typical Max No. of Dwellings	Typical Max Street Length (m)
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	n/a	60	600
	Secondary and Primary Collector	n/a	400	As approved

(d) Design Criteria for Category B and C is outlined in Table 9 and Table 10.

Table 9 – Street Hierarchy Design Criteria – Category B								
Zoning Type	**Street Hierarchy**	**Reserve Width [1,3] (Minimum)**	**Carriageway Width (Minimum) [2]**	**Central Median**	**Verge Width [1] (Minimum)**	**Formalised Parking Lanes**	**Footpath**	**Lot Access**
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	15m	2 x 3.0m Lanes	None	2 x 4.5m	None	1 x 1.5m Footpath 1 x 2.7m Corridor	Direct access
	Primary and Secondary Collector	15m	2 x 3.0m Lanes	As Required	2 x 4.5m	None	1 x 1.5m Footpath 1 x 2.7m Corridor	Direct access

Table 10 — Street Hierarchy Design Criteria - Category C								
Zoning Type	**Street Hierarchy**	**Reserve Width [1,3] (Minimum)**	**Carriageway Width (Minimum)**	**Central Median**	**Verge Width (Minimum)**	**Formalised Parking Lanes**	**Footpath**	**Lot Access**
Residential, Mixed Use and Industrial	Minor Street / Cul-de-sac; and Access Street	17m	8m (2 x 3.0m Lanes, 2 x 1.0m shoulders)	None	2 x 4.5m	None	2 x 2.7m Corridors	Direct access
	Primary and Secondary Collector	17m	8m (2 x 3.0m Lanes, 2 x 1.0m shoulders)	As Required	2 x 4.5m	None	2 x 2.7m Corridors	Direct access

Table 9 & 10 Notes:

1. Road Reserve and Verge Widths must be equal to or greater than the minimum values nominated. Road Reserve and Verge Widths must be appropriately sized to accommodate table drains and separate service corridors/footpath corridors. Road Reserves Widths and Verge Widths will often be larger than the values indicated, to fit table drains. These minimums provides flexibility for on-road drainage alternatives and situations where table drains are provided on one-side only.
2. Carriageway widths may be widened to convey more stormwater in the street carriageway, where desirable for project specific circumstances (e.g. where it is practicable to reduce the extent of table drains and/or open drains).
3. Road Reserve widths are 'minimum'. Appropriate pavement widening, with line marking, must be included at all intersections and horizontal curves to enable turning design vehicles. Minimum verge widths must not be compromised, unless approved by the Relevant Authority.

4.5.3 DESIGN CRITERIA – CATEGORY D AND E

(a) Infrastructure Category D and Category E utilise rural street cross-sections typically comprising:

(i) sealed carriageways with spray seal wearing surface generally. Asphalt provided at some intersections/

(ii) culs-de-sac (Category D only);

(iii) shoulders (no kerbing) and table drains to convey stormwater;

(iv) table drains and service corridors in lieu of formal verges, with footpath corridors (no footpaths) and grassed landscaping treatments only; and

(v) a mix of underground/overhead services.

(b) Street Hierarchy Selection can be guided by Table 11 to determine which street type is appropriate for each area of the Subdivision. A range of selection criteria is presented including ADT, number of lots and length of street to offer flexibility for circumstances where individual criteria may not be appropriate. These criteria are presented as typical maximum values, acknowledging that higher order streets may be appropriate under low traffic volumes and or density of development to support town planning objectives.

Table 11 — Street Hierarchy Selection Criteria - Category D and E

Zoning	Street Type	Typical Max Annual Daily Traffic Volumes (vpd)	Typical Max No. of Dwellings	Typical Max Street Length (m)
Rural Residential (RR) Rural Living (RL)	Minor Street/ Cul-de-sac	n/a	5	500
	Access Street	n/a	60	6,000
	Secondary Collector	n/a	300	As approved
	Primary Collector	n/a	>300	As approved
Other Rural Zones (H, A, R)	Minor Street/ Cul-de-sac	n/a	10	500
	Access Street	n/a	60	30,000
	Secondary Collector	n/a	300	As approved
	Primary Collector	n/a	>300	As approved

(c) Design Criteria for Category D and Category E is outlined in Table 12.

Table 12 — Street Hierarchy Design Criteria - Category D and E								
Zoning Type	**Street Hierarchy [2]**	**Reserve Width [1,3] (Minimum)**	**Carriageway Width (Minimum)**	**Central Median**	**Verge Width [1] (Minimum)**	**Formalised Parking Lanes**	**Footpath**	**Lot Access**
All Rural Zones (RR, RL, H, A, R)	Minor Street / Cul-de-sac	20m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	None	2 x 5.5m	None	2 x 2.7m Corridors	Direct access
	Access Street	22m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	None	2 x 6.5m	None	2 x 2.7m Corridors	Direct access
	Secondary Collector	25m	9m (2 x 3.5m Lanes, 2 x 1.0m shoulders)	As Required	2 x 8m	None	2 x 2.7m Corridors	Direct access
	Primary Collector	30m	10m (2x 3.5m Lanes, 2 x 1.5m shoulders)	As Required	2 x10m	None	2 x 2.7m Corridors	Direct access

Table Notes:

1. Road Reserve and Verge Widths must be equal to or greater than the minimum values nominated. Road Reserve and Verge Widths must be appropriately sized to accommodate table drains and separate service corridors/footpath corridors.
2. Reserve Widths may need to be increased to facilitate a higher order of street hierarchy under future development.
3. Road Reserve widths are 'minimum'. Appropriate pavement widening, with line marking, must be included at all intersections and horizontal curves to enable turning of design vehicles. Minimum verge widths must not be compromised, unless approved by the Relevant Authority.

4.6 STREET DESIGN

(a) Design of streets must comply with Australian Standards, Austroads Guidelines, Standard Drawings (Part 3) and the requirements of this section.

(b) Sight Distances must be checked and confirmed satisfactory in accordance with Austroads Guidelines.

4.6.1 RESERVE BOUNDARIES

(a) Road Reserve widths must generally comply with the requirements of Table 5 to Table 12.

(b) Truncations of suitable dimensions must be provided for all boundary corners at all intersections to allow for sight distances for both vehicles and pedestrians, as well as verge width, and footpath installation. A 3m x 3m truncation must be provided as a minimum, unless otherwise approved by the Relevant Authority.

(c) Truncations at intersections with Northern Territory Government Controlled Roads must comply with NT Government requirements.

4.6.2 CUL-DE-SAC AND INTERSECTION TURNING CRITERIA

(a) Where culs-de-sac are approved for use by the Relevant Authority, Cul-de-sac radii must be minimum 10m kerb-to-kerb to facilitate access for garbage trucks. Larger radii may be required where larger vehicles are expected, which is to be determined via turn-path analysis.

(b) Intersections are to be designed to accommodate appropriate vehicle use in accordance with Table 13 and Austroads Guidelines.

4.6.3 KERBING

(a) For streets where kerbing is specified, comply with Standard Drawings (Refer Part 3).

(b) Barrier kerb types must be used:

(i) on Primary Collector streets, except traffic islands and medians which must be mountable kerbing;

(ii) adjacent to all public open space areas; and

(iii) where required to restrict vehicle access or protect pedestrians/cyclists.

4.6.4 TRAFFIC ISLANDS AND MEDIANS

(a) Medians must be provided as specified in Table 5 to Table 12. Additional streets may warrant application of medians to control traffic and provide pedestrian refuge.

(b) Minimum traffic island and median widths are to be designed in accordance with Austroads Guidelines.

(c) Traffic Islands and Medians are to be surrounded with mountable kerbing. Infill must be:

(i) Traffic Islands and medians 2.5m wider or larger to be landscaped in accordance with Section 6.

(ii) Traffic Islands and medians less than 2.5m to be minimum 150mm concrete infill with SL82 mesh reinforcing.

4.6.5 VERGES

(a) Verge widths must comply with the requirements of Table 5 to Table 12. Formalised Parking must not encroach into the minimum verge widths specified.

(b) Footpaths must be provided as nominated in Table 5 to Table 12 and constructed in accordance with the Standard Drawings (Refer Part 3).

(c) Verges must be appropriately landscaped in accordance with Section 6.

4.6.6 FORMALISED ON-STREET PARKING

(a) Formalised parking must be provided in the form of indented bays in accordance with AS2890, where specified in Table 5 to Table 12, as well as adjacent public open space and natural vegetation areas.

(b) Groups of indented bays are not to exceed a length of nominally 100m before having a landscaped separation in the form of a bulb-out to ensure the streetscape environment encourages desired operating speeds. Spacing between bulb-outs should allow for multiples of approximately 6.5m and take into account all necessary services.

(c) Off-street parking is also required for Public Open Space Areas (Refer Section 5. Public Open Space).

Table 13 — Intersection Turning Criteria

Intersecting Streets	Design Vehicle	Checking Vehicle	Minimum Kerb Radii [1,2]
Residential Zoned Streets			
Laneway/Minor Street	Service Vehicle (8.8m)	Service Vehicle (8.8m)	10m
Minor Street/ Access Street	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Minor Street/Secondary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Access Street/Secondary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Access Street/ Primary Collector	Service Vehicle (8.8m)	Single Unit Truck/ Bus (12.5m)	10m
Secondary Collector/ Primary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi- Trailer (19m)	12.5m
Primary Collector/ Arterial	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m
Rural Residential (RR) and Rural Living (RL) Zoned Streets			
Minor Street/ Access Street	Service Vehicle (8.8m)	Prime Mover and Semi- Trailer (19m)	10m
Minor Street/Secondary Collector	Service Vehicle (8.8m)	Prime Mover and Semi- Trailer (19m)	10m
Access Street/Secondary Collector	Service Vehicle (8.8m)	Prime Mover and Semi- Trailer (19m)	10m
Access Street/ Primary Collector	Service Vehicle (8.8m)	Prime Mover and Semi- Trailer (19m)	10m
Secondary Collector/ Primary Collector	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m
Primary Collector/ Arterial	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m

Table 13 — Intersection Turning Criteria			
Intersecting Streets	**Design Vehicle**	**Checking Vehicle**	**Minimum Kerb Radii** [1,2]
Mixed Use Zone Streets			
Minor Street/ Access Street	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi- Trailer (19m)	12.5m
Minor Street/Secondary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi- Trailer (19m)	12.5m
Access Street/Secondary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi- Trailer (19m)	12.5m
Access Street/ Primary Collector	Single Unit Truck/ Bus (12.5m)	Prime Mover and Semi- Trailer (19m)	12.5m
Secondary Collector/ Primary Collector	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m
Primary Collector/ Arterial	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m
Industrial Zoned Streets			
All industrial street intersections	Prime Mover and Semi-Trailer (19m)	B-double (25m)	15m
Rural (R) Zone Streets			
All rural street intersections are to be designed to accommodate A - Triple (53m) Road Trains in accordance with Austroads Guide to Road Design Part 4: Intersection and Crossings unless otherwise agreed with the Relevant Authority.			

Table Notes:

1. Minimum radii for vehicles 12.5m or greater are to be confirmed by a turn path analysis and approved by the Relevant Authority.
2. Where practicable to do so, and subject to approval by the Relevant Authority, smaller kerb radii may be desirable to provide traffic calming to achieve the desired speed environment (Clause 4.2.4).

4.6.7 LOT ACCESS / DRIVEWAYS

(a) Direct access to allotments from the fronting Road Reserve can only be provided where permitted under Table 5 to Table 12. Where applicable, Laneways may be provided to facilitate rear of lot access on Primary Collectors, subject to approval by the Relevant Authority and the requirements of Clause 4.6.8. Laneways.

(b) Driveways in Subdivisions must comply with Standard Drawings (Refer Part 3) and *AS/NZS 2890.1: Parking Facilities - Off-street parking*. Driveway widths in excess of those shown in the Standard Drawings may be provided, subject to approval of the Relevant Authority.

(c) Driveways must be located with the following minimum setbacks/clearances, as measured from the edge of kerb flare/taper, and provide adequate sight distances in accordance with Austroads Guidelines:

(i) 500 mm from street signs

(ii) 600 mm from any stormwater drainage pit

(iii) 1000 mm from overhead power/street light poles

(iv) 1200 mm clear of service pits, pillars, valve boxes etc.

(v) 6 metres from the tangent point of any intersections.

(d) The Developer must submit an access management plan, illustrating the availability for safe and clear access/crossover locations and extents for all allotments.

4.6.8 LANEWAYS

(a) The use of Laneways is subject to approval by the Relevant Authority and they must only be used in conjunction with Primary Collector streets in urban environments to facilitate indirect rear access for allotments fronting onto streets with Average Daily Traffic > 5,000 vehicles per day. In no circumstance should a lot solely front a laneway.

(b) Allowing for lots to front onto Primary Collector Streets will assist to activate the street, encourage the 'desired speed environment' (Section 4.2.4), improve streetscape amenity and provide passive surveillance to create a pedestrian friendly environment.

(c) The design, layout and detailing of laneways and the strategic siting of buildings to overlook these laneways is an important consideration and is critical for community safety.

(d) Design of Laneways must address the following:

(i) Layouts must enable direct sight lines and passive surveillance down the entire length of the laneway along both directions from adjoining streets. Straight lanes and T-lanes provide a greater level of passive surveillance. H-lanes, dog-leg lanes and tightly curved lanes are not acceptable.

(ii) Land use zoning should support siting of high density residential, mixed use and multi-storey dwellings in key locations to offer passive surveillance over the laneway. Typically these are sited at the ends of laneways and all mid-lane junctions.

(iii) Provide adequate sight line truncations at intersections for pedestrian and vehicular safety. A minimum 2.8m sight line truncation (2m x 2m at 90 degree angle) must be provided.

(iv) Laneway length must be max 140m where practicable. If longer laneways are required, a mid-lane link must be provided.

(v) Laneway width should be sufficient to ensure adequate reversing space and minimise requirements for building or fence setbacks on lots, particularly where these could result in hidden recesses or provide illegal access opportunities into rear yards. Half-a-metre (0.5 metres) setback for garages and fences, and a minimum laneway width of 6 metres, allows adequate reversing space and improves safety and surveillance.

(vi) Laneways may be locally widened in parts to create mews courts.

(vii) Laneways must provide rubbish collection access.

(viii) Laneways should function solely as vehicle access to lots and not act as, or create and alternate, through-route in the overall street network.

(ix) Street lighting must be provided at the entrance to laneways and at intermediate locations along the laneways where required to support vehicle and pedestrian safety.

(x) Utility service corridors must generally be located within the Primary Collector Street.

4.7 STORMWATER DESIGN

(a) Stormwater drainage design within all Road Reserves must comply with the requirements of Section 7.

4.8 STREET PAVEMENT DESIGN

(a) The objective in the design of the street pavement is to select appropriate pavement and surfacing materials, types, layer thickness' and configurations to ensure that the pavement performs adequately and requires minimal maintenance under the anticipated traffic loading for the design life.

(b) The minimum design life for pavement design must be 30 years.

(c) All street pavements must be designed in accordance with the current version of the *Austroads Guide to Pavement Technology* and the Standard Specification (Refer Part 4).

(d) The Developer must submit the pavement design in the Design Report to the Relevant Authority for approval.

(e) The design of the pavement must involve consideration of the following four input variables:

(i) Design traffic;

(ii) Subgrade evaluation;

(iii) Pavement and surfacing materials; and

(iv) Construction and maintenance considerations.

4.8.1 DESIGN TRAFFIC

(a) The Developer must undertake an analysis for design traffic and is responsible for determining design traffic loadings and appropriate pavement structure. Assessment of design traffic must include consideration of Subdivision staging and construction vehicles through completed stages to construct Public Infrastructure for further stages.

(b) Design traffic loadings used for pavement design must be the greater of:

(i) design traffic loadings determined under clause 4.8.1(a); and

(ii) minimum design traffic loadings nominated in Table 14 to Table 16.

Table 14 — Minimum Design Traffic (Category A)

Street Hierarchy	Design Equivalent Standard Axles (DESAs)	
	Residential	Mixed Use / Industrial
Laneway Minor Street / Cul-de-sac	8.0×10^3	-
Access Street	5.0×10^4	8.0×10^5
Secondary Collector	5.0×10^5	2.0×10^6
Primary Collector	1.0×10^6	5.0×10^6

Table 15 — Minimum Design Traffic (Category B to C)

Street Hierarchy	Design Equivalent Standard Axles (DESAs)
	All Zones
All streets	5.0×10^4

Table 16 — Minimum Design Traffic (Category D to E)	
Street Hierarchy	**Design Equivalent Standard Axles (DESAs)**
	All Zones
Minor Steet / Cul-de-sac Access Street	5.0×10^4
Secondary Collector Primary Collector	5.0×10^5

4.8.2 SUBGRADE EVALUATION

(a) Subgrade evaluation must be carried out by a competent and suitably experienced geotechnical engineering professional with previous relevant experience, with all findings and recommendations provided in a written geotechnical report in accordance with *AS1726:2017 Geotechnical Site Investigations* and Austroads Guidelines.

(b) Geotechnical site investigations must include the following items as a minimum:

(i) Visual assessment of terrain and assessment of geological setting.

(ii) Intrusive investigations at regular spacings within the Development Site such as test pits or boreholes as applicable, generally to depths of about 1.5 m below subgrade level.

(iii) In-situ testing generally to depths of about 1.5 m below subgrade level or deeper if very weak conditions are present. Methods may include Dynamic cone penetrometer (DCP), plate load tests (PLT), PANDA or other industry accepted methods. Non-destructive testing such as falling light weight deflectometer (LFWD) testing may supplement the previously listed test methods.

(iv) Laboratory testing of representative soil horizons to NATA standards, including as a minimum, soil classification and 4 day soaked CBR tests using modified compaction, in accordance with Northern Territory Test Methods (Refer Part 2 Reference Documents). Soil reactivity testing may be required where moderately reactive (or higher) soils are present.

(v) Preparation of a combined factual and interpretive report with recommended Subgrade Design CBR value(s) for use in pavement design.

(c) Design CBR values of greater than 12% require detailed justification in the geotechnical report.

(d) Laboratory CBR swell and Weighted Plasticity Index (WPI) results should be reported and highlighted if subgrade soils are classed as moderately reactive (or higher) in accordance with Austroads, so the pavement designer can assess additional cover requirements to control reactive soil movements, as required.

(e) In accordance with Austroads, lime modified subgrade layers may not exceed a Design CBR value of 15%. The recommended Subgrade Design CBR value for lime stabilised subgrades must be supported by a laboratory testing trial documented in the geotechnical report.

4.8.3 PAVEMENT COMPOSITION

(a) The following standards must apply:

(i) Subgrade layer (150 mm below subgrade surface) to be compacted to achieve a minimum density ratio of 95% of the maximum modified dry density.

(ii) Where lightly or heavily bound cement treated base layers are used, mechanistic pavement design methods must be used and documented in the pavement design report, ignoring post-cracked life.

(iii) Appropriately designed lime treated pavement layers are permitted. Design dosage rates must be supported by a laboratory testing trial documented in the geotechnical report.

(iv) Pavement layer thickness limits for flexible pavements as follows (excluding wearing course):

Table 17 — Pavement Layer Thickness for Flexible Pavements

Pavement Layer	Minimum Thickness (mm)	Maximum Thickness (mm)
Base	150	250
Sub-base [1]	125	250
Lime Stabilised Subgrade [1]	150	300

Table Notes:

1. More than one layer may be required, but each layer must not exceed the prescribed limits.

(v) Pavement layer thickness limits for rigid pavements in accordance with Austroads Guide to Pavement Technology Part 2.

(b) All base and subbase materials to be Fine Crushed Rock (FCR) or natural gravel, as identified in Table 2.

(i) Where FCR is used in unconfined pavements with shoulders and table drains, erosion protection measures must be provided to mitigate unravelling of exposed FCR in the shoulders and batters.

(c) Pavement materials, compaction standards, and other construction requirements must comply with the Standard Specification (Part 4).

4.8.4 WEARING SURFACE

(a) The Developer is responsible for providing a wearing surface design that accommodates the design loading, including construction traffic.

(b) The minimum wearing surfaces are outlined in Table 18 to Table 21. Asphalt thickness is reported as 'compacted thickness'. Bracketed values denote bitumen grade. For the purpose of assessing these tables, a garbage truck is not considered a heavy vehicle movement.

(c) Wearing surface design for intersections with NTG Controlled Roads must comply with the DIPL Standard Specification for Roadworks.

Table 18— Minimum Wearing Surface for Infrastructure Category A	
Application	**Minimum Wearing Surface Design**
Property Access / Driveways	
All Applications	Reinforced Concrete Pavement
Residential/Mixed Use Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 30mm Asphalt AC10 - Mix Type 2 (A20E or A15E)
Culs-de-sac and Intersections (no heavy vehicle movements[1])	Prime and 40mm Asphalt AC10 - Mix Type 2 (A20E or A15E) or Prime and 40mm Asphalt AC14 - Mix Type 3 (A20E) or Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Intersections (with heavy vehicle movements[1])	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Residential/Mixed Use Streets (ADT > 5,000 AADT)	
Streets	Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Intersections	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Industrial Streets	
Streets and Intersections (Zone LI)	Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Streets and Intersections (Zones GI, DV)	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)

Table 19 — Minimum Wearing Surface for Infrastructure Category B & C	
Application	**Minimum Wearing Surface Design**
Property Access / Driveways	
Residential Access	Prime and 14mm Single Coat Seal (S10E); or Reinforced Concrete Pavement
Mixed Use/ Industrial Access	Reinforced Concrete Pavement
Residential / Mixed Use Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements[1])	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Intersections (with heavy vehicle movements[1])	Prime and 14/7mmm Two-Coat Spray Seal (S20E)
Residential/Mixed Use Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 14/7mm Two-Coat Spray Seal (S20E)
Industrial Streets	
Streets and Intersections (Zone LI)	Prime and 14/7mm Two-Coat Spray Seal (S20E)
Streets and Intersections (Zones GI, DV)	Prime and 20/10mm Two-Coat Spray Seal (S20E)

Table 20 — Minimum Wearing Surface for Infrastructure Category D	
Application	**Minimum Wearing Surface Design**
Property Access / Driveways	
All Applications	Prime and 14mm Single Coat Seal (S10E)
Rural Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements[1])	Prime and 40mm Asphalt AC10 - Mix Type 2 (A20E or A15E) or Prime and 40mm Asphalt AC14 - Mix Type 3 (A20E) or Prime and 40mm Asphalt AC14 - Mix Type 5 (A15E)
Intersections (with heavy vehicle movements[1])	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)
Rural Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 50mm Asphalt AC14 - Mix Type 5 (A15E)

1.

Table 21 — Minimum Wearing Surface for Infrastructure Category E	
Application	**Minimum Wearing Surface Design**
Property Access / Driveways	
All Applications	Prime and 14mm Single Coat Seal (S10E)
Rural Streets (ADT ≤ 5,000 AADT)	
Streets	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Culs-de-sac and Intersections (no heavy vehicle movements[1])	Prime and 14/7mm Two-Coat Spray Seal (S10E)
Intersections (with heavy vehicle movements[1])	Prime and 14/7mmm Two-Coat Spray Seal (S20E)
Rural Streets (ADT > 5,000 AADT)	
Streets and Intersections	Prime and 14/7mm Two-Coat Spray Seal (S20E)

4.8.5 ALTERNATIVE PAVEMENT TREATMENTS

(a) Where alternative street pavement treatments are proposed (e.g. entry statement or special features), plans and specifications must be submitted to the Relevant Authority for approval.

4.8.6 SUBSURFACE DRAINAGE

(a) Refer to Section 7.9.15 for subsurface drainage requirements.

4.9 STREET FURNITURE AND TRAFFIC CONTROL DEVICES

(a) Street furniture must be provided where required in accordance with Standard Drawings, Austroads and Relevant Australian Standards.

(b) All street signs, warning signs, regulatory signs, directional signs, and line marking must:

(i) be designed and provided in accordance with *AS1742: Manual of Uniform Traffic Control Devices*; and

(ii) use reflective high intensity grade reflective material for all signs (Type III as per *AS 1742*).

(c) As a minimum, the following signs and line marking must be provided:

(i) street name signs at each intersection - one at each T-intersection and two at each four-way intersection;

(ii) speed limit signs, including school zones;

(iii) radar speed signs immediately following school zone signs to alert drivers of their speed, up to the speed limit, after which it is to flash “slow down”;

(iv) warning signs at the approach to all hazards;

(v) “keep left” signs at the approach end of the first island at all channelised intersections and at all median openings;

(vi) separation lines on sub-arterials and collectors;

(vii) double unbroken lines on street centreline at locations on two-way streets where the sight distance available is less than the desirable minimum specified in Austroads;

(viii) at a temporary termination of street construction, such as a subdivision or stage boundary a diagonal striped sight board must be erected;

(ix) holding lines at T-intersections; and

(x) other traffic control devices necessary for effective traffic control and any traffic control devices required by the Relevant Authority.

(d) Line marking must be applied with a minimum of two (2) coats. The first coat must be applied prior to the Practical Completion Date; and the second coat six (6) months later unless otherwise agreed with the Relevant Authority.

4.10 SHARED PATHS AND FOOTPATH DESIGN

(a) The provision of safe and convenient facilities for pedestrians and cyclists is required. Subdivision development designs must incorporate a system of footpaths and shared paths as outlined in Table 2 - Typical Infrastructure Expectations, unless otherwise agreed with the Relevant Authority.

(b) Design of shared paths and footpaths must comply with relevant legislation, current Australian Standards, Austroads Guidelines, Standard Drawings (Part 3) and the following requirements.

4.10.1 APPLICATION

(a) Footpaths must be provided in Road Reserves as per Table 5 to Table 12 as a minimum.

(b) Footpaths and shared paths must also be included throughout Subdivisions to:

(i) connect residential areas to public open spaces and other points of interest;

(ii) provide access throughout the subdivision and to connect with the regional path network, unless otherwise agreed with the Relevant Authority;

(iii) activate public open space areas and provide access to associated facilities.

(c) On-street Cycle Lanes should be considered where Annual Daily Traffic (ADT) is forecast to exceed 3,000 vehicles per day. The Developer should consult with the Relevant Authority during the project development phase to confirm regional cycle path network strategies and agree on appropriate provision of cyclist facilities.

4.10.2 KERB RAMPS AND REFUGES

(a) Kerb ramps must be provided at all kerbs where footpaths and shared paths cross streets and roads (i.e. Kerb Ramp Crossings). These must be designed and constructed in accordance with Standard Drawings and relevant Australian Standards.

(b) Pedestrian refuges must be provided within medians, as required under relevant Austroads Guidelines and Australian Standards.

4.10.3 ACCESS FOR PERSONS WITH A DISABILITY

(a) All public places and facilities for public access, use and enjoyment in any Subdivision must comply with the *Disability Discrimination Act 1992 (Cth)*. In particular, all public places and facilities for public access, use and enjoyment, must be reasonably open, accessible and available to people with a disability in accordance with that Act. Refer to *Australian Human Rights Commission Advisory Note on Streetscape, Public Outdoor Areas, Fixtures, Fittings and Furniture* for guidance (Part 2).

(b) Assessment of design requirements for streets and pathways in Subdivisions should be undertaken on a case-by-case basis to identify opportunities to remove barriers and improve accessibility where it is practicable to do so. Designs should aim to:

(i) provide fair and equitable access for persons with a disability; and

(ii) provide a more usable and accessible environment for all persons.

(c) Application of Tactile Ground Surface Indicators (TGSIs) within streets and pathways in Subdivisions will improve methods of wayfinding and increase safety within the built environment for blind or vision-impaired persons. The requirements of *AS1428.4.1* must be considered on a case-by-case basis and applied where appropriate to ensure safe access for blind or vision-impaired persons. Where TGSI's are required, they must be of high-contrast in colour to the surface being installed on, and not be singular 'button' style.

4.11 ROAD SAFETY AUDITS

(a) The Developer must consult with Relevant Authorities to confirm the scope of road safety audits required for Public Infrastructure.

(b) All roads and/or intersections involving Arterial or Sub-Arterial Roads are subject to Road Safety Audits in accordance with the DLI Policy: *Road Safety Audits*. In general, the following must be provided:

(i) Stage 3 Audit (Detail Design)

(ii) Stage 4 Audit (Pre-opening Design)

(c) Road Safety Audits must be prepared by a suitably qualified Road Safety Auditor and undertaken in accordance with national practice given in Austroads Guidelines.

(d) Appropriate consideration must be given to vulnerable road users and for unique traffic conditions that exist in the Northern Territory.

5 PUBLIC OPEN SPACE

5.1 INTRODUCTION

(a) This section sets out the requirements for Public Open Space, as applicable to Residential/Mixed Use Subdivisions under the Planning Scheme. For Industrial and Rural zoned Subdivisions, this section is generally not applicable unless mandated by Development Permit conditions; however, the Developer is recommended to consider the design elements outlined within this section and apply them to their Subdivision as appropriate.

(b) The provision of an integrated network of Public Open Space is a key factor in a neighbourhood's liveability, vitality, civic interaction and sense of place. A complementary range of well-located, site-responsive parks of different types, scales and activity levels should work together across project boundaries to facilitate walking and cycling as well as provide recreation, play and outdoor lifestyle opportunities for the whole community.

(c) This section sets out the range of design elements that are to be considered and addressed in the planning and design of public open space areas within a Subdivision. The design elements considered are:

- (i) Public Open Space Provision & Distribution
- (ii) Land Use & Activity
- (iii) Site Responsive Design
- (iv) Interfaces & Surveillance
- (v) Accessibility & Movement
- (vi) Stormwater Management & Drainage
- (vii) Structures & Hard Landscaping
- (viii) Streetscapes

(d) Information in each element is arranged in terms of:

- (i) Objectives - which set out the broader aims for the topic;
- (ii) Mandatory Criteria - which specify specific requirements which must be complied with; and
- (iii) Design Suggestions - which provides further options and strategies for consideration.

(e) Alternate and innovative approaches to the Mandatory Criteria may only be considered if they can clearly be demonstrated to achieve the Objectives and are subject to approval by the Relevant Authorities.

(f) Soft landscaping is covered separately within Section 6.

(g) Detailed requirements for lighting are covered within Section 12.

5.2 PUBLIC OPEN SPACE MASTERPLAN

(a) The Developer must prepare a Public Open Space Masterplan to support the Subdivision Masterplan (Section 2.3), to be submitted with the Development Application during the preliminary design development phase.

(b) The Public Open Space Masterplan must fully describe responses to the design elements outlined in this section, and clearly identify the following:

(i) location, category and size of Public Open Space, including a summary of the total area and the proportion of the area designated to different types of public open space (active, passive, linkage corridors etc.);

(ii) how linkage corridors are connected to external linkages, public open space in neighbouring suburbs or adjacent shopping, educational and recreational facilities;

(iii) the proposed network of footpaths, shared paths and cycle paths in the Subdivision that will link each Public Open Space together and to adjoining subdivisions/developments, and provide a clear hierarchy of pedestrian movement to Areas of Significance and to and between sporting, recreation and community facilities;

(iv) how access for persons with disability, and appropriate furniture, is provided to all Public Open Space compliant with requirements for access for persons with disability.

(v) Public Infrastructure to be constructed in linkage corridors, with facilities designed to encourage pedestrian and cyclists activity over private vehicle use for short trips;

(vi) stormwater management elements and Water Sensitive Urban Design (WSUD) strategies to be included in the Subdivision. These must be integral with the Public Open Space and landscape design;

(vii) areas of ecological importance to be protected and include connective habitat corridors to adjoining natural habitats;

(viii) biting insect transition, easements and buffer zones;

(ix) a recreation strategy accommodating all age groups and recreational interests;

(x) a street tree framework and theme which clearly notes which tree species will be planted in each street with reference to the local authority street tree strategy where available;

(xi) the location, identification and health report for existing vegetation to be retained;

(xii) a proposed plant species list of new trees, shrubs, and grass;

(xiii) the irrigation reticulation main line systems, controllers, and water sources; and

(xiv) irrigation strategy and water use table for irrigated landscape planting and grassing in public open space.

5.3 PUBLIC OPEN SPACE PROVISION AND DISTRIBUTION

(a) This section covers the overall quantum of Public Open Space to be provided, the range of open space types, what they should include, and how they should be arranged in a broader open space network.

(b) Formal provision of Public Open Space is only required for Residential/Mixed Use Subdivisions. The following requirements are not applicable to Industrial and Rural Zoned Subdivisions, unless otherwise mandated through Development Permit conditions.

5.3.1 OBJECTIVES:

(a) To provide easy, walkable access to some form of Public Open Space for all residents within applicable Subdivisions.

(b) To appropriately locate and distribute higher use spaces throughout neighbourhoods.

(c) To ensure open space is suitably sized for its purpose.

(d) To facilitate maintenance regimes.

5.3.2 MANDATORY CRITERIA:

(a) The Planning Scheme requires Public Open Space be provided within Residential/Mixed Use Subdivisions, covering a minimum of 10 percent of the subdivision area. Allocation of Public Open Space must comply with the requirements of the Planning Scheme, as well as the following additional requirements:

  (i) a minimum of 50 percent of public open space must be landscaped/developed space; and

  (ii) a maximum of 50 percent of public open space can be undeveloped remnant bushland where this space includes Public Infrastructure that provides public access and benefit.

(b) Remnant bushland must be maintained in a healthy state during construction if it is to be included in the above public open space calculation. Degraded remnant bushland must be revegetated, if it is to be included in the open space calculation.

(c) Lakes and wetlands must provide a high level of amenity and recreational use if they are to be included in the above open space calculation. The inclusion of lakes and wetlands in the open space calculation is subject to approval by the Relevant Authority.

(d) Public Open Space Hierarchy must conform to Table 22 — Public Open Space Hierarchy, including:

  (i) Pocket Parks

  (ii) Local Parks

  (iii) Neighbourhood Parks

  (iv) Regional Parks

  (v) Encumbered Linkage Corridors

  (vi) Unencumbered Linkage Corridors

5.3.3 DESIGN SUGGESTIONS:

(a) Pocket parks are encouraged to be linked to larger ones by linkage corridors or appropriate street linkages to facilitate efficient maintenance regimes.

Table 22 — Public Open Space Hierarchy	
Hierarchy Type (Typical Sizes)	**Intended Use**
Pocket Park (< 1,500m²)	Pocket Parks are smaller public open spaces focused toward providing a nearby space for local community members. The area catchment is generally a 400 metre radius or a 5-minute walk. The space is typically utilised for short periods of time and may support active and passive play but does not provide for organised sporting events.
Local Park (1,500 to 5,000 m²)	Local Parks are medium sized public open spaces focused toward providing a nearby space for local community members. The area catchment is generally a 1000 metre radius or a 10-minute walk. The space is typically utilised for active and passive play but does not provide for organised sporting events. Local Park location and design should: • include accessible, safe pedestrian and cycling connections; • form part of an overall pedestrian and cycling network to connect key destination points; • support good passive surveillance; • be responsive to natural Development Site features; • build on sense of place; • provide active and passive recreation, shade and seating; and • assist to preserve local biodiversity and natural area values.
Neighbourhood Park (5,000 m² to 2 ha)	Neighbourhood Parks are large public open spaces serving as the recreational and social focus of a community. Residents are attracted by the variety of features and facilities and opportunities to socialise. Neighbourhood Parks can assist to engender sense of place and protect specific conservation values through retention of nature spaces. They may be used for junior sport or sports training if appropriate space is available. Neighbourhood Park location and design should: • be central to neighbourhood population catchment; • include accessible, safe pedestrian and cycling connections; • form part of an overall pedestrian and cycling network to connect key destination points; • support good passive surveillance; • be responsive to natural Development Site features; • build on sense of place; • provide active and passive recreation for a range of age groups and interests; • provide sporting based Public Infrastructure elements; and • assist to preserve local biodiversity and natural area values. Neighbourhood Park location and design may also: • be co-located with future schools to create a community hub at the planning stage; and • be large enough to enable different activities and uses to occur simultaneously.

Table 22 — Public Open Space Hierarchy	
Regional Park (> 2 ha)	Regional Parks are principally designed to provide for organised formal sport. They will very likely include substantial recreation space and some nature space connected to habitat corridors at planning stage. Regional Park design and function should consider biodiversity principles and environmental management goals. Regional Parks serve several neighbourhoods with players and visitors travelling from surrounding districts. Regional Park location and design should: • be located central to the population catchment to maximise accessibility; • accommodate the recommended dimensions and supporting amenity for formal sport and recreation; • be located on Collector Streets with good passive surveillance; • be serviced by public transport networks; and • include accessible, safe pedestrian and cycling connectors. Regional Park location and design may also: • be collocated with a future school or other community facilities at the planning stage to create a community hub (refer Area Plan); • provide a significant visual break in the urban environment, particularly along major thoroughfares; and • assist to preserve local biodiversity and natural area values. Regional Park activities may: • consist of sufficient space to accommodate a variety of concurrent uses, including organised sports, children's play, picnicking, exercising the dog, social gatherings and individual activities; • include a combination of bushland, open parkland for casual play and space for organised sport; and • accommodate multiple user groups, clubs and associations.
Encumbered Linkage Corridor (Min 15m wide)	Encumbered Linkage Corridors are designed to cater for service easements adjacent to pedestrian and cyclist movements between public open space areas or a pedestrian access point and a public open space area.
Linkage Corridor (Min 10m wide)	Linkage corridors are designed to cater for pedestrian and cyclist movements between public open space areas or a pedestrian access point and a public open space area.

5.4 LAND USE & ACTIVITY

(a) Existing and proposed surrounding land uses can have a significant and potentially negative influence on a Public Open Space in terms of their traffic generation, built form relationships and other factors. So too can particular higher use Public Open Space types be perceived as creating negative impacts for adjacent land uses in terms of noise and traffic generation.

5.4.1 OBJECTIVES:

(a) To pair appropriate Public Open Space provision with anticipated or existing land uses.

(b) To ensure activity levels within Public Open Space does not detract from the lifestyle of surrounding residents and businesses.

5.4.2 MANDATORY CRITERIA:

(a) Parking areas for higher use areas must be carefully located so as not to impact amenity for surrounding residents and businesses.

5.4.3 DESIGN SUGGESTIONS:

(a) Public Open Space areas within activity centres are encouraged to include a higher proportion of hardscaped treatments.

5.5 SITE RESPONSIVE DESIGN

(a) Site responsive design primarily relates to adopting a sensitive response to the existing landform and topography, providing a more authentic and anchored outcome. It may include retention of key landscape features such as trees or rocks, and can often have significant benefits in terms of limiting earthworks requirements and facilitating stormwater management strategies.

5.5.1 OBJECTIVES:

(a) To help create a sense of place by preserving landform and other natural features, where possible.

5.5.2 MANDATORY CRITERIA:

(a) Developers must identify and protect areas of ecological importance and ensure that the areas values are not compromised through the Subdivision process.

(b) Connective habitat corridors between adjoining natural habitats must be provided, where applicable.

5.5.3 DESIGN SUGGESTIONS:

(a) Retention of existing trees and features is encouraged.

(b) Designs that preserve and respond to existing ridge lines and valleys are encouraged.

5.6 INTERFACES & SURVEILLANCE

(a) The interface between adjacent residents and businesses and Public Open Space can be critical to their ongoing success and must be carefully considered.

(b) Passive surveillance of Public Open Space from rooms, windows and places frequented by people can go a long way to improving the space's overall sense of safety.

5.6.1 OBJECTIVES:

(a) To provide high amenity outlook for residents.

(b) To create a safe environment for users and minimise anti-social activity.

5.6.2 MANDATORY CRITERIA:

(a) Crime Prevention Through Environmental Design (CPTED) principles must be adhered to with all facilities.

(b) All areas of Public Open Space must include street frontage on at least one side to promote passive surveillance.

(c) Long, narrow pathways between fences must be avoided.

(d) Where lots front directly onto Public Open Space, Developers must demonstrate how surveillance of the public domain is achieved.

5.6.3 DESIGN SUGGESTIONS:

(a) Lighting and landscape treatments should be designed to encourage active use during the day and night to minimise anti-social behaviour and vandalism.

(b) Apartments and multi-storey forms are encouraged around Public Open Space generally to assist with passive surveillance.

(c) For allotments with a direct interface to Public Open Space, apartments are encouraged over single dwellings due to their enhanced opportunities for co-ordinated interface management such as integrated fencing design, finished level management, shared controlled pedestrian access and possible controlled individual courtyard access.

5.7 ACCESSIBILITY & MOVEMENT

(a) This section relates to accessibility both in terms of universal access for disabled persons, but also to the more general linkages and connections within and between Public Open Spaces.

5.7.1 OBJECTIVES:

(a) To ensure access to Public Open Space areas is available for all.

(b) To provide safe and clear linkages for pedestrians and cyclists around and between Public Open Space(s).

(c) To create pedestrian priority spaces, while enabling access to service and maintenance vehicles.

(d) To ensure on-street and off-street parking facilities are made available to service Public Open Space(s).

5.7.2 MANDATORY CRITERIA:

(a) All public places and facilities for public access, use and enjoyment in any Subdivision must comply with the *Disability Discrimination Act 1992 (Cth)*. In particular, all public places and facilities for public access, use and enjoyment, must be reasonably open, accessible and available to people with a disability in accordance with that Act

(b) Public Open Spaces must be designed to comply with all relevant disabled access legislation, regulations and standards, including *AS1428: Design for Access* and Mobility as far as reasonably practicable.

(c) The Developer must ensure that an adequate and safe hierarchy of linkage and pathways is achieved throughout the Public Open Space areas such that pedestrians and cyclists can move around and between areas of Public Open Space easily and with a high level of amenity.

(d) Public Open Space areas must be designed to:

  (i) prevent access by public vehicles;

  (ii) allow for service access for emergency, council and maintenance vehicles;

  (iii) provide access points at maximum 300 metre centres;

  (iv) provide access points from the lower classification of street where practicable; and

  (v) provide lockable gates/barriers at all access points.

(e) Shared path connections must be provided between all playground areas.

(f) Access must be provided to all pathways, street and park furniture in accordance with all disabled access requirements and standards, and CPTED principles. Circulation spaces around seats and tables must provide fair and equitable access for persons with disabilities.

(g) Refer Section 4.10 for requirements on pathways generally.

(h) On-street and off-street parking facilities must be provided for Public Open Space Areas, in accordance with the Planning Scheme as agreed with the Relevant Authority.

5.7.3 DESIGN SUGGESTIONS:

(a) Seating for rest stops should be considered along pathways.

(b) View corridors should be maintained where possible between nodes.

(c) Bicycle infrastructure should be incorporated adjacent Collector Streets and areas of high traffic.

5.8 STORMWATER MANAGEMENT & DRAINAGE

(a) The Public Open Space network plays an important role in the management of stormwater throughout a Subdivision and this should be integrated and balanced with its other recreational purposes.

5.8.1 OBJECTIVES:

(a) To manage the movement of stormwater safely and efficiently.

(b) To minimise the time that stormwater impacts upon the usability of Public Open Space.

5.8.2 MANDATORY CRITERIA:

(a) Stormwater management elements and Water Sensitive Urban Design (WSUD) strategies must be included in the Subdivision and be integrated with the overall Public Open Space and soft landscaping design.

(b) Refer Section 7 for general Stormwater Drainage requirements.

(c) Landscaped areas must be designed to ensure they are free draining.

(d) Subsoil drainage must be provided to all soft fall areas in accordance with Australian Standards. Provide subsoil drainage to all other landscaped areas, as necessary.

(e) Public Open Space areas may be utilised for detention purposes in major storm events, but must remain unencumbered by drains during minor storm events and have sufficient flat area for informal recreation. Detention basins must be designed in accordance with Section 7.9.14.

5.8.3 DESIGN SUGGESTIONS:

(a) Landscape schemes are encouraged to be reflective of natural stormwater systems where possible.

5.9 STRUCTURES & HARD LANDSCAPING

(a) Structures and hard landscaping form an important, typically well-used and often costly part of any landscape design and should be considered carefully to ensure that they are specified and located appropriately.

5.9.1 OBJECTIVES:

(a) Provide a variety of structures and hard landscaping to Public Open Space areas, with types and amounts of Public Infrastructure determined by predicted volumes of population in the Public Open Space at any one time. Structures and hard landscaping to include:

(i) places of rest and gathering such as seating, picnic tables, benches, boulders and other seating types that facilitate a rest stop or place for social connection. Table and seating must provide fair and equitable access opportunities for persons with disabilities, such as inclusion of table settings for wheelchair users;

(ii) appropriate shade structures for seating areas, picnic tables, recreation spaces and playground equipment that considers the duration of time park users will remain at the fixed infrastructure location.

(iii) automated unisex public toilet facilities in locations of occasional and/or intermittent high peak usage.

(iv) active recreation opportunities, including sporting and play equipment;

(v) litter bins to collect waste, located adjacent maintenance access points and near picnic facilities;

(vi) barbecues and cooking facilities for social gatherings;

(vii) hard wearing surface treatments for key pathways and higher use areas;

(viii) multi-modal transport storage, such as bike racks; and

(ix) access to water for drinking and maintenance.

(b) Ensure that required services including stormwater, water, wastewater, electrical, CCTV/communications and lighting are provided to service the structures and hard landscaping.

5.9.2 MANDATORY CRITERIA:

(a) A range of furniture items must be provided at appropriate locations in Public Open Spaces to improve public amenity and recreational usage, complying with the following:

(i) All furniture must be in accordance with relevant Australian Standards including *AS 1428* to cater for people with a disability, local and national building codes, and include Certification as necessary, to the approval of the Relevant Authority.

(ii) Local, Neighbourhood and Regional Parks must include Public Infrastructure that can be accessed by people with a disability.

(iii) All furniture must be robust, vandal proof, built of durable materials that will withstand general weathering and deterioration.

(iv) All seating must be built from materials that do not overheat, creating a burn hazard, and discourages inappropriate use.

(v) Shade cover must be provided to all table and seating areas. This may be achieved by a combination of tree planting and constructed shade structures, except for prominent table and seating areas which must be shaded by constructed shade structures to the approval of the Local Authority. Constructed shade structures must comply with the Building Code of Australia and be Certified.

(vi) Constructed shade structures must be located outside of minor drainage flow paths and shaded areas must not be inundated by minor storm events.

(vii) Places where people gather (e.g. near play equipment or at park entrances) must be provided with litter collection, seating, and constructed or natural shade cover to the approval of the Relevant Authority.

(viii) automated unisex public toilet facilities must be provided in Local, Neighbourhood and/or Regional Parks as agreed with the Relevant Authority.

(b) Drinking fountains must:

(i) be located on a concrete slab;

(ii) provide equitable access for all users;

(iii) incorporate appropriate drainage linked to the stormwater system; or subsoil drainage systems to plantings that will benefit from additional soil moisture, subject to approval by the Local Authority;

(iv) incorporate automatic shut-off mechanisms to reduce water wastage;

(v) provide back flow prevention; and

(vi) incorporate a dog water bowl.

(c) Bike racks must be provided at park entrances, along the cycle network and/or at destinations within Public Open Space.

(d) Internal LED lighting must be provided to primary pathways and play areas, with the exception of pocket parks where they are sufficiently lit from adjacent street lighting. Refer Section 12 for details.

(e) Neighbourhood and Regional Parks must include barbecues and/ or cooking facilities for social gatherings, unless otherwise agreed with the Relevant Authority.

(f) Sporting and play equipment must meet the following requirements:

(i) Provide a range of play opportunities and equipment or features for users of a variety of ages and abilities, including a portion of accessible play elements for persons with disabilities. The overall

approach to provision of play equipment and recreational facilities must be outlined in the Public Open Space Masterplan.

(ii) All play equipment must comply with the relevant Australian Standards, local and national building codes, and include certification as necessary, to the approval of the Relevant Authority. Relevant Australian Standards include but are not limited to *AS 4486.1-1997* and *AS 4685.1-6-2004*.

(iii) Play equipment must include impact absorbing surrounds, with subsoil drainage, to Australian Standards requirements. Unless otherwise approved by the Relevant Authority, impact absorbing surrounds must be made of durable rubber suited to the climate and meet fall from height requirements at and around all play/exercise equipment, to the satisfaction of the Relevant Authority.

(iv) Total shade cover, measured between 9am and 3pm, must be provided to all play equipment by constructed shade structures. Constructed shade structures must be designed to prevent access to roofs/shade material from the ground and other infrastructure, with min 4.5m clearance from the ground and min 2.5m clearance from all other equipment and structures, which may be reduced to 2m where there is restricted ability to climb structures, to the satisfaction of the Relevant Authority.

(v) Play areas must have adequate separation from traffic conflict areas (vehicle, bike and pedestrian traffic) and large open stormwater drains.

(vi) Play equipment and constructed shade structures must be located outside of minor drainage flow paths and shaded areas must not be inundated by a minor storm event.

(vii) Design and location of play equipment is to be in accordance with CPTED principles.

(viii) Bins and shaded seating must be provided nearby.

(g) Park name signage and other informative signage must be provided to assist wayfinding and commemorate historical, social or natural cultural elements and place making.

5.10 STREETSCAPES

(a) Streetscape designs can form important secondary visual cues to help people navigate to open space assets. Streets can also become special spaces for residents, especially when more generous verges or planting regimes are proposed.

5.10.1 OBJECTIVES:

(a) Streetscape design should support the amenity, function and wayfinding of neighbourhoods.

5.10.2 MANDATORY CRITERIA:

(a) Developers must provide detailed sections and explanatory technical information for any atypical streetscapes proposed.

5.10.3 DESIGN SUGGESTIONS:

(a) Larger, possibly asymmetrical verges are encouraged where tree retention or special landscape treatments are proposed.

(b) Boulevard treatments are encouraged for streets which lead to open space areas.

(c) Water management bio-swale streets are encouraged in the Monsoonal North climatic region, where appropriate.

6 SOFT LANDSCAPING

6.1 INTRODUCTION

(a) Requirements for soft landscaping across varying land use zoning and locality are broadly described in Table 2 — Typical Public Infrastructure Expectations.

6.2 OBJECTIVES

(a) To provide guidelines for the planning and design of soft landscaping elements throughout streetscapes and Public Open Spaces within a Subdivision.

(b) To ensure appropriate species of flora are selected.

(c) To ensure handover and ongoing maintenance is facilitated.

6.3 MANDATORY CRITERIA

(a) All areas within Road Reserves and Public Open Space, which are not hardscaped, must be landscaped with appropriate soft landscaping to provide a sufficient level of amenity and mitigate erosion, to the satisfaction of the Relevant Authority.

(b) Locate all soft landscaping elements with public safety as a major consideration.

(c) Comply with all requirements of the Standard Drawings and Standard Specification.

6.3.1 FLORA SELECTION

(a) All trees, plants, shrubs and ground cover species including grass seed mixes must be approved by the Relevant Authority. The Relevant Authority may nominate pre-approved species and seed mixes.

(b) All flora species and planting arrangements must be low maintenance, water efficient, and suitable for the intended use, location, wind loading, site soils and drainage conditions.

(c) All trees must have the following characteristics:

  (i) sturdy and well hardened trunks and stems;

  (ii) a well developed root system;

  (iii) a minimum 3 months in the container;

  (iv) obviously sound, healthy and vigorous appearance; and

  (v) be free from pests and disease.

(d) Flora with thorns, or similar, are not permitted.

6.3.2 TREE PLANTING

(a) The tree planting corridor in Road Reserves is generally located 1100 – 1600mm behind kerb and must be installed with root barriers as per the Standard Drawings.

(b) Where reasonably practicable, trees must be planted a minimum 3 metres from built infrastructure (streets, pathways, structures, etc.). Where trees are located less than 3 metres from built Public Infrastructure, root barriers must be installed as per the Subdivision Standard Drawings (Part 3). Root barriers must also be provided to protect built Public Infrastructure from existing trees, as per *AS 4970*.

(c) Trees and shrubs in Power and Water service corridors and easements must be selected from the Power and Water approved list of allowable plants.

(d) Trees and planting must be installed to provide the following clearances at full maturity:

  (i) appropriate separation between different species of trees and plants;

(ii) clear sight distances for pedestrians and vehicles at intersections, driveways Pedestrian Crossings, and Kerb Ramp Crossings;

(iii) clearance from overhead power lines, light poles and CCTV cameras to prevent Public Infrastructure damage and compromised light spills/CCTV views;

(iv) clearance to underground services and stormwater pits to avoid root damage; and

(v) minimum 3 metres clearance from fire hydrants.

6.3.3 GARDEN BEDS

(a) Ensure a variety of flora is installed in each garden bed to create thematic planting.

(b) Design planting arrangements to achieve 100 percent canopy cover of the garden bed at maturation, unless otherwise agreed with the Relevant Authority.

6.3.4 GRASSING

(a) Provide a variety of dryland (non-irrigated) and irrigated grassing, as appropriate.

6.3.5 REQUIREMENTS FOR STREETSCAPES

(a) Streetscapes must generally be planted as follows:

(i) Primary Collector Street – Thematic planting is required on all verges and in any median areas. Landscape treatment to include garden beds, tree planting and grassing to both verges and medians as well as appropriate drainage, irrigation and growing medium.

(ii) Secondary Collector, Access, and Minor / Cul-de-Sac Streets – Landscape treatment to include tree planting and grassing to both verges and medians.

(iii) Roundabouts - typically designed with topsoil, subsoil drainage, feature planting, irrigation and mulch. Hard landscaping treatments may be adopted where subsoil drainage cannot be adequately provided, subject to approval by the Relevant Authority.

6.3.6 REQUIREMENTS FOR PUBLIC OPEN SPACE

(a) All Public Open Space areas must be landscaped to a minimum standard for the purposes of public amenity, conforming to the following requirements:

(i) a range of plant material must be used with an appropriate balance and mix of upper canopy to provide shade, shrubs and ground covers;

(ii) all areas that are disturbed during construction must be stabilised with grassing or other methods;

(iii) open areas must be provided for active recreation purposes;

(iv) shade trees (and shade structures) must be provided over play equipment, seats and along pathways for aesthetic and comfort reasons; and

(v) areas of retained vegetation must be improved with additional planting of native species where required, as well as mulching and kerbed edges.

6.3.7 IRRIGATION

(a) Permanent irrigation must be limited to active open space areas, featured landscape areas and garden beds.

(b) Within Road Reserves, except verges adjacent irrigated parks or open space areas, irrigation systems are not required and will not be owned or maintained by the Relevant Authorities.

(c) Irrigation systems must be designed and certified by a qualified irrigation designer certified by Irrigation Australia, and must comply with all relevant Australian Standards.

(d) Landscaping and irrigation works must be designed to achieve efficient use of water, providing adequate water for healthy growth of plants without wastage.

(e) All possible sources of water for irrigation purposes must be investigated by the Developer, with potable water only used where alternative water sources are not practicable. If required, potable water supply must comply with the requirements of Section WATER8.

(f) The Developer is responsible for the supply of water and irrigation of all soft landscaping during the Defects Liability Period. Where permanent irrigation is absent, temporary irrigation may be required to assist with establishment and maintenance of soft landscaping. Any temporary irrigation installed must be removed by the Developer prior to completion of the Defects Liability Period, unless otherwise agreed with the Relevant Authority.

6.4 DESIGN SUGGESTIONS

(a) Use of trees and planting to reinforce the status and character of each type of street is encouraged.

(b) Planting regimes that are indigenous to the area are encouraged.

(c) Xeriscaping and low water use planting schemes are encouraged, particularly in locations with low rainfall.

7 STORMWATER DRAINAGE

(a) This section, together with those parts of Section 4 dealing with drainage in respect of streets and pathways, sets out the minimum requirements for design, documentation and approval of stormwater drainage systems servicing Subdivisions.

(b) Stormwater drainage is a key design consideration for the development of all land to ensure both natural systems and constructed systems continue to function in terms of stormwater volumes, discharge rates, velocities and water quality. Adverse impacts on upstream and downstream environments, including both built environments and natural ecosystems, must be mitigated. It is the responsibility of the Developer to ensure stormwater drainage design and construction is compatible with existing, proposed and, to the greatest extent possible, foreseeable future land use.

(c) The Developer must implement Water Sensitive Urban Design (WSUD) best management practices to mitigate adverse impacts on natural ecosystems as far as reasonably practicable. In the context of stormwater drainage, this includes but is not limited to:

(i) preservation of natural hydrological flow regimes, including managing sub-catchment flow directions, discharge rates and volumes (Section 7.2.3);

(ii) retention of natural Waterways, where practicable to do so (Section 7.2.4);

(iii) selection of stormwater drainage infrastructure to slow down flows, maximise groundwater recharge, and filter out nutrients and other pollutants (Section 7.9); and

(iv) management of stormwater quality (Section 7.10).

(d) The Relevant Authorities for stormwater drainage management are:

(i) Local Authority in respect of stormwater Public Infrastructure design and construction on, as well as quantity and quality of discharge of stormwater to or through, Local Authority streets, land and other Public Infrastructure owned or under the care and control of the relevant Local Authority.

(ii) DLPE in respect of stormwater Public Infrastructure design and construction on, as well as discharge into land owned by the Crown.

(iii) DLI in respect of Northern Territory Government Controlled Road Reserves.

(iv) DLPE in respect of pollution incidents of surface water, groundwater and/or tidal waters under the *Water Act 1992 (NT)*; and works interfering with a Waterway.

(v) Northern Territory Environmental Protection authority in respect of pollution incidents under the *Waste Management and Pollution Control Act 1998 (NT)*.

(vi) NT Health – Medical Entomology Section in respect of creation or disturbance of biting insect habitats.

(e) Stormwater design must conform to the following documents and the requirements of this Section:

(i) Australian Rainfall and Runoff (Geoscience Australia);

(ii) Stormwater Drainage Design in Small Urban Catchments (ARRB Special Report No. 34);

(iii) QUDM (by the Institute of Public Works Engineering Australasia - Queensland & Northern Territory (IPWEA-QNT));

(iv) Austroads Guidelines, including Guide to Road Design – Part 5: Drainage;

(v) Relevant Australian Standards;

(vi) The relevant policies or guidelines in Part 2 - Reference Documents; and

(vii) The details provided in the accompanying Part 3 – Standard Drawings.

(f) Riverine flood/storm surge modelling and stormwater design must incorporate the longest outlook in CSIRO's Sea Level Rise Predictions.

(g) All stormwater drainage infrastructure including but not limited to pits, pipes, open drains, and basins must be free flowing and must not facilitate breeding of biting insects, as far as reasonably practicable. Refer to *Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the NT* and *Constructed Wetlands in the NT, Guidelines to Prevent Mosquito Breeding* for further guidance on best practice design and management.

7.1 STORMWATER MANAGEMENT STRATEGY

(a) Stormwater management and design approval is a two-part process. Developers must:

(i) Submit a Part 1 Stormwater Management Plan for review to each Relevant Authority during the project development phase, prior to (or at the time of) submitting a Development Application; and

(ii) Submit a Part 2 Stormwater Management Plan for approval to each Relevant Authority during the design development phase, after a Development Permit is received.

(b) Flood studies may be required to confirm riverine/catchment flood levels and extents where existing studies have not been undertaken, as made available by DLPE- Water Resources.

7.1.1 PART 1 STORMWATER MANAGEMENT PLAN

(a) Part 1 Stormwater Management Plans must:

(i) include a catchment plan, clearly illustrating the existing and proposed management of stormwater flows entering and/or leaving the Development Site;

(ii) for staged developments, provide an overall drainage plan for the whole of the proposed Subdivision, and provide for ongoing stormwater management throughout the staged development construction phase. Typically, a connection to the trunk drainage system must be constructed in the first stage, regardless of where the actual development works commence; however, the Developer may propose alternative stormwater management methods for approval by the Relevant Authority.

(iii) expressly consider the findings and recommendations of any existing plans or reports that may affect or be affected by stormwater management on the Development Site.

(iv) Part 1 Stormwater Management Plans must also identify the following as a minimum:

(A) primary and secondary storm surge levels and extents;

(B) riverine / catchment flood levels and extents;

(C) assumed sea level rise;

(D) locations of stormwater discharges;

(E) any impacts of the Subdivision on the catchment-wide drainage system, including connection points and modifications required to upstream and downstream drainage infrastructure, as applicable;

(F) stormwater management options that may mitigate any adverse impacts on existing drainage infrastructure resulting from the proposed Subdivision; and

(G) stormwater quality requirements, including sizing and positioning of stormwater quality treatment devices.

7.1.2 PART 2 STORMWATER MANAGEMENT PLAN

(a) A Part 2 Stormwater Management Plan must be submitted to each Relevant Authority for approval after a Development Permit is received. This should be supported with approval(s) for discharging stormwater into downstream private land or Public Infrastructure.

(b) A Part 2 Stormwater Management Plan must include schematic information demonstrating that the proposed Subdivision will comply with the following conditions:

(i) all urban properties are provided with flood immunity for the 1 percent Annual Exceedance Probability (AEP) Storm Event including storm surge, riverine / catchment flooding and local stormwater flows, except for Areas of Significance which require greater immunity;

(ii) all rural properties maintain a minimum 1 hectare of unconstrained land during the 1 percent Annual Exceedance Probability (AEP) Storm Event including storm surge, riverine / catchment flooding and local stormwater flows, except for Areas of Significance which require greater immunity;

(iii) all stormwater flow directions and management controls must be identified, including preliminary sizing of controls (e.g. detention systems, water quality treatment systems etc.);

(iv) all stormwater must flow to a Lawful Point of Discharge without causing Nuisance to adjacent properties or Crown land, or exceeding the capacity of existing Public Infrastructure;

(v) a risk assessment of the drainage system must be provided, identifying any safety measures to be adopted in the design; and

(vi) all measures that will be taken to prevent pollution of stormwater from construction activities must be identified, including separate controls for each stage of the construction program.

7.2 STORMWATER DESIGN PHILOSOPHY

7.2.1 DESIGN LIFE

(a) All materials and components of the stormwater drainage system must be durable and Fit For Purpose with a minimum design life of 50 years.

7.2.2 MAJOR/MINOR FLOOD MANAGEMENT CONCEPT

(a) Design of the stormwater drainage systems must be based on the 'Major/Minor Flood Management Concept', which provides two distinct but conjunctively-acting drainage networks to manage 'Minor' (frequent) storm events and 'Major' (rare) storm events.

(i) The minor drainage system typically comprises underground pipes or table drains, which are designed to convey to disposal a minor stormwater flow of Annual Exceedance Probability (AEP) as specified in Table 25.

(ii) The major drainage system typically comprises the arrangement of Road Reserves, drainage reserves, open space, detention basins etc. to convey to disposal a major stormwater flow of Annual Exceedance Probability (AEP) as specified in Table 26. Overland flow paths via Public Infrastructure must be provided to all major drainage paths. Trapped sag points and land locked catchments will not be accepted, unless otherwise approved by the Relevant Authority.

7.2.3 STORMWATER CATCHMENTS AND DRAINAGE NETWORKS

(a) Design of stormwater drainage networks must address the following requirements:

(i) Hydrological calculations must be undertaken considering land use across all contributing catchments is fully developed according to current permitted land use within the Planning Scheme.

(ii) Where stormwater from upstream catchments currently drains through the Development Site, stormwater infrastructure must be sized to accommodate such stormwater, without posing any adverse impacts on upstream drainage infrastructure.

(iii) Post-development flows leaving the Development Site must be equal to or less than pre-development flows for all storm events up to and including the 1% AEP event[1]. Attenuation devices, such as

[1] If the Development Site is located near the catchment outlet and discharges directly into a major water body, it may be appropriate to release water without on-site detention. Where this occurs, it is recommended that the Developer consult with the Relevant Authority to agree on requirements. Note, the requirements of Clause 7.2.3 (iii) must be met, unless otherwise approved by the Relevant Authority

detention basins, may be incorporated within the Subdivision to detain peak flow rates to achieve this objective.

7.2.4 NATURAL WATERWAYS

(a) Natural Waterways, lagoons, swamps and similar natural features must generally be retained in their natural state in order to maintain existing outflow characteristics and groundwater aquifer recharge.

(b) Where construction works are required to manage stormwater drainage in these areas, the methods must be approved by the Relevant Authorities and a '*Permit to Interfere with a Waterway*' may be required under Section 41(1) of the *Water Act 1992 (NT)*.

7.2.5 GENERAL REQUIREMENTS FOR RESIDENTIAL, MIXED USE AND INDUSTRIAL ZONES

(a) Category A Localities must comply with the following requirements:

(i) All allotments must be graded to drain towards an adjacent servicing Road Reserve or drainage reserve. Inter-allotment drainage will only be permitted where approved by the Relevant Authority and an easement is provided in accordance with Section 7.7.

(ii) The following allotments must collect all stormwater on the Development Site during the minor storm event and discharge via a Stormwater Lot Connection to a Lawful Point of Discharge:

(A) All lots smaller than 600 m^2;

(B) All lots with setback lot boundaries equal to or less than 1.5 metres;

(C) All non-single residential allotments (such as duplex sites and units); and

(D) All commercial and industrial allotments.

(iii) All Stormwater Lot Connections must provide a grated inlet pit installed at the property boundary to safely accommodate surcharge into the Road Reserve at the connection point without impacting upstream hydraulic performance (min 450 x 450 GIP for Residential Zones; and 900 x 600 GIP for Commercial/Industrial Zones).

(iv) Typical Lot Connection details for Residential Zones are provided in Part 3 (Standard Drawings).

(b) Category B and C Localities must comply with the following requirements:

(i) Stormwater drainage must maintain natural sheet flow across the lot into the Relevant Authority drainage system, which may include table drains, open drains, culverts, floodways and/or natural Waterways.

(ii) Inter-allotment drainage may be approved where natural sheet flow is maintained, or concentrated drainage is formalised with appropriate easements and agreement from the downstream land owners. Easements and concentrated drainage is not preferred and requires approval from the Relevant Authority.

7.2.6 GENERAL REQUIREMENTS FOR RURAL ZONES

(a) Stormwater drainage in rural zones must maintain natural sheet flow across the lot into the Relevant Authority drainage system, which may include table drains, open drains, culverts, floodways and/or natural Waterways.

(b) Inter-allotment drainage may be approved where natural sheet flow is maintained, or concentrated drainage is formalised with appropriate easements and agreement from the downstream land owners. Easements and concentrated drainage is not preferred in rural areas and requires approval from the Relevant Authority.

7.3 HYDROLOGICAL DESIGN

7.3.1 GENERAL

Hydrological calculations for both major and minor drainage systems must be provided to the Relevant Authority as part of the Design Report (Section 2.4).

7.3.2 METHODS

(a) Hydrological design must be undertaken in accordance with the methods outlined within the current version of Queensland Urban Drainage Manual (QUDM), unless noted otherwise.

(b) Detention Basins must be modelled using runoff-routing software in accordance with Section 7.9.14.

(c) Runoff-routing modelling, where used, must be undertaken in accordance with Australian Rainfall & Runoff.

7.3.3 CATCHMENT CHARACTERISTICS

(a) Catchment characteristics must be defined based on full development of all contributing catchments (internal or external to the Subdivision) in accordance with the Planning Scheme.

(b) The coefficient of discharge used in Rational Method calculations must be in accordance with the current version of QUDM, unless regional-specific criteria is set by the Relevant Authority (Refer Section 14 Variations).

(c) Catchment parameters for runoff-routing modelling, including catchment coefficients and rainfall losses, are to conform to Australian Rainfall & Runoff.

7.3.4 RAINFALL

(a) Rainfall data for the design storm must be obtained from Bureau of Meteorology Intensity-Frequency-Duration Charts.

(b) Temporal patterns must be obtained from Australian Rainfall & Runoff.

7.4 HYDRAULIC DESIGN

7.4.1 GENERAL

(a) Hydraulic calculations for both major and minor drainage systems must be provided to the Relevant Authority as part of the Design Report (Section 2.4).

7.4.2 METHODS

(a) Hydraulic design of pits, pipes, culverts, table drains and open drains must be in accordance with the current version of QUDM, unless noted otherwise.

(b) Hydraulic design of subsurface drainage must be in accordance with Part 3 – Standard Drawings, the current version of QUDM, and Austroads Guidelines, unless noted otherwise.

7.4.3 OUTLET CONDITIONS

(a) Where drainage is impacted by tidal or storm surge action, hydraulic design of stormwater Public Infrastructure must consider the following tailwater conditions:

- Minor Storm – MHWS (plus sea level rise)
- Major Storm – HAT (plus sea level rise)

(b) Where drainage systems discharge via non-tidal outfalls (e.g. into lakes, open channels, creeks, rivers etc.), hydraulic design of stormwater Public Infrastructure must consider the expected tailwater conditions within these receiving waters, including assessment of coincident flooding probabilities.

7.4.4 BLOCKAGE FACTORS

(a) Underground pit/pipe networks designed to convey part-stormwater flows during the Major Storm Event must be assigned with the following blockage factors to inlet capacities for determination of resulting overland flows:

(i) Generally: 50% blockage

(ii) Pits in sag locations: 100% blockage

(b) Blockage factors outlined in 7.4.2(a) may need to be adjusted for rural, regional and remote areas to take into consideration anticipated debris loadings and frequency of maintenance.

(c) All pipes and culverts, other than underground pit/pipe networks, must adopt blockage factors for all storm events in accordance with *Australian Rainfall and Runoff*.

7.5 DESIGN STORM EVENTS

(a) Design storm events must be in accordance with Table 23 to Table 24.

(b) Where catchment zones discharge into downstream Public Infrastructure with lower design standards, provisions must be made to safely accommodate surcharge into the Road Reserve at the connection point without impacting upstream hydraulic performance.

Table 23 — Design Storm Events for Residential/Mixed Use and Industrial Zones

Application	Annual Exceedance Probability (AEP)	
	Minor Storm	Major Storm
Residential Zones (excl. HR)	50%	1%
Commercial and HR Zones	10%	
Industrial Zones	20%	
All Other Land Use Zones	50%	
Areas of Significance (See Definitions)	1%	0.2%

Table 24 — Design Storm Events for Rural Zones

Application	Annual Exceedance Probability (AEP)	
	Minor Storm	Major Storm
Rural Zones (RR, RL, R)		1%
- Table Drains	50%	
- Culverts under Driveway Crossovers	50%	
- Cross Road Culverts	5%	
- Floodways	Refer Section 7.9.13 for details.	

7.6 DESIGN FLOW CRITERIA

(d) Use of streets, open space and drainage reserves for stormwater runoff must be in accordance with Table 25 and Table 26.

Table 25 — Minor Storm Flow Criteria

Drainage Public Infrastructure	Minor Storm Criteria
Kerb and Gutter Flow	Comply with the following:

Street Hierarchy	Typical Carriageway	Typical Max Spread Width from Nominal Kerb Line [2, 3]	Minimum 'Flood-Free' Lane Widths [1]
Minor Street	2 x 3m Lanes	2.5 m	0.5 m
Access Street	2 x 3.5m Lanes	2.5 m	1.0 m
Secondary Collector	2 x 3.5m Lanes 2 x 2.3m Parking Lanes	1.0 m	2.5 m
Primary Collector	2 x 3.5m Lanes 2 x 2.3m Parking Lanes 3m Median	1.0 m	2.5 m

1. Minimum 'flood-free' lane widths must be met for all traffic lanes.
2. Typical max spread widths are based on typical carriageway. Larger spread widths may be possible if wider lane widths are provided.
3. Nominal kerb line refers to edge of traffic lanes, and not the outside kerb line of parking lanes.
4. Refer Figure 10 to Figure 12 for illustration of typical street cross section spread widths.

Site Condition	Max. Spread Width from Kerb
Normal Condition	As per above Table.
Pedestrian Crossings or Bus Stops	0.5 m
At Intersection Kerb Returns and Kerb Ramp Crossings	1.0 m

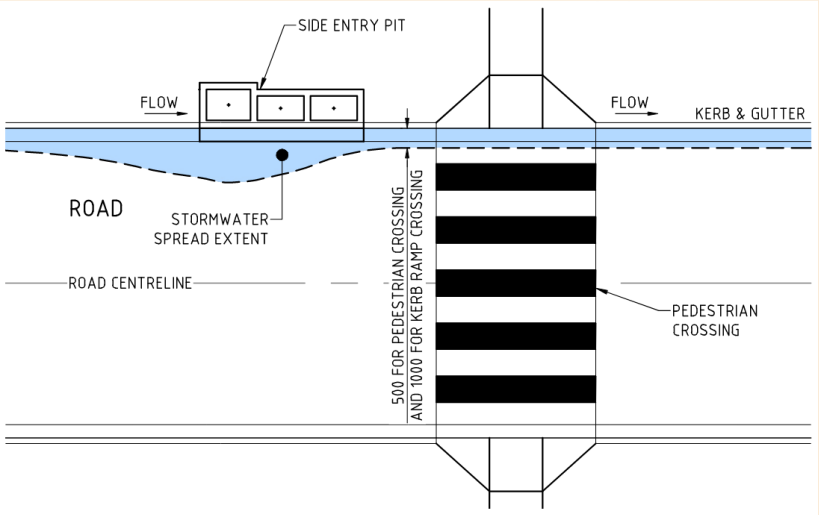


Figure 7 - Spread width – Road crossing

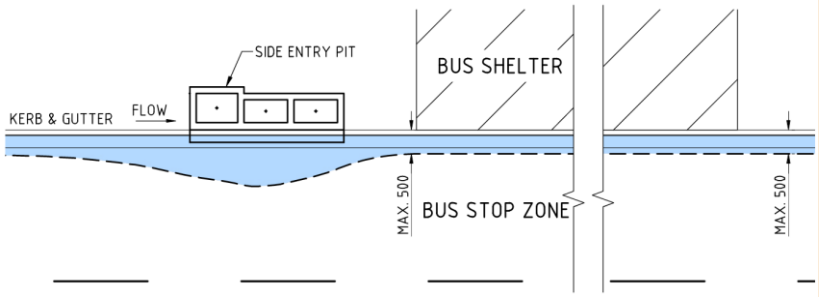


Figure 8 - Spread width – Bus stop

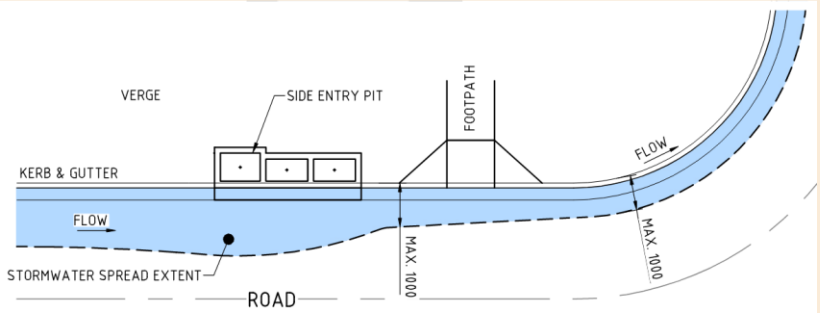


Figure 9 - Spread width – Kerb return

For vehicular safety, comply with the following criteria for transverse flows:

Site Condition	Flow Limits
Still water at sag	Depth ≤ 300mm
Risk to life (e.g. causeway or floodway)	Depth ≤ 200mm Depth x Velocity ≤ 0.30 m^2/s
No risk to life (e.g. road intersection)	Depth ≤ 300mm Depth x Velocity ≤ 0.30 m^2/s

Table Drains	Flows contained in table drains and meeting the following: Minimum 200 mm freeboard to edge of street shoulder. Flow depth ≤ 750 mm Flow velocity < Scour velocity Product of depth (m) and velocity (m/s): Refer to Table 28.
Culverts under Driveway Crossovers	Headwaters satisfy table drain flow criteria. Headwaters provide minimum 150 mm freeboard to edge of shoulder on driveway crossover. Flow velocity < Scour velocity
Cross Road Culverts	Headwaters satisfy Table Drain flow criteria. Headwaters provide minimum 200 mm freeboard to edge of street shoulder. Flow velocity < Scour Velocity
Open Space and Drainage Reserves	Flow to be contained in formal drain section and comply with the requirements of Table 29 — Open Drain Design Criteria.
Pedestrian Linkages	Pathways to be free of inundation. Minimum 1.0 metre width next to boundaries free of inundation.

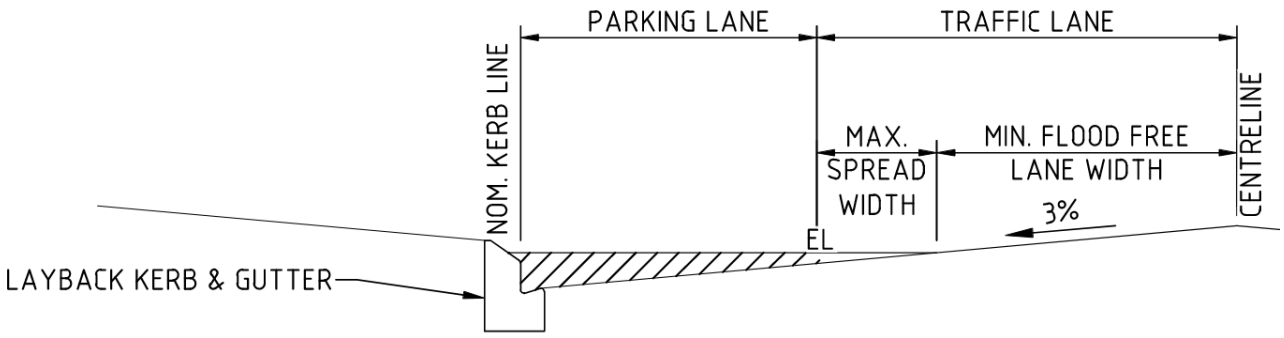


Figure 10 – Spread Width – Streets with on-street Parking - Option 1

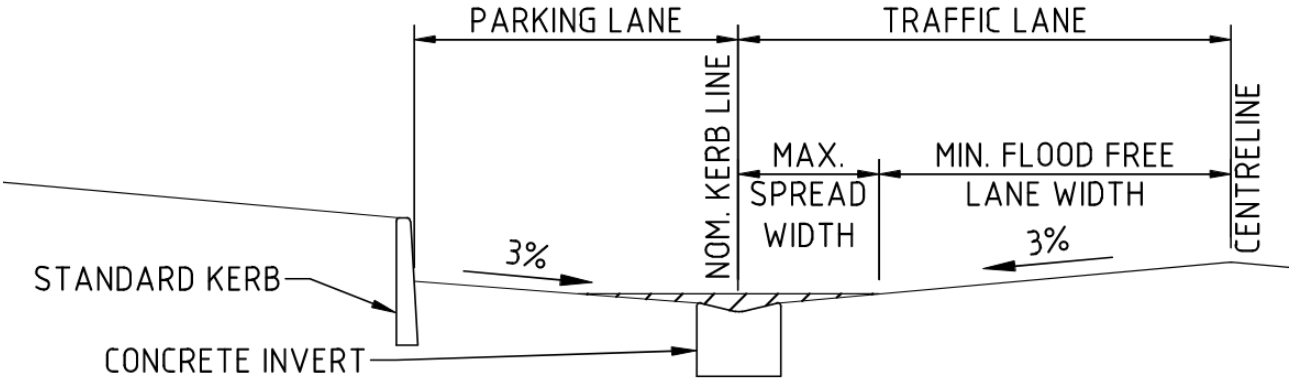


Figure 11 – Spread Width – Streets with on-street Parking - Option 2

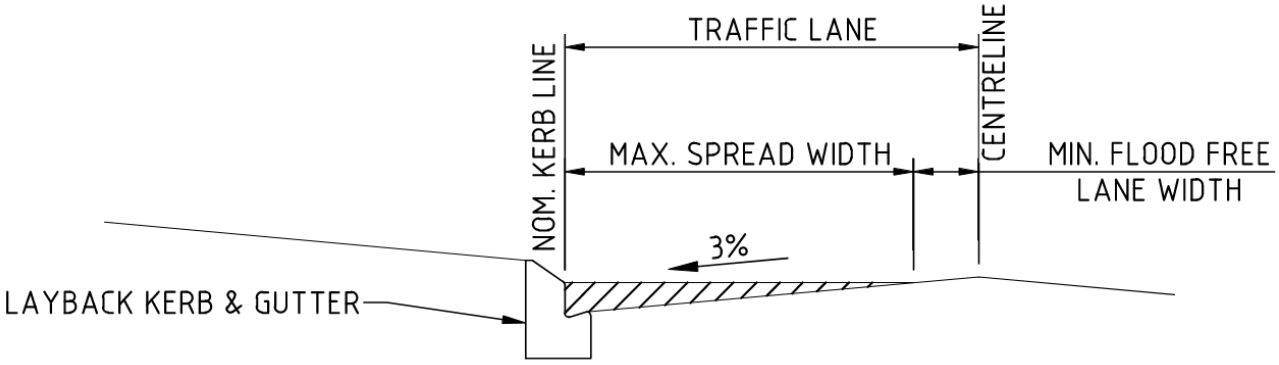


Figure 12 – Spread Width – No on-street Parking

Table 26 — Major Storm Flow Criteria

<table>
<tr><th>Application</th><th>Major Storm Criteria</th></tr>
<tr><td>Streets with Underground Pipe Systems</td><td>Flow contained in Road Reserve boundaries
Longitudinal flows to meet the following criteria:
<table>
<tr><th>Site Condition</th><th>Flow Limits</th></tr>
<tr><td>Potential risk to life</td><td>Depth ≤ 250mm
Depth x Velocity ≤ 0.40 m^2/s</td></tr>
<tr><td>No risk to life</td><td>Depth ≤ 250mm
Depth x Velocity ≤ 0.60 m^2/s</td></tr>
</table>
Transverse flows, including water overtopping the roadway, to meet the following criteria:
<table>
<tr><th>Site Condition</th><th>Flow Limits</th></tr>
<tr><td>Still water at sag</td><td>Depth ≤ 300mm</td></tr>
<tr><td>Risk to life
(e.g. causeway or floodway)</td><td>Depth ≤ 200mm
Depth x Velocity ≤ 0.30 m^2/s</td></tr>
<tr><td>No risk to life
(e.g. road intersection)</td><td>Depth ≤ 300mm
Depth x Velocity ≤ 0.45 m^2/s</td></tr>
</table></td></tr>
<tr><td>Streets with Table Drains</td><td>All longitudinal and transverse flows on the carriageway to meet the Depth and Depth x Velocity criteria nominated for Streets with Underground Pipe Systems.
Flows within table drains to comply with Table 28.
Extent of flooding (or flow spread) during the Major Storm must be assessed and illustrated on Design Drawings, with flooding over proposed Lots identified as Constrained Land. Total areas of Constrained Land must be illustrated on the Design Drawings, demonstrating compliance with Planning Scheme requirements for unconstrained land.</td></tr>
<tr><td>Open Space and Drainage Reserves</td><td>Flow to be contained in formal drain section and comply with the requirements of Table 29 — Open Drain Design Criteria.
Min 300 mm Freeboard to allotment boundaries.
Open Spaces (e.g. recreational ovals) can be used to attenuate flows and/or convey major flows, where approved by the Relevant Authority and appropriate safety measures are put in place.</td></tr>
</table>

Pedestrian Linkages	Inundation of pathways to meet the following criteria: • Depth ≤ 200 mm • Product of depth (m) and velocity (m/s) ≤ 0.30 m2/s Min 300 mm Freeboard to allotment boundaries. Minimum 1.0 metre width next to boundaries free of inundation.

7.7 DRAINAGE EASEMENTS

(a) Rear allotment drainage will not be permitted for Category A Localities.

(b) All attempts must be made to manage stormwater drainage flows within the street/drainage reserves and associated drainage systems without the use of drainage easements. Where it is impracticable to achieve this, the Developer must obtain approval from the Relevant Authority for the use of drainage easements.

(c) Where drainage easements are approved, the following criteria must be met:

(i) The minimum easement width for underground systems must be 3.0 metres for pipe diameters of 450 mm or less and depths of up to 1.5 metres. An increase in easement width must be provided for larger pipes and/or depths, as advised by the Relevant Authority. Major Storm flows (1% AEP Event) must be safely conveyed separately via the street/drainage reserve network;

(ii) Drainage easements for open drains must be designed to cater for the Major Storm Event (1% AEP), including freeboard. Easement width must accommodate full drain width plus additional land for access and maintenance as required by the Relevant Authority; and

(iii) The Developer will be responsible for the production of all easement documents and for execution and registration on each relevant title.

7.8 DRAINAGE RESERVES

(a) Drainage reserves are parcels of land owned by a Relevant Authority where the primary use is for stormwater drainage. Application of drainage reserves in Subdivisions will be subject to approval by Relevant Authorities.

(b) Where approved for use, drainage reserves must be designed to ensure public safety and amenity is maintained as a priority and the following criteria must be met:

(i) Drainage reserves must be designed to cater for the Major Storm Event (1% AEP) including freeboard;

(ii) Drainage reserves must contain vegetation, with appropriate fire breaks to adjacent properties, and cannot be lined with impervious surfaces, except where required for low flow drains; and

(iii) Drainage reserves widths are to be determined by the Public Infrastructure for which the drainage reserve caters and provide the following:

(A) A minimum buffer of 2 metres between adjacent property boundaries and the edge of an underground drain, or the edge of an open drain's top batter; and

(B) A 5 metre wide access corridor along one side of an open or underground drain to enable access for inspection and mechanical maintenance (i.e. mowing or slashing).

7.9 DRAINAGE INFRASTRUCTURE

(a) All drainage infrastructure must be constructed in accordance with the Standard Drawings (Refer Part 3), Specification (Refer Part 4) and these Guidelines.

(b) Alternatives including precast concrete structures may be accepted, subject to approval by the Relevant Authority. Where precast pits are used, 7MPa flowable fill is required for backfill.

(c) For all drainage infrastructure, appropriate safety measures must be provided to prevent the public from being trapped during storm events or flooding. Accordingly, risk assessment of the drainage system must be provided in the Part 2 Stormwater Management Plan and any safety measures identified must be included in the design at no cost to the Relevant Authority. Warning signs must be installed where required.

(d) For underground drainage networks, the inlets of all drainage pits and headwalls must be fitted with safety grates (or other appropriate safety measures) to mitigate the risk of unintended entry into piped systems. Design of such structures must be considered in the hydraulic design of drainage infrastructure, including impacts such as blockage and bypass overflows.

(e) Open drainage structures must be designed and fitted with features that assist persons within the flow to exit the open drain structure.

(f) In areas of high water table, the designer must consider buoyancy in relation to design of all drainage structures including pipe and culvert joints.

(g) Design of drainage Public Infrastructure must consider maintenance requirements of the Relevant Authority.

7.9.1 PIPES

(a) Scour protection must be provided at all pipes outlets.

(b) Stormwater drainage pipes must comply with Table 27.

Table 27 — Pipes Design Criteria	
Materials	Reinforced concrete, including fibre reinforced concrete, manufactured and tested to Australian Standards. Polypropylene, manufactured and tested to Australian Standards, may be considered but only used where approved by the Relevant Authority. Application to use polypropylene pipes must be supported with a detailed life-cycle assessment, including but not limited to consideration of performance outcomes, economics and sustainability.
Reinforced Concrete Pipes (RCP)	Minimum Size – DN 375 Minimum Class 2 [1] Minimum clear cover must generally be 600mm in accordance with manufacturer's specifications. Reduced cover may be acceptable where higher class pipes are used. Provide sealed joints, such as Rubber Ring Joints (RRJ) or Flush Joint (FJ) with External Bands (EB)
Clearances to Services	As per *AS3500.3* and Service Authority requirements, whichever is greater.
Minimum Grades	**Typical Minimum Grades** Minimum pipe grades are as follows, unless noted otherwise: Desirable Value: 0.50%

	Absolute Value: 0.30% [2] **Underground Pit/Pipe Networks** In underground pit/pipe drainage networks where the following hydraulic design criteria is met for all pipes with less than 0.50% grade: • pipes are flowing full during the Minor Design Storm Event; and • pipe flow velocities are ≥ 0.60 m/s in the 63% AEP Storm Event; absolute minimum pipe grades are as follows: DN375: 0.40% DN675: 0.18% DN450: 0.30% DN750: 0.15% DN525: 0.25% DN900: 0.12% DN600: 0.20% ≥DN 1050: 0.10%
Maximum Grade [3]	As required to control maximum velocities. Typical maximum grades for common pipe sizes are as follows: DN 375 - 15.0% DN 750 - 5.5% DN 450 - 11.0% DN 900 - 4.5% DN 525 - 9.0% DN 1050 - 3.5% DN 600 - 7.5% DN 1200 - 3.0% DN 675 - 6.5% DN 1500 - 2.2%
Flow Velocity Limits [4]	Desirable Values: Min 1.0 m/s to Max 4.0 m/s Absolute Values: Min 0.6 m/s to Max 6.0 m/s

Table Notes:

1. *All drainage systems subject to tidal influence (up to HAT) must be marine grade concrete as per AS3600.*
2. *'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.*
3. *Maximum grades apply to both physical pipe grades and hydraulic grade lines.*
4. *Flow velocity limits are set to ensure self cleaning of the pipe is maintained, and scouring/erosion of the conduit does not occur.*

7.9.2 DRAINAGE PITS - GENERAL

(a) All pits must be spaced maximum 90 metres intervals.

(b) All pits subject to vehicle loading must be designed to withstand expected loads.

(c) All access covers and grates must be Class D (Heavy Duty) in accordance with *AS3996*.

(d) Pits to be free draining.

(e) A reduction in pipe size from upstream to downstream of a pit is not permitted, except where approved by the Relevant Authority. Where approved, ensure the system works hydraulically, and comply with the following:

(i) Upstream Pipe ≤ DN600 - No change permitted

(ii) Upstream Pipe is DN675 to DN 1200 - max reduction of one pipe size

(iii) Upstream Pipe > DN1200 - max reduction of two pipe sizes

(f) Pipework openings must be located within a single wall of a pit; that is, pipes must not be permitted to enter through the corners of a pit structure.

(g) Pit depths must be maximum 3.0 metres, unless otherwise approved by the Relevant Authority.

(h) Pits must be located to minimise the likelihood of conflictwith service conduits and future driveways.

(i) Minimum freeboard for pits must comply with the following during the Minor Storm Event:

  (i) 150mm below the pit inlet on side entry pits and letterbox pits; and

  (ii) 150mm below the surface for grated inlet pits and junction pits.

(j) All drainage systems subject to tidal influence (up to HAT) must be marine grade concrete as per *AS3600*.

7.9.3 SIDE ENTRY PITS

(a) The spacing and size of side entry pits (SEP) must be designed to achieve the flow criteria in Table 25.

(b) SEPs must be located at all low (sag) points. One additional SEP must be provided on-grade upstream of a low point (one side only) for overflow relief, such that the inlet level of the on-grade pit is 200mm higher than the inlet level of the sag pit.

(c) SEPs must be located immediately upstream of Pedestrian Crossings, and bus stops to limit the flow to 500mm maximum width for the minor design storm event in these locations.

(d) SEPs must be located immediately upstream of the tangent point of kerb returns, small radius convex curves (kerb radius less than 15 m), and Kerb Ramp Crossings to limit the flow to 1000 mm width for the minor design storm event in these locations.

(e) SEPs must be located to reduce potential for conflict with driveways.

(f) The location of stormwater pits on intersection tangent points or within the kerb radius at intersections must be avoided. If there is no suitable alternative, stormwater pits located in these areas may be approved by the Relevant Authority and, where approved, must be fitted with heavy duty frames and lids to provide protection from damage by wheel loads.

(g) The clearance between the kerb invert and the underside of the lid, or lid support, where applicable, must be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter galvanised bar must be placed across the opening for safety purposes.

7.9.4 JUNCTION PITS (ACCESS CHAMBERS)

(a) Junction Pits must 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.

(b) On long lengths of constant size and grade, where side entry pits or other inlet pits are not required, junction pits must be constructed at maximum 90 metre intervals for cleaning and maintenance purposes.

7.9.5 LETTERBOX PITS

(a) Letterbox pits must be constructed within the invert of open drains or at low points in public open space to contain stormwater flows.

(b) Appropriate erosion control measures, such as stone pitching, must be included.

(c) The clear opening of the inlet must be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter galvanised bar must be placed across the opening for safety purposes.

7.9.6 INLET PITS

(a) Grated Inlet Pits (GIPs) are not preferred due to risk of blockage, particularly 'flush grate' systems, and must only be used where approved by the Relevant Authority. A proposal to use GIPs must address:

(i) whether the GIP is located on-grade allowing for bypass flows, or at a sag point;

(ii) if the GIP will be highly susceptible to debris loading leading to blockages, whether via natural organic matter or man-made waste; and

(iii) the risks associated with local stormwater flooding in the event of a blockage occurring, including whether appropriate overflow relief is available.

(b) Where GIPs are approved for use, the following criteria must be met as a minimum:

(i) maximum depth of water must be limited to 300mm in a blockage and overflow relief must be provided.

(ii) grates must be provided with an Allen key bolt down feature (or similar approved) and safely trafficable for pedestrians, cyclists and vehicles.

7.9.7 SURCHARGE PITS

(a) The use of surcharge pits is subject to approval by the Relevant Authority.

(b) Where approved for use, the pit must be designed to address the following:

(i) grates/outlet screens must be provided with an Allen key bolt down feature (or similar approved) and be safely trafficable for pedestrians, cyclists and vehicles unless provisions are in place to prohibit access for each respective mode of transport;

(ii) safety features must be provided to mitigate the risk of persons becoming trapped inside the pit;

(iii) the risk of blockage in the pit/grate must be appropriately considered, including assessment of potential flooding problems;

(iv) the pit and outlet screen must have sufficient structural integrity to withstand high outflow velocities and high pressure forces which may result due to blockage of the grate, particularly due to the presence of a bolt down feature; and

(v) safe maintenance access must be provided for clearing of debris.

(c) Hydraulic design of surcharge pits must be undertaken in accordance with established industry guidelines and have due consideration for energy losses including 90° mitre bend loss, expansion loss, screen loss, exit loss, and friction loss in the chamber.

7.9.8 BLIND PITS AND BANDAGE JOINTS

(a) Underground (Blind) pits are not permitted.

(b) Bandage joints for pipe connections are not permitted.

7.9.9 CATCH DRAINS

(a) Where undeveloped land slopes towards the Development Site, catch drains must be provided within the Development Site to divert flow away from, or through, the Development Site in a controlled manner. Catch drains must be designed as open drains in accordance with Section 7.9.11, with sufficient capacity to safely convey the Major Storm Flows (1% AEP Event).

7.9.10 TABLE DRAINS

(a) Table drains must be lined with appropriate dry land grasses. Concrete lined table drains are not encouraged and must be approved by the Relevant Authority. Unlined drains may be accepted when drains are cut in rock or within water stressed communities, subject to approval by the Relevant Authority.

(b) Table drains must be trapezoidal in shape, with profiles such that mowing can be achieved with tractor mounted equipment, or as otherwise agreed with the Relevant Authority.

(c) Where deflections in drain alignments are necessary, horizontal curves with a minimum 5 metre radius must be provided.

(d) Where drop structures are employed to control slope and velocity, the designer must address the potential for additional scour and erosion, associated maintenance issues and public safety.

(e) Scour protection must be provided at change of direction, drop structures and at the inlet / outlet to pipes and culvert structures.

(f) The design of table drains must ensure public safety and amenity is a priority. A risk assessment must be carried out and appropriate control measures put in place.

(g) Table drains must only retain water during storm conditions.

(h) Provide a minimum 1.5 metre offset between the top of batter and adjacent property boundary, widened as necessary to suit service corridor allocations.

(i) Table Drains must be designed in accordance with Table 28.

Table 28 — Table Drain Design Criteria	
Minimum Base Width	2.0m
Maximum Batter Slope	1:6 (desirable); 1:4 (absolute)
Minimum Grade[1]	0.50% (desirable); 0.30% (absolute)
Maximum Flow Depth	750mm
Minimum Freeboard	Minimum 200mm to edge of shoulder. Freeboard must account for dynamic effects on bends, leading to increased water surface elevation.
Maximum Velocity	Not to exceed scour velocity
Maximum Depth x Velocity	Minor Storm Event: 0.40 m^2/s. Major Storm Event: 0.60 m^2/s Higher values may be proposed to the Relevant Authority for approval, supported by a risk assessment in accordance with *ISO 31000* prepared by a Qualified Professional.

Table Notes

1. *'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.*

7.9.11 OPEN DRAINS

(a) In urban environments, open drains are only permitted where they form part of the trunk drainage system.

(b) Open drains must be lined with appropriate grass as a minimum. Unlined drains may be accepted when drains are cut in rock or within water stressed communities, subject to approval by the Relevant Authority.

(c) Profiles of grass lined drains must be such that mowing can be achieved with tractor mounted equipment.

(d) All deflections in drain alignments must be provided with horizontal curves with min 5 metre radius.

(e) Where drop structures are employed to control slope and velocity, the designer must consider the potential for additional scour and erosion, associated maintenance issues and public safety.

(f) Scour protection must be provided at any change of direction, drop structures and at inlets/outlets to pipes and culverts.

(g) Open drains must only retain water during storm conditions. They must be provided with suitable outlets to ensure they are free draining and mitigate erosion of downstream environments.

(h) The design of open drains must ensure public safety and amenity is a priority. A risk assessment must be carried out and appropriate control measures put in place, including fencing where appropriate. Where fencing is used, it must have suitable gate provisions to permit access for maintenance purposes.

(i) Open Drains must be designed in accordance with Table 29.

Table 29 — Open Drain Design Criteria	
Minimum Base Width	2.0m
Maximum Batter Slope	1:6 (desirable); 1:4 (absolute)
Minimum Grade[1]	0.50% (desirable); 0.30% (absolute)
Maximum Flow Depth	750mm
Minimum Freeboard	Freeboard to be measured to top of bank, and be the greater of: • 300mm; • 20% of Channel Depth; or • Velocity Head ($V^2/2g$).
Maximum Velocity	Not to exceed scour velocity
Maximum Depth x Velocity	0.40m2/s. Higher values may be proposed to the Relevant Authority for approval, supported by a risk assessment in accordance with *ISO 31000* prepared by a Qualified Professional.
Low Flow Drains	Low Flow Drains must be provided in all open drains servicing Category A Public Infrastructure localities within the Monsoonal North Climatic Region (Figure 4), to preclude the creation of boggy saturated areas and mosquito breeding sites due to Dry Season Base Flows. Low Flow Drains must meet the following criteria: • The open drain base must be sloped to a low flow drain with a defined invert to prevent waterlogging and encourage self cleansing velocities; • The low flow drain must be impervious to prevent weed or other vegetation growth, ensuring it remains free draining, while also providing a benchmark for maintaining longitudinal design grades; • The low flow drain must be designed to wholly contain expected Dry Season Base Flows[2] and provide a profile which facilitates easy maintenance; and • Scour protection must be provided immediately adjacent the impervious low flow drain, with adequate hydraulic roughness to control low flow velocities.

Table Notes

1. *'Desirable' minimum grades must be complied with unless Development Site constraints govern adoption of 'absolute' grades and approval is obtained from the Relevant Authority.*
2. *Anticipated Dry Season Base Flows are site-specific and will be influenced by both groundwater drawdown and excess irrigation within the catchment. Estimation of Dry Season Base Flows should be undertaken during initial Development Site investigations.*

7.9.12 CULVERTS

(a) Culverts may be Reinforced Concrete Box Culverts (RCBC) or Reinforced Concrete Pipes (RCP). RCBCs are preferred where fauna or livestock passage is required.

(b) All culverts under streets and driveway crossovers must have headwalls in accordance with Standard Drawings (Refer Part 3).

(c) Headwalls must be designed with a clear zone width in accordance with Austroads Guidelines: Guide to Road Design – Part 6: Roadside Design Safety and Barriers, unless otherwise approved by the Relevant Authority.

(d) Scour protection must be provided at the inlet and outlets of all culverts.

(e) RCPs must comply with the requirements in Table 27. RCBCs must comply with Table 30.

Table 30 — Reinforced Concrete Box Culvert Design Criteria	
Materials	Reinforced concrete, including fibre reinforced concrete manufactured and tested to Australian Standards.
Reinforced Concrete Box Culverts (RCBC)	Minimum Height – 450mm Designed in accordance with Australian Standards Provide sealed joints with mortar and external seals
Clearances to Services	As per *AS3500.3* or Service Authority requirements, whichever is greater.
Minimum Grade	0.50% (desirable), 0.30% (absolute)
Velocity Limits	Desirable Values: Min 1.0 m/s to Max 4.0 m/s Absolute Values: Min 0.6 m/s to Max 6.0 m/s

7.9.13 FLOODWAYS

(a) Where a natural low point exists within an existing or proposed new street, a floodway may be required to manage stormwater drainage flows across this point.

(b) Floodways must be designed to be trafficable during a 1% AEP storm event. Trafficable access/egress will be deemed sufficient where a floodway meets the 'Major Storm Criteria' listed under Table 26.

(c) Floodways must meet the following criteria:

  (i) The floodway must have an appropriate pavement strengthening method, approved by the Relevant Authority;

  (ii) Concrete margins are required at both the upstream and downstream edge of pavement, with weep holes installed in the downstream margin;

  (iii) Appropriate upstream and downstream protection measures must be constructed to mitigate erosion/scour and prevent damage to both private and Public Infrastructure; and

  (iv) Warning sign(s) for floodways, including depth markers and "Water Over Road" signs, must be installed.

(d) Floodways resulting in street/road closures for any period must only be provided where approved by the Relevant Authority. The decision to provide such a floodway must be supported by adequate consideration of alternatives, identifying that it is not viable to construct a bridge, culvert, or trafficable floodway. The average annual time of closure (AAToC) must also be determined and considered in a detailed risk

assessment of interruptions to transport access/egress in the area. The requirements of Clause 4.2.1(f) must also be demonstrated to be met.

7.9.14 DETENTION BASINS

(a) Detention basins may be required to attenuate post-development peak flow rates to match pre-development flow rates discharging from the Development Site, as discussed in Section 7.2.3(a)(iii).

(b) Detention basins must generally be designed in accordance with *Australian Rainfall & Runoff*, including considerations for:

  (i) hydrological design, flood capacity, and freeboard requirements;

  (ii) hydraulic design of primary and secondary outlets;

  (iii) basin floor and embankment design;

  (iv) public and operational safety; and

  (v) maintenance requirements.

(c) Detention basins can be considered as dams and design must give appropriate consideration to the *Australian National Committee on Large Dam (ANCOLD) Guidelines.*

(d) Detention basins must be modelled using runoff-routing software and designed to ensure pre-development flow rates are not exceeded for all storm events ranging from 1EY to 1% AEP, and all storm durations ranging from 10 minutes to 72 hours.

(e) Detention basins must be designed both hydraulically and structurally to permit safe discharge of floods in excess of the 1% AEP storm event. The AEP for which the performance of the basin must be checked needs to be determined in consultation with the Relevant Authority, with appropriate consideration to the likely consequences of failure.

(f) Minimum freeboard must comply with the recommendations of *Australian Rainfall & Runoff* and be not less than 300mm for the 1% AEP storm event.

(g) With the exception of natural ornamental lakes and wetlands, detention basins must be free draining within a 72-hour period and are not to pond water, to prevent the creation of breeding sites for biting insects.

(h) The basin floor must be designed with a suitable grade that provides positive drainage to the basin outlet, with all basin inlet pipes/drains connected to the basin outlet via low flow drains to ensure continual flows do not create water logging and ponding on the basin surface (see Table 29 for low flow drain requirements).

(i) All batter slopes must be constructed one-in-six or flatter, unless otherwise approved by the Relevant Authority and supported by a site-specific geotechnical assessment.

(j) Fill materials used to construct the detention basin embankments must be in accordance with 'Embankment Fill' as described in Part 4 Standard Specification. A project-specific amendment must be prepared for pipe laying details including cut-off collars for penetrations through embankment walls, where required.

(k) Public amenity, usability, risk, and safety must be paramount considerations in drainage design.

(l) The basins must be designed with adequate safety provisions relating to potential public access. This includes consideration for exclusion fencing, inlet grates on pipes/structures, and safe egress for persons that may enter the basin. Where a basin is to be fenced, a minimum 1.5 metres offset between the fence and top of batter must be provided.

(m) The basins must be designed to minimise the required levels and frequency of maintenance, and ensure safe and adequate maintenance access is provided.

(n) Where approved by the Relevant Authority, Detention basins may be co-located with stormwater quality treatment devices as described in Section 7.10.2. Stormwater treatment devices are typically designed to facilitate bypass of major storm event flows, so co-location will typically lead to increased sediment loads,

flow velocities and extended detention depths during infrequent storm events, which may result in adverse compromises. Where co-location of systems is proposed, the Developer must demonstrate that the functional requirements of both stormwater drainage and stormwater quality management systems are met, to the satisfaction of the Relevant Authority.

7.9.15 SUBSURFACE DRAINAGE CONTROL

(a) Subsurface drainage control is required to allow the pavement subgrade to drain and mitigate the effects of groundwater seepage, and irrigation/stormwater infiltration through street surfaces and verges.

(b) Subsurface drainage control typically comprises the use of subsoil drains and/or table drains, which must comply with Austroads Guidelines and Standard Drawings (Refer Part 3). Where table drains are used, the invert must be min 150mm below the pavement subgrade level (i.e. underside of pavement).

(c) The Developer must undertake a detailed investigation to determine the scope of subsurface drainage works required.

(d) Subsurface drainage control must be provided on both sides of street pavements, as well as in roundabouts and islands with soft landscaping. Subsurface drainage must also be incorporated into walkways, drainage easements/reserves and public open space as required to provide adequate protection to buildings, structures and public amenities from groundwater; preclude the creation of boggy saturated areas; and allow for maintenance access throughout the year.

(e) If groundwater seepage problems occur on the Development Site, including the sites of any External Works, within the Defects Liability Period, the Developer must:

  (i) conduct works to rectify the groundwater seepage problems; and

  (ii) repair all damaged works resulting from groundwater seepage.

7.10 STORMWATER QUALITY MANAGEMENT

(a) Stormwater is rainwater, including anything the rain runoff carries along with it into the public drainage system. Stormwater from activities associated with development and post subdivision development can carry many pollutants, (e.g. sediment, oil, chemicals, nutrients, heavy metals and general wastes) that are known to cause pollution of Waterways as well as sedimentation in stormwater infrastructure.

(b) Developers must ensure stormwater systems are designed to comply with the requirements listed in the following sections.

(c) Developers may be subject to prosecution for activities associated with Subdivision development resulting in the discharge of pollutants into stormwater infrastructure or the environment (or both). In addition, Relevant Authorities may recover damages from Developers that cause damage to Public Infrastructure by failing to appropriately manage sediment and other pollutants.

7.10.1 WASTE CONTROL

(a) Any stormwater discharged from the Development Works must not contain contaminants or wastes.

(b) Development Works and associated activities must be continually managed to prevent wastes or contaminants (e.g. sediment runoff, vehicle washing wastes, concrete wastes, paint residues, oil/chemical spillages or leaks) from entering the stormwater system and, subsequently the environment.

(c) Water quality control systems are required for all stormwater discharges for both the construction and operational phase of all developments. These must be designed and located to best achieve the following criteria:

  (i) produce optimum removal of pollutants;

  (ii) minimise ongoing maintenance requirements/costs;

  (iii) provide suitable maintenance access; and

  (iv) respond to the types of pollutants being generated from the catchment(s).

(d) If the Development Site includes or may include contaminated land, refer to Section 3.5 for details.

(e) Trade Waste must not be discharged into stormwater infrastructure, which must be demonstrated in the Stormwater Management Plan. Options for managing Trade Waste typically include:

  (i) Capture and recycle all Trade Waste streams;

  (ii) Capture all Trade Waste streams and have them removed by an appropriately licensed collector/ transporter; or

  (iii) Discharge Trade Wastes to the sewerage system under a Trade Waste Agreement with the sewerage provider (Power and Water).

7.10.2 STORMWATER QUALITY

(a) The *Waste Management and Pollution Control Act 1998 (NT)* and the *Water Act 1992 (NT)* are the primary legislation that protects natural water resources in the Northern Territory. Developers must also consider any other relevant Northern Territory guidelines or strategies (e.g. *Darwin Harbour Strategy*).

(b) When conducting any activity or performing any action that may cause pollution or environmental harm, or that may generate waste, Developers must comply with their general environmental duty to take all measures that are reasonable and practicable to prevent or minimise pollution or environmental harm.

(c) Specific stormwater quality requirements for Subdivisions are as follows:

  (i) Developers must include stormwater quality objectives and mitigation measures in Stormwater Management Plans (Refer Section 7.1) that are intended to be met as part of its conditions of development approval;

(ii) Stormwater quality controls must be designed to consider all stormwater flows, including Dry Season Base Flows, and achieve the pollutant reduction targets at Table 31.

(iii) The Developer must design all stormwater quality treatment devices using MUSIC (Model for Urban Stormwater Improvement Conceptualisation) software and provide all model data and outputs to the Relevant Authority for approval;

(iv) The Developer must develop operational management plans for all proposed stormwater quality treatment devices and provide to the Relevant Authority for approval;

(v) The Part 2 Stormwater Management Plan must be Certified by a Certifying Engineer to demonstrate compliance with Australian best industry practice for stormwater environmental management during the construction and post construction phases of Subdivisions; and

(vi) Compliance with the requirements of this guideline does not guarantee performance of stormwater quality treatment devices. Further works may be required should pollution result from the installation of a stormwater management system that is inappropriate to suit project specific conditions.

Table 31 — Stormwater Pollutant Reduction Targets

Stormwater Pollutants	Pollutant Reduction Targets (%)
Gross Pollutants (GP)	90%
Total Suspended Solids (TSS)	75%
Total Phosphorous (TP)	60%
Total Nitrogen (TN)	35%

(d) The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is a software tool that simulates the behaviour of stormwater quality within catchments. MUSIC is the preferred tool for demonstrating the performance of stormwater quality treatment systems. To ensure a consistent and uniform approach to stormwater quality modelling and assessment in the Northern Territory, MUSIC Models must be designed using the following parameters to demonstrate compliance with the stormwater quality management objectives. Further support for MUSIC Modelling is provided in the *MUSIC Modelling Guidelines* and *MUSIC User Manual* provided by Water by Design.

(i) In the absence of a hydrological calibration of MUSIC in the Northern Territory, the interim rainfall parameters in Table 32 must be adopted.

(ii) All other parameters must be used as outlined in the *MUSIC Modelling Guideline*.

Table 32 — MUSIC Rainfall parameters

Location	Rainfall gauge	Mean annual rainfall (mm)	10yr rainfall period	10yr Average rainfall (mm)
Greater Darwin Region	Darwin Airport (014015)	1728	1987 - 1996	1699
Katherine Region	Katherine Aviation Museum (014903)	1091	1997 - 2006	964
Alice Springs Region	Alice Springs Airport (015590)	284	1997 - 2006	276

(e) The following stormwater quality treatment devices have been installed in the Northern Territory and have available field data. Suitable climates and design requirements for each treatment device are nominated at Table 33.

Table 33 — Stormwater Treatment Devices

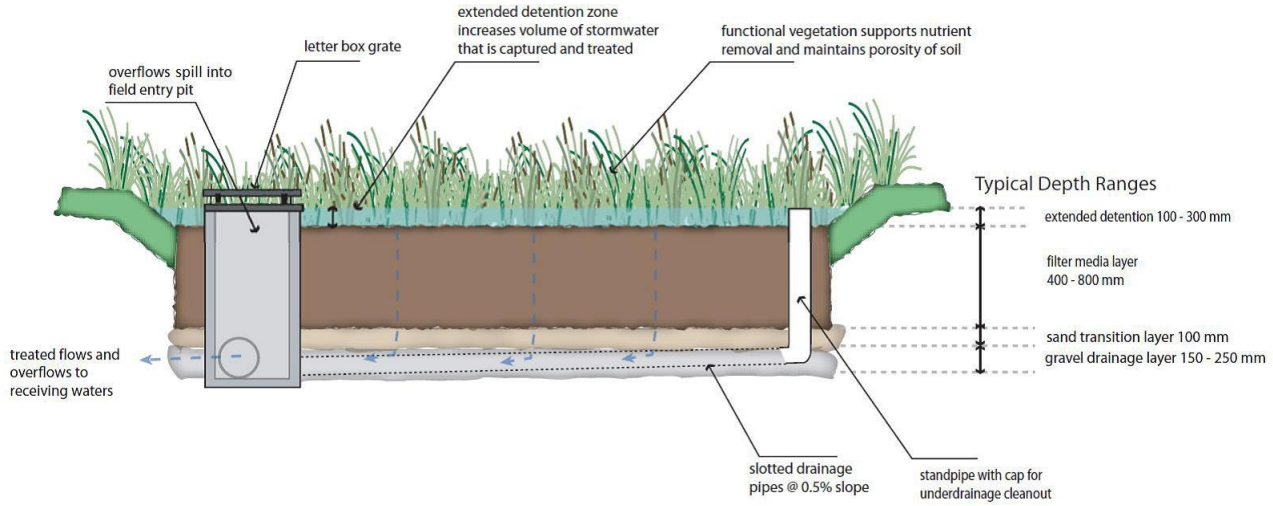
Treatment System	Suitable Climates (Refer Figure 4)		Design Requirements in the Northern Territory
	Monsoonal North	Rangelands	
Bioretention systems	Y	N	Only to be allowed as at-source treatment devices; and Requires irrigation for vegetation health during the dry season.
Ponds	Y	N	Designed to tolerate dry season condition (once established) without an artificial water supply. The effects of Dry Season Base Flow within the Monsoonal North climatic region must be appropriately considered in the design of these systems.
Wet/Dry Tropics Wetland	Y	N	
Ephemeral Wetland	Y	Y	

(f) Stormwater quality treatment systems are not limited to the options provided in Table 33; and any available treatment device can be presented to the Relevant Authority during the design development phase for approval at the discretion of the Relevant Authority. All stormwater quality treatment designs must be modelled in MUSIC with the correct parameters for the location and submitted for approval by the Relevant Authority.

(g) Typical design parameters for the common treatment systems outlined in Table 33 are as follows:

(i) Bioretention systems are a combination of vegetation and filter substrate that provide treatment of stormwater through filtration, extended detention and some biological uptake. They are designed to accept stormwater runoff and allow it to percolate through the densely vegetated filtration media before it is discharged (Table 34).

Table 34 — Bioretention Typical Design Parameters	
Filter Media Depth	0.5m
Extended Detention Depth	0.2m
Infiltration Rate	100mm/hr



(ii) Ponds as stormwater treatment devices are open water bodies that may contain submerged aquatic plants. They are designed to intercept stormwater pollutants, but are vulnerable to inter-event water quality issues such as algal blooms or nuisance growths of aquatic macrophytes. Typical design parameters for ponds are provided in Table 35 and the *NT Stormwater Treatment Pond Design Guidelines*.

Table 35 — Pond Typical Design Parameters	
Depth	1.5m (minimum)
Inlet Zone	Approx. 20% of pond area
Extended Detention Depth [1]	0.1m
Detention Time	48 hours
A 1 year ARI capacity connection between the inlet zone and main pond	

Table Notes:

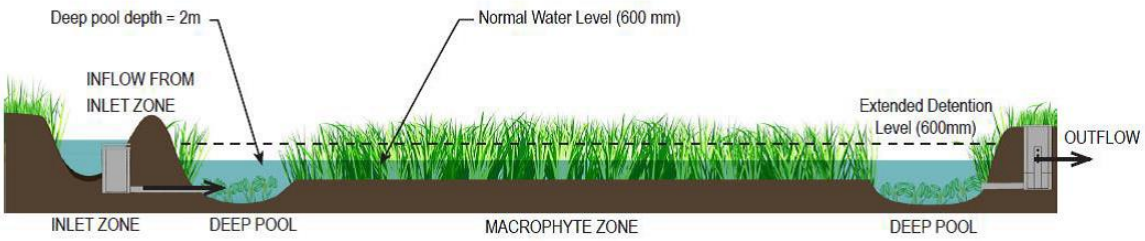
1. *Extended detention depths can be greater, where pond is co-located with a detention basin (Refer Section 7.9.14).*

(iii) Wet/Dry Tropics Wetlands are designed to treat stormwater runoff by capturing and retaining the stormwater for an extended period to provide treatment. The wetlands consist of deep pools (20 percent by area), which provide refugia for mosquito predators and a densely vegetated macrophyte zone (80 percent by area) (Table 36). The recommended design has been developed to ensure the wetlands will sustain permanent water in the deep pools to function as predator habitat and be able to sustain perennial vegetation in the macrophyte zone during the dry season. The depth of the macrophyte zone should be adjusted, dependent on the expected occurrence of Dry Season Base Flows. Typical design parameters for Wet/Dry Tropic Wetlands are provided in Table 36.

Table 36 — Wet/Dry Tropic Wetland Design Parameters

Deep pool Depth	2m
Macrophyte Zone Depth (no Dry Season Base Flow)	0.6m
Macrophyte Zone Depth (with Dry Season Base Flow)	0.35m
Inlet Zone	Approx. 20% of Wetland Area
Extended Detention Depth	0.6 m
Detention Time	48 hours
1 year ARI capacity connection between the inlet zone and macrophyte zone	

NORMAL WATER LEVEL



EXTENDED DETENTION

(iv) Ephemeral Wetlands are typically freshwater systems that experience regular inundation during rainfall, but drain and have no permanent standing water. Typical design parameters for Ephemeral Wetlands are provided in Table 37. They should be designed to resemble natural bushland settings in the NT, such as:

(A) Melaleuca / pandanus ecosystems in the Greater Darwin / Katherine Regions

(B) Woodland / grassland ecosystems in the Alice Springs Region

Typical design parameters for Ephemeral Wetlands are provided in Table 37

Table 37 — Ephemeral Wetland Design Parameters	
Extended Detention Depth	0.6m
Inlet Zone	Approx. 20% of the Wetland Area
Detention Time	48 hours
No Standing water in vegetated wetland zone under normal conditions	
1 year ARI capacity connection between the inlet zone and macrophyte zone	

(h) The configuration of the above stormwater treatment devices must include a forebay sedimentation zone. In ponds and the wet/dry tropic wetlands this would be a wet sediment basin. Ephemeral wetlands would include a dry inlet zone.

(i) All stormwater treatment devices must be protected through the construction/land disturbance phase to protect them from sediment laden stormwater flows.

(j) All plant species proposed for Water Quality treatment devices must be selected by a suitably qualified landscape architect/ecologist/horticulturalist, be low maintenance and suitable for the intended use, location, Development Site soil and drainage conditions. Plant species must be in accordance with requirements of the Relevant Authority, where available, and submitted to the Relevant Authority for approval.

7.10.3 EROSION AND SEDIMENT CONTROL

(a) Erosion and sediment control refers to the works undertaken to manage the disturbance of soils with the purpose of preventing and/or mitigating erosion and subsequent sediment discharge from a Development Site. The objective is to prevent detriment to the built and/or natural environments through the implementation of best practice erosion, drainage and sediment control.

(b) The Relevant Authorities in respect of erosion and sediment control are:

  (i) DLPE for information in relation to planning and design of Erosion and Sediment Control Plans (ESCPs); and

  (ii) the relevant Local Authority, and DLPE (dependent on Development Permit requirements) in respect of regulation and clearance of Development Permit conditions requiring the preparation and implementation of ESCPs.

(c) The Relevant Authorities for administering environmental offences are:

  (i) The Northern Territory Environmental Protection Authority (NT EPA) in respect of offences under the *Waste Management and Pollution Control Act 1998 (NT)*; and

  (ii) DLPE in respect of offences under the *Water Act 1992 (NT)*.

(d) Sediment release from Development Sites can create issues which may result in liability for damages, extra costs for the Developer, and can give rise to unnecessary delays, disputes and regulatory action. These include but are not limited to the following:

  (i) Damage to land and Public Infrastructure on and/or adjacent to the Development Site.

  (ii) Nuisance.

  (iii) Traffic and pedestrian hazards.

  (iv) Blockage of stormwater drainage systems.

  (v) Mosquito breeding in ponded water as a result of erosion and sediment deposition.

  (vi) Environmental harm to Waterways, wetlands and estuaries including flora and fauna.

(e) ESCPs are often required by Local Authorities and Relevant Authorities as part of their respective consent and compliance processes for Subdivisions involving the clearing of land (whether of vegetation or of pre- existing buildings, structures, or other infrastructure) or other soil disturbing activities.

(f) The level of information and detail supplied in an ESCP must be commensurate with the potential environmental risk and the complexity of the proposed works; and of sufficient clarity to allow on-site personnel to appropriately implement the plan and achieve the required natural and built environmental protection.

(g) An ESCP should be prepared by, or under the supervision of, a suitably qualified and experienced professional in erosion and sediment control and submitted to the Relevant Authority for acceptance and/or approval prior to any Development Site disturbance (including pre-works activities). It is the responsibility of the Developer and Contractor to ensure the ESCP is implemented and effective.

(h) Based on the size, complexity and location of the Subdivision, a Certified Professional in Erosion and Sediment Control (CPESC), or approved equivalent, may be required to develop and certify the ESCP and in some cases may be required to oversee implementation to ensure effectiveness. For high to extreme risk Subdivisions, a CPESC, or approved equivalent, third party auditor may be required to review and verify the ESCP prior to submission to the Relevant Authority for acceptance. Requirements are included in Development Permit conditions.

(i) Development Permits may stipulate an ESCP "Type". DLPE has developed the Land Management Fact Sheet Erosion and Sediment Control (ESCP) Procedures (Refer Part 2) which identifies the different ESCP types and procedural requirements for each type.

(j) Regular inspections may be undertaken by the Relevant Authority, or their delegate, to ensure compliance. When works are complete, an inspection will be undertaken by the Relevant Authority, or their delegate, to ensure works are satisfactory in relation to erosion and sediment control and Development Site stabilisation.

(k) For Subdivision Works, DLPE recommends the International Erosion Control Association (IECA) Australasia *Best Practice Erosion and Sediment Control* (BPESC) manual as a guide for the type of information, detail and data that should be included in an ESCP. The ESCP must detail strategies and methods of erosion, drainage and sediment controls for mitigating erosion and sediment loss from the Development Site during the clearing, establishment and construction phases.

7.11 LAWFUL POINTS OF DISCHARGE TO STORMWATER INFRASTRUCTURE

(a) The Relevant Authorities for a Lawful Point of Discharge to stormwater Public Infrastructure are:

  (i) Local Authorities in respect of Lawful Point of Discharge to stormwater Public Infrastructure in Local Authority streets, parks or other public areas under the care and control of the Local Authority;

  (ii) DLI in relation to stormwater Public Infrastructure in Northern Territory Government Controlled Road Reserves.

  (iii) DLPE where the discharge point is on land controlled by the Crown.

(b) All stormwater infrastructure constructed as part of Subdivision developments requires a Lawful Point of Discharge into downstream drainage Public Infrastructure. The Developer must seek and obtain written authorisation from all Relevant Authorities prior to making any connection into existing stormwater Public Infrastructure and must comply with any conditions imposed upon such authorisation.

(c) Where easements are required through downstream private property to convey stormwater flows from the Development Site to a Lawful Point of Discharge, the Developer is responsible for the production of all easement documents and for execution and registration on each relevant title.

(d) Prior to approval of the Lawful Point of Discharge by the Relevant Authority, the Developer must obtain written approval to discharge stormwater into downstream environments:

  (i) from the Relevant Authority(s) of a receiving trunk drainage system;

  (ii) from a Relevant Authority or Regulatory Authority that administers a Waterway (Section 7.12).

(e) The discharge of stormwater to a Lawful Point of Discharge must not exceed pre-development flows, as per Clause 7.2.3(a)(iii). The Relevant Authority may, subject to their approval, consider unattenuated discharge where:

  (i) The Developer's Consultant provides Certified engineering calculations supporting capacity of the downstream drainage network is sufficient to accommodate flows from all contributing catchments without any adverse impacts, considering full development across all contributing catchments in accordance with permitted land use under the Planning Scheme; or

  (ii) The Developer's Consultant provides Certified engineering calculations and designs demonstrating the scope of upgrade works required to provide the downstream drainage network with sufficient capacity to accommodate increased flows from the Subdivision, without any adverse impacts, and the Developer undertakes these works to the satisfaction of the Relevant Authority, at no cost to the Relevant Authority.

(a) The Developer must demonstrate that stormwater discharging from the Development Site will meet water quality objectives prior to the Relevant Authority providing approval for a Lawful Point of Discharge.

7.12 DISCHARGE TO WATERWAYS

(a) All stormwater infrastructure constructed as part of a Subdivision requires approval to discharge to Waterways. The Developer must seek and obtain written authorisation from all Relevant Authorities and

Regulatory Authorities prior to making any connection into the natural environment and must comply with any conditions imposed upon such authorisation.

(b) The Relevant Authorities for discharge to Waterways are as follows:

(i) The Local Authority, where a Waterway resides within Local Authority owned land or a private parcel of land which receives stormwater via easement from stormwater drainage Public Infrastructure owned by the Local Authority.

(ii) DLPE, where a Waterway resides within NT Government owned land or a private parcel of land which receives stormwater via easement from stormwater drainage Public Infrastructure owned by the NT Government.

(iii) DLPE - Crown Land Estate office, where a Waterway is located within a parcel of Crown land.

(c) Written approval to discharge stormwater into a Waterway, from applicable Relevant Authorities as described under Clause 7.12(b), is required prior to approval of the Stormwater Management Plan(s) and Design Drawings by the Relevant Authority.

8 WATER

(a) All Subdivisions must make provisions for an adequate supply of potable water to service the Subdivision, having regard to the nature and context of the Subdivision.

(b) The Relevant Authorities for water supply are:

(i) Power and Water Corporation (PWC) for connections to and supply of water from municipal systems within PWC licence areas; and

(ii) DLPE, Water Resources Division, in relation to licensing and advice on installation of bores and extraction of ground or surface water.

(c) The *Indigenous Community Engineering Guidelines* (ICEG) must be considered in the planning and design of water infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

8.1 WATER MAINS

(a) All water Public Infrastructure to be gifted to PWC must be designed by a PWC accredited consultant with relevant qualifications to the requirements of *PWC's Connection Code for Water Supply and Sewerage Services* and the *Water Supply Code of Australia NT Supplement*, and submitted to PWC for approval.

(b) The *PWC Connection Code for Water Supply and Sewerage Services* sets out the technical, procedural and charging requirements of PWC in relation to Subdivision development activity. It is intended that this Connection Code will encourage orderly, well designed and cost-effective connection, augmentation and extension of PWC Public Infrastructure.

(c) PWC encourages master planning of the entire development to assess network capacity for the full development. In smaller networks, new development activity may impact on existing source and/or treatment capacity, and augmentation could involve long lead times. PWC recommends early engagement by the Developer to facilitate preliminary assessment of network capacity for the proposed Subdivision.

(d) Where there is no reticulation near the Development Site, PWC encourages early engagement by the Developer to facilitate preliminary assessment of potential costs and technical issues in servicing the Subdivision.

(e) Minimum information required by PWC for all Development Applications:

(i) Address

(ii) Proposed town planning zones;

(iii) Number of lots;

(iv) Lot layout;

(v) Area of each lot;

(vi) Existing land use and zoning;

(vii) Subdivision staging;

(viii) Known development constraints;

(ix) Proposed servicing arrangements;

(x) Contours of land at 0.5 metre intervals;

(xi) Specific building development; and

(xii) Constrained land details.

(f) Minimum information required by PWC for assessment and approval of the proposed water supply network:

(i) Water Masterplan showing current and ultimate water network, water strategy, and Equivalent Population (EP) loads including allocation for lots other than Single Dwellings;

(ii) Primary and secondary water connection points to provide network redundancy;

(iii) Internal designs with assumed connection points;

(iv) Detailed survey and geotechnical information for pipe bedding and structural designs;

(v) Design Report including but not limited to:

(A) Assumed design parameters and boundary conditions;

(B) Hydraulics and structural calculations; and

(C) Modelling inputs/outputs, including a summary of results for various scenarios.

8.2 BORES

(a) The use of groundwater for domestic and commercial use is regulated under the *Water Act 1992 (NT)*. This includes provisions for granting bore work permits, drilling licences and licences for extracting surface water and/or groundwater.

(b) Developers must seek advice from DLPE Water Resources Division prior to the construction of a bore.

(c) Within Water Control Districts, the drilling and construction of all bores must be permitted. Bores must be constructed by a drillerwith an NT drilling licence in accordance with the national standard.

(d) Groundwater extraction from bores for domestic purposes, drinking water for grazing stock or irrigating a garden less than 0.5 hectares will require a permit to construct a bore in a water control district; however, does not require a licence to extract and use groundwater for these purposes. Extraction and use of groundwater for any other purpose within water control districts must be licensed. For extraction outside of water control districts, contact the DLPE Water Resources Division.

8.2.1 SITE SELECTION CRITERIA

(a) A Groundwater Assessment that describes the suitability of the quality and quantity of local aquifers for the intended use of the groundwater for the proposed Subdivision must be provided to the Relevant Authority during the project development phase (Refer Section 3.9 for further details).

(b) The key considerations in locating a new bore is the separation distance to waste control and pollution sources. The following are the specified separation distances in the *NT Code of Practice for Wastewater Management* and DLPE Bore Construction Guidelines:

(i) 100 metres separation distance for a traditional septic tank effluent trench;

(ii) 50 metres separation distance for aerated waste water treatment systems (un-chlorinated effluent);

(iii) 30 metres separation distance for aerated waste water treatment systems (where effluent is continuously chlorinated); and

(iv) 100 metres separation distance for any pollution source, such as fertiliser and / or chemical storage area, packing sheds, plant workshops and animal enclosures;

(c) Other location requirements are:

(i) No bore is permitted to be constructed within a firebreak; and

(ii) Bores must be separated by a minimum distance of 70 metres to avoid interference between pumps.

8.2.2 BORE INSTALLATION

(a) Installation of bores and wastewater systems are intrinsic to each other to ensure water being extracted from bores and the underlying aquifer is not contaminated. The location of bores and on-site wastewater management systems must be shown on the Rural Master Services Plan.

(b) For any lots less than or equal to 2 hectares in area, the Developer must construct all bores required on these lots at the locations shown in the approved Rural Master Services Plan. This is to ensure that subsequent land purchasers are not precluded from constructing bores by the site selection criteria set out above, due to the construction of bores or septic systems on neighbouring properties.

9 WASTEWATER MANAGEMENT

(c) The management, including treatment and disposal of wastewater (e.g. domestic sewage) is an important consideration in all Subdivisions, whether urban, rural or remote and whether disposal is intended to be through an established reticulated network or by On- site Wastewater Management Systems (OWMS).

(d) Connection to reticulated sewerage is the preferred option for collection and treatment of wastewater. OWMS must only be considered where connection to reticulated sewerage is not feasible, and a risk assessment is undertaken to confirm OWMS is a suitable solution. Refer Section 9.2 for detailed requirements.

(e) Large scale OWMS and community wastewater management systems may require specific approvals to operate from environmental and health agencies. The complexity and scale of these systems requires them to be captured within the planning stages of a Subdivision.

(f) The *Indigenous Community Engineering Guidelines* (ICEG) must be considered in the planning and design of wastewater infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

(g) All wastewater Public Infrastructure to be gifted to PWC must be designed by a PWC accredited consultant with relevant qualifications to the requirements of PWC's *Connection Code for Water Supply and Sewerage Services* and the *Water Supply Code of Australia NT Supplement* and submitted to PWC for approval.

9.1 RETICULATED SEWERAGE

(a) All subdivisions must provide for connection to reticulated sewerage where practicable.

(b) Reticulated sewerage is a network of pipes including property connection sewers that receives wastewater from customer properties. In most cases, reticulated sewerage for wastewater disposal will be available within or adjacent to urban areas.

(c) The Relevant Authorities for Reticulated Sewerage are:

  (i) Department of Housing, Local Government and Community Development provides guidance for Public Infrastructure development for remote communities in the NT through the *Indigenous Community Engineering Guidelines* (ICEG);

  (ii) Power and Water Corporation (PWC) manages extensions and connections to existing reticulated sewerage via an Authorised Connection; and

  (iii) The Utilities Commission establishes new and extends current Sewerage Services License Areas.

(d) All Subdivisions are to be connected to reticulated sewerage where required by the Planning Scheme.

(e) It may be necessary to extend or upgrade the existing reticulated sewerage to service a Subdivision. In these cases, advice and the approval of the Power and Water Corporation (PWC) and the Utilities Commission to extend the reticulated sewerage will be required.

(f) Any External Works undertaken should consider the full range of potential end uses to ensure Public Infrastructure is sufficient to prevent discharge to the environment (or stormwater system) of industrial wastewater or contaminated stormwater from potentially polluting end users (e.g. mechanics and car wash facilities).

(g) Reticulated sewerage within a PWC Sewerage Services Licence Area must:

  (i) be designed to the requirements of *PWC's Connection Code for Water Supply and Sewerage Services* and the *NT Supplement to the WSAA Code*; and

  (ii) be designed by a PWC accredited hydraulic designer.

(h) Minimum information required by PWC for assessment and approval of the proposed sewer network:

(i) Sewer Masterplan showing current and ultimate sewer network, sewer strategy, and Equivalent Population (EP) loads including allocation for lots other than Single Dwellings;

(ii) internal designs with assumed connection points;

(iii) Detailed survey and geotechnical information for pipe bedding and structural designs;

(iv) Design Report, including but not limited to:

(A) Assumed design parameters and boundary conditions;

(B) Hydraulics and structural calculations; and

(C) Modelling inputs/outputs, including a summary of results for various scenarios.

(v) Other documents as listed in Table 3 — Design, Construction and Handover Process.

(i) Reticulated sewerage within a Sewerage Services Licence Area outside of PWC control must be provided in accordance with the terms of a licence issued by the Utilities Commission.

(j) Development of reticulated sewerage in remote communities must be in accordance with ICEG.

(k) Most reticulated sewerage schemes are not designed to accept Trade Waste. The *PWC Trade Waste Code* sets out criteria under which approval will be granted to allow discharge of trade waste to Power and Water's sewerage system. If Trade Waste cannot be accepted by the sewerage provider, alternative arrangements must be made in accordance with *Water Supply and Sewerage Services Act 2000* (NT) and the requirements of the sewerage provider.

9.2 FEASIBILITY/RISK ASSESSMENT OF UNSEWERED SUBDIVISIONS

(a) During the Project Development Phase, the Developer must undertake a feasibility/risk assessment for an unsewered subdivision which assesses the broad economic, health and environmental consequences of not connecting to reticulated sewerage. It must include the following as a minimum:

(i) Assessing feasibility of not connecting to reticulated sewerage.

(ii) Exploring opportunities to extend existing reticulated sewerage.

(iii) Providing a long-term planning horizon for connecting to reticulated sewerage.

(iv) Assessing risks and outlining the costs and benefits of On-site Wastewater Management Systems (OWMS) versus reticulated sewerage.

(b) Where OWMS are proposed, the Developer must demonstrate the Subdivision can comply with the requirements of the *Code of Practice for Wastewater Management*, and undertake a risk assessment to determine:

(i) overall risk of utilising OWMS, including accumulative risk and pollutant modelling;

(ii) the level of risk posed by Development Site based constraints for individual allotments or activities in the proposed Subdivision; and

(iii) appropriate types of OWMS technology and any limitations.

(c) Site-and-soil evaluation must be developed, which examines the site-based constraints relevant to the proposed Subdivision to determine the level of risk of using OWMS. It must be carried out in accordance with the *Code of Practice for Wastewater management* and include the following as a minimum:

(i) Detailed site-specific information identifying the site and soil constraints to be considered when selecting and designing OWMS, including any constraints which might compromise the long-term effectiveness of using OWMS.

(ii) Evaluation of any risk of contamination of groundwater/surface water and associated health risks.

(iii) Evaluation of the sustainability and environmental implications of OWMS for the Subdivision, including impacts on public health, land use and the continuing uses of energy, materials and finances. Refer NT

EPA Guideline: *Recommended Land Use Separation Distances* for requirements on buffer distances to minimise interaction between potentially conflicting land uses.

(d) Where a Community Wastewater Management System is proposed and all or part of the Subdivision falls within an existing Sewerage Services Licence Area, the feasibility assessment must consider excision of the Subdivision from the Sewerage Services Licence Area, or assess options and requirements for connection into the reticulated sewerage system in the future.

(e) The Regulatory Authorities for feasibility and risk assessments of unsewered subdivisions are:

(i) Power Water Corporation (PWC) for confirming requirements to connect to their existing or planned sewerage network, including extending reticulated sewerage beyond the existing sewer reticulation within a Sewerage Services Licence Area;

(ii) the Utilities Commission for confirming requirements to extend or excise areas within a Sewerage Services Licence Area;

(iii) NT Health for providing comment on feasibility and risk assessments with respect to compliance with the *Code of Practice for Wastewater Management*;

(iv) DLPE for providing comment on feasibility and risk assessments with respect to risks to surface water and groundwater systems; and

(v) Northern Territory Environmental Protection Authority (NT EPA) for providing comment on feasibility and risk assessments with respect to waste discharge license requirements.

9.3 ON-SITE WASTEWATER MANAGEMENT SYSTEMS

(a) There are two broad categories of On-site Wastewater Management Systems (OWMS) recognised in the NT:

(i) Small OWMS servicing individual lots with a maximum hydraulic flow less than 2,000 L/day (e.g. residential and commercial systems); and

(ii) Large-scale OWMS servicing individual lots, or a group of properties that are part of a single activity, with a maximum hydraulic flow greater than 2,000 L/day (e.g. shopping centres, correctional facilities, workers camps, etc.).

Large-scale OWMS may also include Community Wastewater Management Systems that incorporate a decentralised system for the collection and management of wastewater generated in a town, regional area or other community, but does not include Power and Water Corporation sewerage infrastructure.

(b) The Regulatory Authorities for OWMS generally are:

(i) DLPE – Building Advisory Services (BAS) for enforcing compliance on all OWMS in building control areas;

(ii) NT Health – Environmental Health (EH) for OWMS that treat more than 2,000 L/day outside of building control areas;

(iii) NT Environmental Protection Authority (NT EPA) for the granting of waste discharge licenses under the *Water Act 1992 (NT)* and environmental protection licenses and approvals under the *Waste Management and Pollution Control Act 1998 (NT)*; and

(iv) Power and Water Corporation in relation to any OWMS proposed within a Well- head Protection Zone.

(c) The Developer must ensure that requirements from Regulatory Authorities are met and considered within planning submissions.

(d) The Developer must consider the following Reference Documents for design of OWMS:

(i) *Public and Environmental Health Act 2011 (NT)* and *Public and Environmental Health Regulations 2014 (NT)*

(ii) Code of Practice for Wastewater Management 2020 (NT)

(iii) Guidance Notes for Wastewater Management 2020 (NT)

(iv) *Code of Practice for Water Recycling 2020 (NT)*

(v) *AS/NZS 1547: On-site Domestic Wastewater Management.*

(vi) *The Plumbing Code of Australia.*

(vii) NT EPA Recommended Land Use Separation Distances - for requirements on buffer distances to minimise interaction between potentially conflicting land uses.

(viii) PWC Wellhead Protection Zone Management Standard – for requirements on setbacks from PWC water production bores.

(ix) *Water Act and Regulations 1992 (NT)* – for requirements on waste discharge licenses.

(x) *Waste Management and Pollution Control Act and Regulations 1998 (NT)* – for requirements on environmental protection licenses and approvals.

(e) Designing community wastewater management systems is complex, relying upon different levels of documentation dependent upon project-specific considerations for effluent reuse, level of treatment required, system loading and receiving environment for effluent disposal. The proposed designs must respond to site constraints identified in the site-and-soil evaluation.

(f) The treatment and disposal of wastewater must not result in the creation or exacerbation of mosquito breeding. Information on design and management principles can be found in the NT Health guideline *Mosquito Breeding and Wastewater Treatment and Disposal in the Northern Territory*.

(g) Disposal of wastewater has the potential to impact on adjacent lands, stormwater drains, waterways or underlying aquifers. Developers may be required to obtain environmental approval from DLPE, and or a Waste Discharge Licence from the Northern Territory Environmental Protection Authority (NT EPA).

(h) All lots forming the proposed Subdivision must be individually Certified by the Certifying Engineer and referenced to the Subdivision Masterplan, confirming that each lot can be serviced with compliant OWMS. Certification must include identification of site constraints to be considered by the certifying engineer (hydraulic) for design and construction purposes, including:

(i) Minimum lot sizes and restrictions due to site constraints identified in the site-and-soil evaluation;

(ii) Special requirements such as restrictions for water/well-head protection zones;

(iii) Particular setbacks, referenced in the *Code of Practice for Wastewater Management*, and noted within the subdivision (such as creeks, waterways, bores); and

(iv) Recognising the application and preference of small and large-scale OWMS.

10 ELECTRICAL

(a) Electrical Public Infrastructure in subdivision developments must be designed by an appropriately qualified electrical consultant.

(b) Electrical Public Infrastructure to be handed over to Power and Water must be designed by a Power and Water Corporation accredited electrical consultant (designer/engineer).

(c) Electrical Public Infrastructure for all lighting must be designed in accordance with Section 12 - Lighting.

(d) Electrical Public Infrastructure design for all other facilities to be handed over to the Relevant Authority (e.g. BBQs, GPOs, Irrigation Controllers etc.) must be designed in accordance with *AS/NZS 3000: Electrical Installations*.

(e) Electrical switchboards and cabinets are to be fitted with double hasp and staple locking systems, with key locks made to Relevant Authority requirements.

(f) The *Indigenous Community Engineering Guidelines* (ICEG) must be considered in the planning and design of electrical infrastructure for remote indigenous communities, as defined in Appendix A of the ICEG.

10.1 POWER AND WATER INFRASTRUCTURE

(a) The Developer must provide the final subdivision layout and intended zoning of each newly created lot to the Power and Water Corporation accredited electrical consultant to facilitate design of the required minimum basic supply.

(b) The Developer's Power and Water accredited electrical consultant must design the electrical reticulation in accordance with;

(i) Network Policy NP001 Design and Construction for Network Assets;

(ii) Network Policy NP020 Guidelines for Developers of Subdivisions and Electricity Infrastructure;

(iii) Network Policy NP041 Guidelines for Electrical Design Consultants; and

(iv) Power and Water Overhead Line, Underground and Aerial Bundled Cable Manuals.

(c) The Developer must comply with the handover and documentation requirements set out in *Network Policy NP001 – Design and Construction of Network Assets*.

(d) For remote communities the Developer and the Developer's Power and Water accredited consultant must also comply with, and ensure the proposed subdivision development will comply with, *Indigenous Community Engineering Guidelines* (ICEG) for Remote Communities in the NT.

(e) Development in urban areas must have underground electrical reticulation.

(f) Development in remote, rural and industrial areas must have overhead electrical reticulation unless the Relevant Authority requests underground electrical reticulation or the Developer has preference to use underground electrical reticulation.

(g) The Developer's Power and Water accredited electrical consultant must provide Certification that all electrical designs comply with standards listed above via a *Certificate of Electrical Design Compliance (NP041 Appendix B)*.

11 COMMUNICATIONS

(a) The Developer is responsible for registering the design and installation of fibre-ready communications facilities to service all lots within Subdivisions of more than two allotments. The Developer must engage a Telecommunications Carrier to roll out the networks for the Subdivision. This carrier will become the Statutory Infrastructure Provider (SIP) for the Subdivision and will need to connect premises and supply wholesale services so retail providers can supply broadband and voice to consumers at those premises.

  (i) The *2020 Telecommunication in New Developments (TIND) Policy* outlines the responsibilities and obligations of Developers and Telecommunications Carriers in greater detail.

  (ii) The Developer may choose any Telecommunications Carrier they wish. If they do not wish to use another carrier, NBN Co is the default SIP of broadband for Australia.

  (iii) The Australian Communications and Media Authority (ACMA) maintains a register of Statutory Infrastructure Providers (Refer Part 2).

(b) The Developer should contact the Telecommunications Carrier as early as possible in the development process. Many Telecommunications Carriers require a minimum of six months' notice before service connections are required.

(c) Communications designs must be in accordance with:

  (i) All relevant Legislation, including Communications Alliance G645: Fibre-Ready Pit and Pipe Specification for Real Estate Development Projects; and

  (ii) Telecommunications Carrier requirements, policies, and technical specifications.

(d) The Developer must liaise directly with the Telecommunications Carrier to confirm the scope of work for provision of communications services to the Subdivision, including any External Works and the land provisions necessary for siting the utility Public Infrastructure within the Subdivision.

(e) The Developer must submit applications and designs to the Telecommunications Carrier for approval prior to construction, to the minimum time frames stipulated by the Telecommunications Carrier.

(f) The Developer must install and obtain acceptance of the constructed communications fibre-ready pit and pipe Public Infrastructure from the Telecommunications Carrier.

(g) The Developer is responsible for contacting the Telecommunications Carrier to coordinate installation of communications cabling in advance of services being required, to the minimum time frames stipulated by the Telecommunications Carrier.

(h) Under Commonwealth law, the Developer must provide underground pit and pipe. However, if a Subdivision is in a rural, bushland or remote area, it may be eligible for exemption from this requirement.

  (i) In rural and remote areas, Developers may claim an exemption from the pit and pipe infrastructure requirements under Part 20A of the *Telecommunications Act 1997* (Cth).

  (ii) This exemption is specifically targeted at developments where telecommunications would generally be offered by direct buried cable, wireless or satellite service, and do not need pit and pipe infrastructure.

  (iii) Other exemptions may also be available, for example, where there is existing pit and pipe infrastructure that can be used, infrastructure is scheduled to be installed, or where above ground infrastructure is used in connection with optical fibre networks.

  (iv) Details on claiming an exemption are available from the website of the Department of Infrastructure, Transport, Regional Development and Communications website (Part 2).

12 LIGHTING

(a) The Relevant Authorities for lighting are:

(i) Local Authority in relation to street lighting and lighting to other public parks and places to be handed over to the Local Authority; and

(ii) DLI in relation to street lighting to roads and lighting to other public places to be handed over to the Northern Territory Government.

(b) The Relevant Standards for street lighting and lighting within public areas are:

(i) AS/NZS 1158: Lighting for Roads and Public Spaces

(ii) AS/NZS 3000: Electrical Installations;

(iii) AS/NZS 4282: Control of the Obtrusive Effects of Outdoor Lighting;

(iv) Power and Water Corporation for electrical supply metering to public areas not within designated Road Reserves and for mounting street lights to overhead power poles; and

(v) Power and Water Corporation for connection to Relevant Authority main switchboards.

(c) Developers must provide lighting to streets, carparks, bus stops, parks, walkways including Pedestrian Crossing and Kerb Ramp Crossings, footpaths/shared paths and other public areas of the proposed subdivision development, unless otherwise specified by the Relevant Authority. This lighting must be in accordance with the relevant Australian Standards and the requirements and specifications of the Relevant Authority.

(d) Smart lighting technology must be incorporated to the requirements of the Relevant Authority.

(e) LED luminaire types must comply with Relevant Authority requirements. Where not specified, the following minimum standards/requirements must apply:

(i) Compliance with *SA/SNZ TS 1158.6:2015 - Lighting for roads and public places Luminaires - Performance*

(ii) Rated life of power supply: 100,000 hours minimum

(iii) Predicate power supply failure rate: 0.2% per 1000 operating hours

(iv) Ingress Protection (IP) ratings:

(A) Optical Module: minimum IP65

(B) Gear Chamber: minimum IP24

(C) Power Supply: minimum IP65

(v) Correlated Colour Temperature (CCT):

(A) Category V Streets: 4000 K

(B) Category P Streets: 3000 K and 4000 K as directed by the Relevant Authority

(vi) Minimum Colour Rendering Index (CRI): - 70+Ra

(vii) Power supply dimming: Digital Addressable Lighting Interface (DALI) 2.0

(viii) Integral power supply to be Zhaga Book 18 compatible with DALI 2.0

(ix) Luminaire housing: aluminium alloy LM6

(x) Luminaire IK Rating:

(A) Category V Streets: minimum IK06

(B) Category P Streets: minimum IK08

(xi) Smart controls readiness: NEMA/ANSI C136.41 7 contact receptacle

(xii) Electrical Compliance: Class 1 and optional Class 2

(xiii) Surge protection: 20 kV/10 kA within the luminaire housing

(f) Pole/outreach types, footing details, active/neutral street lighting conductor types, and conduit size for all lighting to comply with the Subdivision Standard Drawings (Part 3) and *AS/NZS 3000: Electrical Installations*. Alternative pole/outreach types may be desirable to build a sense of character for the community; and may be submitted to the Relevant Authority for approval.

(g) The Developer must provide structural certification for the proposed luminaire/pole/outreach/footing arrangements, noting that the Subdivision Standard Drawings (Part 3) are based on assumed wind loading which will vary significantly between different localities.

(h) All lighting must be designed by an appropriately qualified Consultant, meeting the requirements of the Relevant Authority.

(i) All lighting designs must be Certified by an appropriately qualified Consultant, having a minimum of four years experience in the design of lighting for subdivisions and:

  (i) for Infrastructure Categories A and D, being a full Member of the Illuminating Engineering Society of Australia and New Zealand (MIES ANZ), or holding equivalent qualifications acceptable to the Relevant Authority.

  (ii) for Infrastructure Categories B, C and E, meeting any additional requirements of the Relevant Authority.

(j) Certification required under Section 12(g) must include a statement confirming that the design meets the requirements of the Subdivision Development Guidelines, any additional requirements of the Relevant Authority, and all requirements of the applicable parts of the *AS/NZS 1158* standard series. Where any aspects do not comply, these must be clearly identified and justified.

(k) The Developer must obtain asset numbers from the Relevant Authority and install identification markers on all lighting poles, in accordance with the requirements of the Relevant Authority.

12.1 PUBLIC OPEN SPACE LIGHTING

(a) Public open space lighting design to comply with *AS/NZS 1158.3.1*, with associated electrical reticulation designed to comply with *AS/NZS 3000*. Lighting must be designed to ensure no nuisance/ obtrusive lighting in accordance with *AS/NZS 4282*.

(b) Developers must provide lighting to Public Open Space areas to Category P with Sub Categories (e.g. P1 to P4, P6 to P12), as advised by the Relevant Authority.

(c) Lighting must support public safety and comply with Crime Prevention Through Environmental Design (CPTED) principles.

(d) Feature lighting, such as bollard lights and ground lights, can be provided but must not form part of the compliance calculations for illumination.

(e) Public open space lighting must be energy efficient LED type. Some Relevant Authorities may have LED manufacturer type preferences to use. With free-standing pole mounted LED luminaires, additional surge diverter/s must be incorporated within the base of the pole as part of the pole switch pack.

(f) Public open space light poles must be rigid Type 9 or 5 in accordance with the Standard Drawings. Poles must be galvanised, or colour powder coated if advised by the Relevant Authority.

12.2 STREET LIGHTING

12.2.1 GENERAL

(a) Street lighting design within subdivisions to comply with *AS/NZS 1158.3.1* Category P1/P2/P3/P4, as advised by the Relevant Authority. Developers may be required to provide new or upgrade existing street lighting at intersection/s with the existing streets/roads, to either Category V or P with Sub Categories *AS/NZS 1158.1.1* Category V3/V5/Flag Lighting or *AS/NZS 1158.3.1* Category P1/P2/P3/ P4, as advised by the Relevant Authority.

(b) Street lighting is generally not provided in rural subdivisions, however, Relevant Authorities may request;

(i) Category V3 Lighting in accordance with *AS/NZS 1158.1.1* to intersections with arterial/sub arterial roads;

(ii) Flag Lighting in accordance with *AS/NZS 1158.1.1* to intersection with all other streets/roads; and

(iii) Lighting in accordance with *AS/NZS 1158.1.1* and *AS/NZS 1158.3.1* for special traffic managements treatments (e.g. pedestrian refuges).

(c) Street lighting for dedicated Pedestrian Crossings away from signalised intersections must be in accordance with the lighting technical parameters of *AS/NZS 1158.4*.

12.2.2 MATERIALS

(a) Street lighting must be energy efficient LED type with integral surge diverter/s. Some Relevant Authorities may have LED manufacturer type preferences to use. With free-standing street light pole mounted LED luminaires, additional surge diverter/s must be incorporated within the base of the street light pole as part of the pole switch pack.

(b) Street light poles must be galvanised, or colour powder-coated if advised by the Relevant Authority. Generally Rigid type poles must be used; however, frangible type (i.e. vehicle impact absorbing columns) may be required by the Relevant Authority.

12.2.3 LOCATION

(a) Street light poles are to be generally aligned with dividing boundary of allotments as far as practicable.

(b) Street light poles must be located in accordance with Australian Standards, within the vicinity of pedestrian refuge locations but not too close as to cause possible viewing obstruction.

12.2.4 CONTROL

(a) Street lighting control is to be designed as outlined in Table 38 below.

Table 38 — Street Lighting Control

Electrical Reticulation	Street Lighting Control Type
Underground	Underground street lighting reticulation is connected to the Relevant Authority main switch board. Control is by the Relevant Authority main switch board containing a contactor (with Photoelectric (PE) cell control), or an individual PE cell/switch/smart control on each street light luminaire.
Overhead	Where overhead Power and Water LV reticulation is Open Wire or Aerial Bundled Conductor (ABC) type, street lighting control must be via an individual Photoelectric (PE) Cell or smart control on each street light luminaire.

12.2.5 REQUIREMENTS FOR UNDERGROUND ELECTRICAL RETICULATION

(a) Where underground street lighting reticulation is used, compliance with *AS/NZS 3000* is required.

(b) The point of supply for the underground street lighting reticulation must be from a Relevant Authority main switch board.

  (i) Where more than one Relevant Authority is involved (e.g. at intersections), then multiple Relevant Authority main switch boards will need to be provided for connection of each Relevant Authority street lighting reticulation.

  (ii) The Relevant Authority main switch board(s) must comply with Power and Water Installation and Service Rules.

  (iii) The Relevant Authority main switch board(s) must incorporate a Multiple Earth Neutral (MEN) connection, connected to earth via an earth stake located adjacent to the Relevant Authority main switch board(s).

  (iv) The Relevant Authority main switch board(s) must incorporate a three-phase circuit breaker main switch and a single phase RCD for traffic signal controller circuits (which are deemed as final sub-circuits with dedicated active/neutral/earth conductors).

(c) Underground street lighting reticulation is to be within the same trench alignment as HV/LV electrical reticulation and communications Public Infrastructure to *AS/NZS 3000* Categoryinstallation requirements, with minimum 0.10 metres separation and typically at 0.75 metres depth of cover to top of street lighting reticulation conduit. For shared trench details, refer to PWC standard drawings S02-02-06-01 to 03. Underground street lighting reticulation cabling type is to be 25sqmm Cu XLPE/NJ/PVC active and neutral conductors, with a 35sqmm Cu PVC-insulated green-yellow earth cable sized to *AS/NZS 3000* requirements. All actives, neutral and earth cables are to be enclosed within the same 80mm HD uPVC conduit.

(d) The Relevant Authority street lighting columns must have switch packs located within each column containing an individual RCD per luminaire, as per the Subdivision Standard Drawings (Part 3).

12.2.6 REQUIREMENTS FOR OVERHEAD ELECTRICAL RETICULATION

(a) Where overhead electrical reticulation is used within a Subdivision, street lights are typically mounted on the power poles in accordance with Power and Water standards, subject to approval by Power and Water.

(b) Where overhead street lighting reticulation is used on Power and Water overhead power poles, compliance with *AS/NZS 3000* is not required as each street light luminaire will be connected to the Power and Water service fuse located on the overhead power pole to Power and Water standard drawings.

12.2.7 REQUIREMENTS FOR STREET LIGHTING CONNECTION

(a) Upon completion of electrical and street lighting works, the Developer must make an application for street lighting connection(s) to both Jacana and Power and Water. Refer Part 2: Reference Documents for Street Lighting Connection Flow Chart for further details.

13 PRACTICAL COMPLETION, DEFECTS, SECURITIES, HANDOVER AND ACCEPTANCE

(a) This section outlines the process for handover of applicable Development Works from the Developer to a Relevant Authority.

13.1 PRACTICAL COMPLETION

(a) The Developer must give each Relevant Authority 10 Business Days prior written notice of the date upon which the Developer estimates it will complete construction of each component of the Development Works intended to be handed over to that Relevant Authority.

(b) When the Developer considers it has completed construction of a component of the Development Works intended to be handed over to a Relevant Authority, the Developer must give notice in writing to the Relevant Authority. Each Relevant Authority may outline its own requirements for information to be submitted upon completion. As a minimum, the following information must be submitted in a digital format with appropriate indexing:

(i) Completion Certificate, including certificates of compliance;

(ii) Construction report, including CCTV Inspection of underground stormwater networks;

(iii) Digital As-constructed Drawings (in AutoCAD format), including As-Constructed Survey files (Refer Part 4 for Details);

(iv) Register of non-conformances and changes from the approved design, including evidence of Certification by the Certifying Engineer and approval by the Relevant Authority;

(v) Detailed breakdown of all assets to be handed over, with valuations based on Construction Cost;

(vi) Dilapidation Reports; and

(vii) All manuals, warranties and other documents required for the use, operation and maintenance of all services and systems forming part of the Development Works.

(c) As soon as reasonably practicable of receiving written notice in accordance with Section 13.1(b), the Relevant Authority will inspect the relevant component of the Development Works and:

(i) if satisfied Practical Completion has been achieved, provide to the Developer a Practical Completion Letter and Clearance Letter (as applicable), which may be subject to conditions requiring rectification of any minor defects and/or omissions within specified timeframes; or

(ii) if not satisfied Practical Completion has been achieved, give notice to the Developer setting out the works required to be undertaken, or the documentation required to be provided, to achieve Practical Completion.

(d) The Developer must perform the works or provide the documentation set out in a notice under section 13.1 (c)(ii) as soon as possible after receipt of the notice and, upon completion may give to the Relevant Authority a further notice in accordance with section 13.1(b).

(e) Section 13.1 will continue to apply in respect of each component of the Development Works intended to be handed over to a Relevant Authority until such time as the Relevant Authority issues a Practical Completion Letter to the Developer pursuant to section 13.1(c)(i).

(f) The Developer must refer to the Relevant Authority for details on applicable charges and payment terms for inspections required under section 13.1(c).

13.2 BONDING OF INCOMPLETE WORKS

(a) Developers may, in appropriate circumstances and with the consent of a Relevant Authority, enter into an arrangement to bond certain incomplete Development Works as part of the Practical Completion process.

(b) Each Relevant Authority will consider whether the circumstances are appropriate for the bonding of the relevant works on a case by case basis and after an assessment of risk posed to the Relevant Authority, end-purchasers of developed allotments and upstream or downstream owners and occupiers. This includes the risk of a Relevant Authority having to undertake incomplete works in the event a Developer defaults.

(c) Bonding of incomplete Development Works will not be considered unless:

(i) The incomplete Development Works can be completed within a reasonable period after the granting of the clearance (see Table 39 — Bonding of Incomplete Works for guidance on timeframes).

(ii) There are no External Works to be undertaken as part of that stage of the Development Works, which are required to service the proposed allotments.

(iii) The Developer has disclosed to the purchaser of any allotment impacted by uncompleted works being bonded that the allotment being purchased is the subject of a Bonding Deed and therefore all services may not be available until the relevant incomplete Development Works are complete.

(iv) All engineering plans for the relevant incomplete Development Works have been completed and all approvals required for them have been obtained.

(v) All preparation and earthworks on lots completed, including any geotechnical assessments required submitted and approved by the Relevant Authority.

(vi) All essential services (water, wastewater and power) reticulation complete, except where agreed otherwise with the Relevant Authority.

(vii) All cadastral survey pegs have been placed for allotment boundaries, except where agreed otherwise with the Relevant Authority.

(viii) Permits to build all buildings/structures that form part of title incomplete Development Works have been obtained, where required by the Building Act.

(ix) Table 39 — Bonding of Incomplete Works indicates the likely minimum requirements for bonding arrangements in respect of different classes or types of Development Works.

(d) The Developer must enter into a Bonding Deed with the Relevant Authority(s) to provide for the bonding arrangement. The Bonding Deed ensures that the incomplete Development Works are legally secured by conditions which would allow the Relevant Authority to step-in and complete the relevant Development Works if required to do so, and a Security Bond to cover the costs of completing the relevant Development Works and the administrative and other costs of stepping-in. A template Bonding Deed is included in Part 2: Reference Documents. This document is provided for information only and will require the Relevant Authority to assess the appropriateness of its use based on the specific requirements of the Relevant Authority and any unique circumstances of the development. Authorities may wish to obtain their own legal advice prior to using the template Bonding Deed.

(e) The Relevant Authority is to be provided with an original and two copies of the deed, duly executed by the Developer prior to lodging with the Relevant Authority. Satisfactory evidence of the items required under clause 13.2(c) above must be attached to the Developer's application for a bonding arrangement.

13.3 DEFECTS

(a) Upon receipt of a Practical Completion Letter, the Defects Liability Period will commence for the period defined in these Guidelines.

(b) During the Defects Liability Period in respect of any component of the Development Works handed over to or intended to be handed over to a Relevant Authority, if any Defect is found or occurs in respect of those works, the Developer must:

(i) repair, replace or otherwise make good the Defect and any damage to the Development Works caused by the defect; and

(ii) carry out such rectification works:

(A) causing as little disruption to the operation of the relevant Development Works (and any surrounding Public Infrastructure) as possible;

(B) in accordance with these Guidelines as if the rectification works were Development Works; and

(C) in accordance with the reasonable requirements of any Relevant Authority.

(c) Unless specified otherwise by the Relevant Authority, the Developer must undertake rectification works for all Defects within the following time frames after becoming aware of the relevant Defect (whether by notice from a Relevant Authority or otherwise):

(i) Major Defects - within 48 hours.

(ii) Minor Defects - within 20 Business Days.

(d) If the Developer fails to undertake rectification works in accordance with this Section within the periods set out above, or if and to the extent a Major Defect requires immediate rectification works (and it is not reasonable to require 48 hours notice to the Developer), then:

(i) the Relevant Authority may carry out the works, or engage third parties to carry out the works; and

(ii) the costs, including incidental costs incurred by the Relevant Authority in connection with doing or procuring the works will be a debt due and payable by the Developer to the Relevant Authority on demand and (without limiting any other rights of the Relevant Authority at law) may be deducted from any Security Bond.

(e) For the duration of the applicable Defects Liability Period, the Developer must maintain all soft landscaping in a healthy condition and meet the required service levels of the Relevant Authority. Any soft landscaping elements which become unhealthy prior to handover and acceptance will be considered a Defect.

13.4 SECURITIES

(a) A Relevant Authority may, in respect of any component of Development Works handed over to and accepted by or to be handed over to and accepted by that Relevant Authority, require the Developer to provide a Security Bond in respect of the Developer's obligations to rectify Defects and maintain the relevant component of the Development Works. Where required, Security Bond to be in the form of:

(i) cash to be held by the Relevant Authority; or

(ii) one or more unconditional and irrevocable guarantees;

(A) issued by an authorised deposit-taking institution as defined in the *Banking Act 1959 (Cth)*, or an insurer, acceptable to the Relevant Authority;

(B) in favour of the Relevant Authority;

(C) given expressly in respect of the Developer's obligations to rectify Defects in and maintain the relevant component of the Development Works; and

(D) with no expiry date.

(b) If the Developer defaults in the performance of its obligations to rectify Defects or maintain the relevant component of the Development Works, the Relevant Authority will be entitled (without prejudice to any other rights or remedies available to it) to:

(i) forfeit or call upon the Security Bond in accordance with its terms; and

(ii) apply part or all of the Security Bond as it sees fit.

(c) Provided there are no outstanding or unrectified Defects in respect of the relevant component of the Development Works at the expiry of the Defects Liability Period, the balance of the Security Bond will be returned to the Developer. Where there are outstanding or unrectified Defects at the expiry of the Defects Liability Period, the balance of the Security Bond may be called upon by the Relevant Authority or held by the Relevant Authority until such time that the Relevant Authority is satisfied all Defects have been rectified to its satisfaction.

13.5 HANDOVER AND ACCEPTANCE

(a) The processes for handover and acceptance of Development Works by each Relevant Authority are set out in the Schedule of Variations.

(b) Where, for any Relevant Authority, there is no handover and acceptance process set out in the Schedule of Variations the following process will apply:

(i) Not less than 20 Business Days prior to the expiry of the Defects Liability Period in respect of any component of the Development Works, the Developer must give notice in writing to the Relevant Authority setting out the date upon which the Defects Liability Period expires.

(ii) Within 10 Business Days of receiving a notice pursuant to Section 13.5(b)(i), the Relevant Authority must inspect the relevant component of the Development Works and must:

(A) give notice to the Developer that there are no outstanding Defects required to be rectified by the Developer, confirming the date on which the Defects Liability Period will expire and the Security Bond (if any) will be released; or

(B) give notice to the Developer that there are outstanding Defects which must be rectified by the Developer prior to the end of the Defects Liability Period (and in any event before the Relevant Authority will accept handover of the relevant component of the Development Works).

(iii) If a Relevant Authority gives the Developer a notice under Section 13.5 (b)(ii)(B), the Developer must rectify the identified Defects and, when complete, must issue a further notice in accordance with Section 13.5 (b)(i).

(iv) Sections 13.5 (b)(i) to 13.5 (b)(iii) will continue to apply until the Relevant Authority issues a notice pursuant to Section 13.5 (b)(ii)(A).

Table 39 — Bonding of Incomplete Works			
Bond Type:	Type 1	Type 2	Type 3
Infrastructure to bond (Subject to agreement with Relevant Authority)	Public Open Space Detention basins (non-critical elements not key to functional stormwater drainage system)	Pathways Soft Landscaping Street furniture (excluding signage relevant to safe road use) Bus stops Final treatment of lakes and/or water quality devices	Driveways
Timeframe for works to be completed	Within 6 months after the date of the Bonding Deed, or such other period agreed between the Relevant Authority and the Developer	Within 18 months after the date of the Bonding Deed, or such other period agreed between the Relevant Authority and the Developer	Within 24 months after the date of the Bonding Deed, or 100% of residential buildings complete, whichever comes first, or such other period agreed between the Relevant Authority and the Developer
Minimum Bond Amount	1.3 x cost of incomplete Development Works	1.5 x cost of incomplete Development Works	1.5 x cost of incomplete Development Works
Key terms of Bonding Deed	Incomplete Works must be able to be isolated and fenced off. Incomplete Works may be subject to testing upon completion and prior to handover. The Developer may be required to pay the costs of the Authority in preparing, negotiating and entering into a Bonding Deed where there is no application fee payable.	Incomplete Works may be subject to testing upon completion and prior to handover. The Developer may be required to pay the costs of the Authority in preparing, negotiating and entering into a Bonding Deed where there is no application fee payable.	The Developer may be required to pay the costs of the Authority in preparing, negotiating and entering into a Bonding Deed where there is no application fee payable.
Objectives/ Factors	Incomplete Works are to be completed prior to the first residential building construction being complete to reduce risk to public safety. This allows subdivision works that can be isolated and fenced off from the rest of the subdivision, to occur in parallel with residential building works, and completed prior to the first residential occupant.	Incomplete Works are to be completed when construction of around 75% of residential buildings are complete. This allows subdivision works that are not essential, to be constructed once the majority of the building works are complete. This reduces the risk of damage to subdivision works associated with building construction.	Incomplete Works are to be completed upon request of the third party land owner and generally once residential buildings are complete. This option is an alternative to a payment in lieu arrangement with the Relevant Authority.