Development and Subdivision Standards - DRAFT

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1 INTRODUCTION

The Litchfield Council – Development and Subdivision Standards (Standards) have been prepared to provide developers and other stakeholders (engineers, planners, contractors etc.) with the minimum standards acceptable to Litchfield Council for design, construction, and maintenance when developing or subdividing land within Litchfield Municipality.

1.1 Structure of the Standards

The Standards are structured to set out clear information on the design and approval process and detail the design criteria and technical requirements for all aspects of development and subdivision managed by Council within Litchfield Municipality.

Figure-1: Structure of the Standards

1.2 Key Terminology

1.2.1 Urban Areas and Rural Areas

For the purposes of these Standards, the following definitions apply:

Urban areas include:

- Residential areas where the median lot size for single dwelling developments is ≤4,000m^2 and/or that include multiple dwelling developments.
- Commercial and industrial precincts.

Rural areas include:

- Residential areas where the median lot size is >4,000m^2, not including multiple dwelling developments.
- Large scale commercial or industrial ventures located amongst larger lot rural residential development (i.e. mango farms).

1.2.2 Commonly Used Terms/Abbreviations and Definitions

Table 1: Commonly Used Terms/Abbreviations and Definitions

Term/Abbreviation	Definition
ALD	Averaged Leased Dimension
ARI	Average Recurrence Interval
Approved	The approval given by Litchfield Council
Clearance of General Conditions	Clearance of Council conditions included as general conditions on a Development Permit
Council	For these Standards, Council shall refer to a Council officer employed by Litchfield Council
Council's email address	council@litchfield.nt.gov.au
CPTED	Crime Prevention Through Environmental Design
DAS	Development Assessment Services (assessment section of the Department of Infrastructure, Planning and Logistics)
DCA	Development Consent Authority
DIPL	Department of Infrastructure, Planning and Logistics
Developer	The person or company responsible for the land to be developed or subdivided
Development Application	A formal plan and documentation identifying the proposed development lodged with Development Assessment Services. The plans and documentation should contain sufficient information to assess the merits and compliance of the proposal with the NT Planning Scheme and these Standards.
Development Permit (DP)	Documentation issued by a consent authority of the NT Government. The Development Permit will have various conditions specified, which may be to the satisfaction of the Council and service authorities. These conditions must be complied with either prior to or during construction or through the life of the development.
Defects Liability Period (DLP)	A 24-month period from the initial handover of assets to Council wherein the Developer will be responsible for the rectification of any defects

Drainage Easement	Under General Rights within Law of Property Act (LPA) for drainage easement, Council has the right to break the surface of, dig, open up and use the land under easement to construct, lay down, take up, use, maintain, repair, relay or inspect drains or drainage pipes for the purpose of draining stormwater and to enter the land under easement at any time (with or without a vehicle or equipment) to do so
Driveway Crossover	The point of access to a property within the road reserve, ceasing at the property boundary
Environment	The natural and built environment and all aspects of surroundings including physical, biological, and aesthetic aspects
ESA	Equivalent Standard Axle
NEMA	US National Electrical Manufacturers Association
NT EPA	Northern Territory Environmental Protection Authority
NTG	Northern Territory Government
Nominated Developer's Representative	The person appointed to represent the Developer. For the purposes of these Standards, once a Developer's Representative has been nominated, that individual may be referred to as the Developer.
Services	Includes water, sewerage, power, gas, or telecommunications, whether below, on, or above ground
Standards	The Litchfield Council – Subdivision and Development Standards
Pollution	An incident where there is a leak, spill, or escape of harmful substances to the environment
WSUD	Water Sensitive Urban Design

1.3 Disclaimer

The developer shall inform themselves fully of all circumstances and conditions relating to the information provided in these Standards and read them in conjunction with relevant legislation.

A developer who has any doubts as to the meaning of any part of the Standards shall seek clarification from Council.

Council reserves the right to vary the Standards for a specific development or subdivision where Council deems the variation to be reasonable or required due to specific site conditions.

Council may amend these Standards, at the discretion of the Director, by publication of a written amendment to these Standards.

Although care has been taken in preparing the information contained in the Standards, Council shall have no liability for or in connection with any indirect, economic, special or consequential loss or damage including without limitation; loss of actual or anticipated profit or revenue, business interruption or shutdown, loss of production, delay costs, loss of opportunity, income or rent, financial and holding costs in connection with these Standards.

2 DESIGN AND APPROVAL PROCESS

2.1 Overview of Development and Subdivision in Litchfield Council

For new developments and subdivisions, Litchfield Council is primarily responsible for approving design of road reserves and works within Council owned road reserves (including landscaping, footpaths and cycle paths, and lighting), stormwater drainage, and waste management.

The Northern Territory Government is responsible for approval of all developments and subdivisions requiring Development Applications, with input provided by various agencies and service authorities on topics of their responsibility. Litchfield Council is one such agency, who will provide advice on the above areas of Council responsibility, as well as comments on the potential effect upon the amenity of Council's residents as a result of the proposal.

In the Northern Territory, developments not requiring Development Applications may require certification by a registered Building Certifier. For these developments, the certifier should seek approval from Council for compliance with Council requirements in relation to the above areas of Council responsibility.

The following section details the development and subdivision process for Litchfield Council. Important considerations that apply throughout the entire process include:

2.1.1 Communication with Council

- For each development or subdivision, the Developer will be required to submit to Council *Form A – Nominated Developer's Representative*. This form is used to nominate a single point of contact for the duration of the development process. It is important that Council liaise with just one person for each development in order to control direction and the flow of information throughout the development process. If the Developer wishes to change the nominated contact during the course of the development, a new form must be submitted to Council. Once *Form A* has been accepted, Council will communicate only with the Nominated Developer's Representative.
- All requests to Council should be submitted in writing to Council's email address – council@litchfield.nt.gov.au. Submissions to other Council email addresses, or verbal requests, will not be accepted.
- Typically, Council will take a maximum of 10 working days to provide comment on each individual submission to Council.

2.1.2 Fees and Charges

- Fees and charges may apply at various stages during the development and subdivision process. These fees are set annually by Council and can be found on Council's website – www.litchfield.nt.gov.au. Fees for subdivisions shall be paid prior to commencement of the Defects Liability Period. Fees for all other developments shall be paid as the fee is incurred.

2.2 Development and Subdivision Process

The following chart outlines the application and construction process for developments and subdivisions in Litchfield Municipality.

For developments requiring a Development Application, Sections 2.2.1 – 2.2.7 should be followed.

For developments not requiring a Development Application, Sections 2.2.5 – 2.2.6 should be followed.

For subdivisions, Sections 2.2.1 – 2.2.8 should be followed.

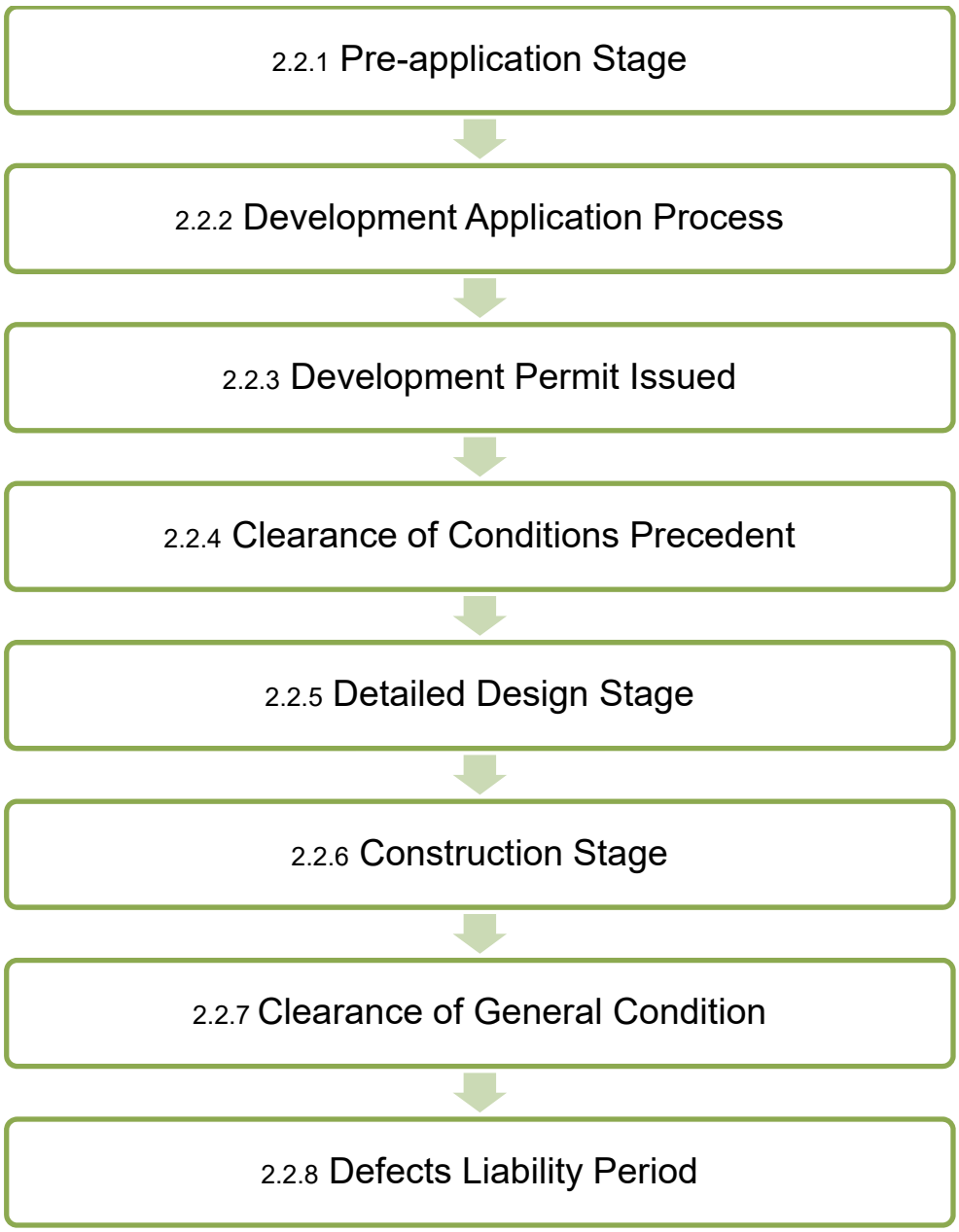


Figure-2: Application and Construction Process

2.2.1 Pre-Application Stage

It is recommended that Developers meet with Council to discuss a proposed development or subdivision prior to submitting an application to Development Assessment Services (DAS). In this meeting, Council will confirm the development process and ensure the Developer is aware of Council's requirements for both application assessment and construction. Meetings should be arranged by emailing or calling Council's Planning and Development division.

2.2.2 Development Application Process

Developers are required to lodge Development Applications with DAS and DAS will advertise the application to Council. Council will assess the application, which may include conducting a site

visit, and will provide a Letter of Comment to DAS. The letter may also be provided for information at the next Council meeting.

Should additional information be required by Council in order to make an adequate assessment of the application, a request for the information will be provided in the Letter of Comment. If additional information is provided to DAS by the applicant, Council will conduct a revised assessment of the application and provide additional comments.

DAS will coordinate the Development Application assessment process and the consent authority (either the Litchfield division of the Development Consent Authority, their delegated appointee, or the Minister) will make a decision on the application.

Should an application be refused, the development process will end at this point.

2.2.3 Development Permit Issued

If the Development Application is approved, a Development Permit will be issued by the Northern Territory Government.

The Development Permit may contain conditions to which the development or subdivision must comply.

If any conditions are noted as being to the satisfaction of Litchfield Council, clearances are required to be sought from Council.

Conditions Precedent are conditions that must be satisfied prior to endorsement of plans and/or prior to commencement of works on site.

General Conditions are conditions that must be satisfied either during the construction process or by finalisation of the development.

2.2.4 Clearance of Conditions Precedent

If a Developer wishes to clear a Condition Precedent subject to Council satisfaction, the Developer should submit a request to Council including the following items:

- Stated request to clear Conditions Precedent
- Development Permit Number
- *Form B – Application for Plan/Report Review* (if applicable to conditions being cleared)
- All plans/reports required to satisfy the relevant conditions (with information as required in *Form B*, if applicable)

If Council fees are applicable for the review of the materials submitted, Council will issue an invoice to the Developer. Review of the materials will not commence until the invoice is paid.

Upon notification to Council by the Developer of the receipt number for the paid invoice, or upon receipt of the request if no invoice is required, Council will organise a pre-start meeting with the Developer and will commence review of the materials submitted. Should Council require additional information to satisfy the condition, the Developer will be notified.

Once Council is satisfied that the conditions have been met to Council's standards, Council will issue a Letter of Clearance of Conditions Precedent.

Due to the nature of Conditions Precedent, there may be a necessity to seek a series of clearances for different Conditions Precedent on the same application. This situation will be identified during the pre-start meeting.

2.2.4.1 Pre-Start Meeting

The purpose of the pre-start meeting is to confirm a joint understanding of all requirements to satisfy Council's standards throughout the development process.

Following this meeting, the Developer will be expected to complete and return *Form A – Nominated Developer's Representative* to Council and Council will issue the Developer an Information Pack containing all forms and a breakdown of the various fees and charges required for the development.

2.2.5 Design Stage

Prior to the commencement of works, the Developer shall have all required engineering works, whether driveway access, road, or stormwater drainage works, approved by Council. The Developer may utilise Council's Standard Drawings or engage a professional engineer to complete detailed design drawings. The drawings must be submitted to Council for approval.

If there are Council fees applicable for review of the materials submitted, Council will issue an invoice to the Developer. Upon notification to Council by the Developer of the receipt number for the paid invoice, or upon receiving the request if no invoice is required, Council will organise a pre-start meeting with the Developer, if no pre-start meeting was previously required at a Conditions Precedent stage. Details of the pre-start meeting are contained in Section 2.2.4.1.

Council will review the drawings for adherence to these Standards and provide comments to the Developer. If the Developer has proposed any variations to the Standards, it is incumbent upon the Developer to draw Council's attention to those variations. If amendments are required, the above design stage process will be repeated (including administration of additional fees as applicable) until the drawings meet all Council requirements and can be approved. Approved drawings will be stamped and signed by Council.

All approvals will expire if construction work has not commenced within one year of the date of Council's approval or if the Developer has not, a minimum of 10 days prior to the expiry date, sought written approval from Council to extend the approval past one year.

Council may request reasonable amendments to the approved drawings if Council requirements have changed between the approval period and construction period.

It is important to note that for any approval granted, the Developer or engineer is not absolved from full responsibility for the correctness and accuracy of the design, drawings, and documents provided.

2.2.6 Construction Stage

No construction works (including earthworks) may commence until all of the following conditions have been met:

- All relevant drawings and specifications have been approved by Council.
- All Conditions Precedent on the Development Permit noted as requiring completion "prior to commencement of works" must be signed off by the relevant authority.
- If works are to take place within Council's road reserve, *Form C – Works Permit – Works Associated with a Development Permit* must be sought from Council.

Construction works should be completed in accordance with the requirements of these Standards, including adherence to all required hold points as addressed in the following sections. Throughout the construction stage, in particular at all hold points, inspections will be required. To book an inspection with Council, the Developer shall submit *Form D – Inspection Request* to Council a minimum of 48 hours in advance of the desired inspection time.

All inspections will be undertaken in conjunction with the Developer. Council will provide a copy of inspection notes agreed upon by both Council and the Developer at the conclusion of the inspection. A formal report will be issued after each inspection hold point and Council will notify the Developer whether or not works may proceed on the site or if rectification works are required.

Fees may apply to the inspection stage, as detailed in Council's Fees and Charges.

2.2.6.1 Works within a Council Road Reserve

Where works are to be carried out within an existing Council road reserve, *Form C – Works Permit for Works Associated with a Development Permit* shall be submitted and approved.

To obtain the above permit, the following documentation must be provided for Council's approval:

- Approved "For-Construction" drawings
- Public liability insurance certificate
- Copy of the site supervisor's White Card
- Traffic Management Plan and/or Traffic Control Guidance Plan
- Workers compensation insurance certificate.

The permit should nominate the time period requested for the works. Council's standard assessment time for a *Works Permit for Work Associated with a Development Permit* is 5 days after all required documentation is submitted to Council and payment is received. Works cannot commence until approval is granted by Council. The Developer should be aware of the required timing and plan accordingly.

2.2.6.2 Naming of Roads

Should new roads be created as part of the subdivision, approval for proposed road names is required from the NT Place Names Committee. Prior to issuing approval for a road name within Litchfield Municipality, the Place Names Committee must seek the view of Council.

Any proposed road name must be reviewed and accepted at a Council meeting. Council supports the Place Names Committee's guidelines for naming of places and naming rules and will review the proposed name in line with those directives. The Developer shall submit the proposed road name and supporting information as noted in the NT Place Names Committee directives in writing to Council.

To avoid delays in the naming process, it is recommended that the Developer seek Council's approval a minimum of 8 weeks prior to submission of the proposed road name to the NT Place Names Committee.

2.2.7 Clearance of General Conditions

After all works required by Council are completed, the Developer shall submit *Form E – Clearance from General Conditions/Release from Defects Liability Period* and request to Council a clearance of general conditions of the Development Permit.

Council will review the Development Permit and any associated materials submitted for compliance with conditions relevant to Council.

For most developments and subdivisions, an inspection will be required. Thus, an inspection request can be submitted at the same time as the request for clearance of General Conditions. Council must receive the inspection request a minimum of 48 hours in advance of the desired inspection time.

Should any issues with or defects in the works be identified, Council will notify the Developer in the inspection report and the Developer shall undertake all necessary steps for rectification of works prior to clearance being issued.

Should no inspection be required, Council will review the General Conditions and provide comments as applicable.

Once all works have been completed to Council's satisfaction, the Developer will be required to submit *Form F – Value of Assets*. For minor developments where driveway crossovers are the only new Council asset, the Developer shall also submit Council's standard drawing(s). For all other developments, the Developer shall also submit the following:

- "As-Constructed" drawings in PDF format
- Auto-CAD version of "As-Constructed" drawings
- Completed georeferencing section of *Form F – Value of Assets* for all new Council assets in GDA94 – MGA Zone52 projection
- For subdivisions only, proposed cadastral survey plan showing all easements.

After Council receives the above assets information, Council will issue final invoices. For developments without subdivision, the Developer will be invoiced for any outstanding inspection fees. For subdivisions, the Developer will be invoiced for the following:

- Administration Fee,
- Development Contribution Plan Fee,
- Fees for additional inspections undertaken due to failure to meet hold point requirements,
- Maintenance Bond to cover the Defects Liability Period, and
- Outstanding Works/Defects Bond, if applicable.

Once payments for all invoices are made, the Developer is responsible for submitting the receipt or receipt number for the paid invoice to Council. Council will then issue the Letter of Clearance of General Conditions.

For developments not including subdivisions, this point will be the conclusion of the Development Process.

2.2.7.1 Value of Assets

The purpose of *Form F – Value of Assets* is to record the total cost of all new and affected assets received by Council as part of the development and/or subdivision. The calculations are based on the cost to Council for replacement of the asset.

2.2.7.2 Administration Fees

An Administration Fee is payable for all subdivisions to cover administrative activities undertaken by Council during the planning and development process for the subdivision. The fee is a percentage of the total Value of Assets received by Council, set each year as part of Council's standard Fees and Charges.

2.2.7.3 Maintenance Bond

The Developer provides the Maintenance Bond as a security for Council during the Defects Liability Period (DLP). The intent is that at the conclusion of the DLP, the Developer will have the opportunity to correct any defects identified prior to final handover of the assets to Council. Should the Developer not provide appropriate rectification of the identified defects to Council's satisfaction, Council may use the Maintenance Bond to rectify the defects.

The Maintenance Bond is calculated at a percentage of the total Value of Assets received by Council and is set each year as part of Council's standard Fees and Charges. Council will accept

cash, cheque, or a bank guarantee for the Maintenance Bond; credit cards cannot be accepted for this bond.

At the conclusion of the DLP, if all works are completed to Council's satisfaction, the Maintenance Bond will be returned to the Developer (see section 2.2.8 – Defects Liability Period).

2.2.7.4 Developer Contribution Plan Fees

Council collects a Developer Contribution Plan fee for each new lot created. Refer to the Developer Contribution Plan for more information.

2.2.7.5 Additional Inspection Fees for Subdivisions

Council's Administration Fees are calculated to cover one inspection per required hold point. During the construction process, if the works fail any required hold point, an additional inspection will be required once rectification works have been undertaken. These fees for additional inspections will be tabulated and charged at the conclusion of the subdivision.

2.2.7.6 Outstanding Works Bond

At the discretion of Council, the Developer may be required to provide an additional bond for any works not completed by the Developer to Council's satisfaction prior to commencement of the DLP. Typically, acceptable outstanding works will be limited to insufficient grass cover. Provision of the Outstanding Works Bond will allow the Developer to finalise the subdivision prior to completing the outstanding works.

The Outstanding Works Bond requires submission and approval of *Form G – Outstanding Works Bond Application* to Council. The Outstanding Works Bond will be of an amount mutually agreed by both parties but will nominally be calculated at the cost of Council completing the outstanding works. However, in the event of inability of both parties to reach an agreement, Council has the discretion to engage a quantity surveyor to estimate the value of the outstanding works. If a quantity surveyor is engaged, the cost of engaging the quantity surveyor will be further added to the bond. Council will accept a bank guarantee for the Outstanding Works Bond.

Once the outstanding works are completed to Council's satisfaction, the Outstanding Works Bond will be returned to the Developer.

2.2.8 Defects Liability Period

When the Letter of Clearance of General Conditions is issued for a subdivision, the subdivision will enter a 24-month Defects Liability Period (DLP). Throughout the DLP and at the conclusion of the 24-month period, Council will inspect the works for defects. Typically, the Developer will only be asked to rectify the defects at the conclusion of the DLP; however, if an identified defect is deemed to be a safety hazard or considered to create on-going maintenance issues for Council, rectification works may be required immediately.

When the DLP is due to expire, the Developer shall again submit *Form E – Clearance of General Conditions/Release from Defects Liability Period* to Council. Council will then undertake a final inspection of the subdivision. Should the inspection identify any defects, other than normal wear and tear or vandalism, the Developer will be notified and asked to rectify the defects.

If, in the opinion of Council, the defects are not appropriately rectified, Council may draw on applicable bonds and undertake rectification works.

When all works are determined to be completed and all defects determined to be rectified to Council's satisfaction, the subdivision will be issued a Letter of Release from Defects Liability Period and any remaining funds in the Maintenance Bond will be returned to the Developer.

2.3 General Design Requirements

The following section provides details for the Developer on requirements of Council for development of detailed designs for developments and subdivisions in Litchfield Municipality.

2.3.1 Use of Qualified Consultants

All design work of assets to be gifted to Council and for works to be approved by Council shall be undertaken by a suitably qualified engineer or other professional, unless otherwise advised by Council.

2.3.2 Survey Plan Requirements

All surveys shall be undertaken by a certified surveyor and shall comply with the provisions of this section. All survey marks/levels relevant to the design submission shall be shown on the plans.

Permanent reference points shall be established within the proposed or existing road reserves at spacing not greater than one kilometre or as required by Council.

2.3.2.1 Units of Measurement

The following units shall be adopted:

- Linear measurements shall be in metres (m)
- Vertical measurements shall be in metres (m)
- Azimuth shall be on the local plane rectangular grid system

2.3.2.2 Vertical Control

All levels are to be provided in Australian Height Datum (AHD) to two decimals, unless specified otherwise by Council. The Developer shall adopt or establish a reliable benchmark by application of appropriate survey procedures from reliable survey stations.

2.3.2.3 Horizontal Control

The following points shall be adopted:

- The horizontal control to two decimals, unless specified otherwise by Council, for each project shall be based on the existing survey stations.
- The contractor shall establish reliable horizontal control where none exist.
- Plans shall show the distance from the centre line of the proposed or existing road to the road reserve boundary at all road tangent points and intersections.
- The centre line shall be pegged at 25m intervals on straight sections and 12.5m intervals on curves, tangent points, and the intersection of road centre lines. Chainage is to be commenced at the intersection of road centre lines. Offset recovery pegs are to be placed left and right of the centre line at no greater than 100m intervals, at tangents and secant points.
- Boundaries of the subdivision shall be clearly pegged to avoid disputes between landowners.

Where any unacceptable discrepancies exist in control marks due to soil settlement, inundation, disturbance or other factors, a discrepancy report will be prepared by the Developer and referred to Council.

A sufficient number of benchmarks – surveyed in three coordinates in GDA94 – MGA Zone52 projection: Eastings, Northings, and Height (AHD) – to enable the works to be set out accurately in accordance with the Standard Drawings shall be provided.

2.3.3 Subdivision Plan Requirements

The Developer must provide a complete set of legible detailed engineering drawings with supporting specifications and reports for each subdivision. For detailed design review, the information shall be provided in PDF format; As-Constructed drawings may be provided in AutoCAD or coordinates may be provided by the Developer on *Form F – Value of Assets*.

The following requirements are applicable to subdivision plans:

- Drafting standards must comply with the provisions of Australian Standard 'Technical Drawing General Principles' AS1100.101-1992 or superior.
- The drawings must show sufficient detail to allow Council to accurately ascertain the feasibility of the design and compliance with Council's Standards in all areas and to allow contractors to confidently construct the works.
- All engineering drawings must include a scale and north arrow and must be legible on A3 print.
- The drawings shall show the location of the site in relation to existing named roads.
- The set of drawings must include:
    - General notes.
    - General details.
    - Site plan with road works and drainage layout.
    - Earthwork management plan.
    - Stormwater management plan.
    - Pavement design.
    - Cross sections.
    - Longitudinal sections.
    - Intersection setout plan.
    - Signs and line-marking arrangement plan.
    - Street light design.
    - Drainage easement arrangement plan.
    - Bus route and bus stop plan, if applicable.
    - Public open space master plan, if applicable.
    - Staging plan, if applicable.
- Where land is developed in stages, each stage must include a drawing showing how that particular stage relates to the project as a whole. The drawing must clearly define the boundaries or limits of the subdivision.
- Although Council does not control reticulated services (sewer, water, gas, power, and telecommunications), this information is required to be shown on plans to prevent conflict with Council infrastructure. All network utility services, including easements, must be located at offsets shown on Council's Standard Drawings, unless an alternative location has been approved by Council.

2.3.4 Driveway Access Plan Requirements

When new driveways are proposed for a development, a driveway access plan will be required. For subdivisions, the driveway access plan may be combined with other required drawings. The plan illustrating the new driveway access shall:

- Be drawn to scale.
- Include a north arrow.
- Clearly demonstrate the location of all driveway access points to the site, including dimensions from the property boundaries.

- Show the proposed material type, material thickness/preparation, and width of all driveways, as well as identifying whether the crossover will be an invert or require a culvert. The sizes and technical specifications for driveways shall be in accordance with these Standards, including Standard Drawings.
- Illustrate any potential obstacles (e.g. power poles, stormwater pits, sewer pits, and trees) and distances from these obstacles to the proposed driveway.
- Show dimensions between each driveway access if multiple driveways are proposed.
- Show the distance from the edge of the driveway to any intersection or any other driveway within 100m of that driveway.

2.3.5 Stormwater Management Plan Requirements

For most developments and subdivisions within Litchfield Municipality, a stormwater management plan will be required. The stormwater management plan shall:

- Be drawn to scale.
- Include a north arrow.
- Be prepared by a suitably qualified professional engineer.
- Include details of site levels (e.g. indicative levels or contour lines). Both existing site levels and designed site levels are required. Contour lines should be provided at an appropriate height difference to clearly show how the existing land and the developed land rises and falls. Typically, a contour height difference of 0.2 m for existing levels and 0.1 m for design levels will be acceptable; however, Council may require greater detail to be shown.
- Show the flood level lines (ARI 100) defining the areas of inundation.
- Include hydrologic calculations.
- Show direction of stormwater flow.
- Show details of surfaces across the lot (e.g. paved, concreted, bituminised, grassed, gravelled and asphalted etc.).
- Show how the stormwater is collected to the extent of the lot boundaries, including all proposed stormwater infrastructure (e.g. open channels, underground pipe, pits, concrete invert, detention and/or detention basins, kerb and gutters, etc.). The sizes and technical specifications for the proposed stormwater infrastructure shall be in accordance with these Standards.
- Show cross-sections of the proposed stormwater infrastructure features.
- Show the location and details of the point of discharge. If an underground connection is used, the Developer shall use the NT Department of Infrastructure, Planning and Logistic's (DIPL) standard drawing for connection details. Where DIPL's Standard Drawings are not applicable, design criteria for stormwater connections shall comply with Australian Standards and best industry practices and must be designed by a professional engineer.
- Show all proposed drainage easements and responsibility for each.

2.3.6 Construction and Environmental Management Plan

For potentially environmentally sensitive uses, such as motor repair stations and service stations, Litchfield Council may request a Construction and Environmental Management Plan (CEMP) for the management and operation of the use. The use must at all times be conducted in accordance with the plan. The CEMP shall:

- Be prepared by an independent qualified professional person and/or organization.
- Include overall environmental objectives for the operation of the use and techniques for their achievement.
- Include procedures to ensure that no significant adverse environmental impacts occur as result of the use.

- Include proposed monitoring systems.
- Identify all possible risks of operational failure and response measures to be implemented.
- Include day to day management requirements for the use, including waste management.

2.3.7 Traffic Impact Assessment

For developments and subdivisions determined by Council to result in a significant change to the existing traffic flow in the area, Council may require a Traffic Impact Assessment be completed that shall:

- Be prepared by a registered traffic engineer.
- Clearly reference all the source of data used in the report and analysis software used.
- Be undertaken in accordance with Austroads Guideline: Guide to Traffic Management – Part 12: Traffic Impacts of Developments.

2.3.8 Traffic Management Plan

For all developments and subdivisions that will result in work being undertaken on or disruptions to the normal traffic flow within Council road reserves, a Traffic Management Plan (TMP) will be required. The TMP shall:

- Be prepared by a person who holds a valid WZ1 certificate, and include the certificate number.
- Be prepared in accordance with Austroads Guidelines standard format.
- Include a risk analysis matrix.
- Include the traffic control diagram.

2.3.9 Road Safety Audit

For developments and subdivisions where Council has identified potential concerns with the proposed road design or impact upon the existing road design as a result of the new development, a Road Safety Audit (RSA) may be required. The RSA shall:

- Be prepared by an independent licenced road safety auditor, and must include the licence number of the auditor.
- Reference all risks identified in the report in accordance with relevant Austroads Guidelines and/or Australian Standards.
- Include photos and/or site plan for each identified risk.
- Include a risk analysis matrix and recommended remediation method.
- Include developer's responses to each recommended remediation method including a timeframe.

3 ROADS AND PATHWAYS

3.1 Design Criteria

This section sets out the standards required by Council for the design and construction of roads and pathways in urban, rural, and industrial/commercial developments and subdivisions. The following standards are to be used:

- This Litchfield Council – Development and Subdivision Standards, which includes Standard Drawings as well as relevant Council policies.
- Austroads Guidelines including:
    - Guide to Road Design
    - Guide to Traffic Management
    - Guide to Pavement Technology
- Relevant Australian Standards.
- Department of Infrastructure, Planning and Logistics (DIPL) standards and specifications.

The Litchfield Council – Development and Subdivision Standards, including Standard Drawings, take precedence over all other guidelines and standards. These Standards are designed with consideration for the environment, safety, and future maintenance requirements. When Council documents do not cover the works to be constructed, then other designs may be adopted with the approval of Council.

Design outside of these Standards may be considered if supporting documentation is provided that addresses Council's concerns for the environment, safety, and future maintenance, including all engineering aspects of the design and risk analysis. This assessment shall be included in the design report submitted with the initial plans. It is recommended that the applicant organise a meeting with Council prior to developing any designs that are not adequately covered by Council's documents.

3.2 Road Hierarchy

The Developer shall take into account the general context of the surrounding area. The proposed roads must be adequate to the surrounding environment and infrastructure.

A road hierarchy is to be established for the proposed development that adheres to Council's Standards.

The allocation of road hierarchy will depend on the road's intended use and functionality, which will then determine the design requirements in accordance with Council's Standards.

Table 2 provides information for determination of road hierarchy.

Table 2: Road Hierarchy

Road Class	Function
Arterial	Primarily traffic movement function. Primary network of strategic links between important centres in a city, town or rural area. No direct access to abutting properties is permitted.
Distributor	Combined traffic movement and access function. Connects arterial roads to areas of development and distributes traffic to local street systems. Limited direct access may be permitted to abutting properties.
Collector	Provides access between Local roads/streets and Distributor roads. Direct access is permitted to abutting properties.
Local	Used primarily for direct access to abutting properties.

3.3 Road Cross Sections

All road designs must be developed with the objectives of providing roads to the standard widths required by Council complete with stormwater drainage and services corridors. Urban roads must additionally consider the need for on street parking, shade street trees, pedestrian footpaths and shared pathways, bus stops and appropriate disabled access to these facilities.

Table 3 indicates minimum widths for each road type. Refer to Council's Standard Drawings for each road type. Council reserves the right to make appropriate adjustments to individual items where a larger road reserve is provided. Refer to Council's Standard Drawings LC-200 and LC-201 for details.

Table 3: Minimum Road Cross Section Widths

Development Area			Road Hierarchy	Road Reserve Width (m)	Carriageway Width (m)	Landscaped Verge Width* (m)	Footpath Width* (m)
Rural Area			Distributor Collector Local	30	10	10	N/A
Urban Area	**Residential**	All Areas	Distributor	22	10	4	2
		Single dwelling lots ≤1,000m^2 and/or multiple dwelling lots	Collector Local	20	10.4**	3	1.8
		Single dwelling lots >1,000m^2 to ≤4,000m^2	Collector Local	20	8	4.2	1.8
	Industrial/Commercial		Distributor	22	10	4	2
			Collector Local	22	10.4**	4	1.8

*Required on both sides of the road.

**Intention is to provide an on-street car parking lane 2.5m in width.

3.4 Design Speed

The Developer must consider the speed environment when designing a new subdivision and make recommendations of appropriate treatments.

The design of roads within the subdivision shall conform to the following desirable operating speed requirements. The minimum design speed for road design is to be 10km/h above the operating speed.

Table 4: Maximum Design Speeds

Development Area		Road Hierarchy	Maximum Desirable Operating Speed* (km/hr)
Rural Area		Collector, Local	80
		Distributor, Arterial	As advised
Urban Area	**Residential**	Arterial, Distributor	As Advised
		Collector	60
		Local	50
	Industrial/ Commercial	Arterial, Distributor	As advised
		Collector	60
		Local	50
*As defined in Austroads Guideline: Guide to Road Design – Part 3 "Geometric Design"			

The following should be considered and included as required:

- A 50km/hr default speed limit applies to built up areas within the Northern Territory.
- A master plan shall be provided showing the proposed speed limits on all new roads.

A Traffic Impact Assessment may be required for developments or subdivisions where Council has concerns about the ability of the existing network to accommodate the increased traffic from the proposed development or subdivision. Community consultation at the Developer's expense may be required under these circumstances.

The Traffic Impact Assessment should nominate all required traffic measures to provide a safe thoroughfare for traffic. All upgrades required as a result of the new development must be constructed by the Developer at the time the road is built, at no cost to Council.

A Road Safety Audit (RSA) will be required for subdivisions or developments where Council identifies potential concerns with the proposed design.

3.5 Design Vehicle

Roads are to be designed to accommodate the maximum vehicle configuration that is likely to utilise the roads. Design vehicles are to adhere to the Austroads Guideline: Austroads Design Vehicles and Turning Path Templates Guide.

Design vehicle turning paths templates should be applied to ensure that:

- The outside edge of the swept path remains within the paved area.
- A minimum clearance of 0.6m shall be provided between the inside swept path and face of kerb or pavement edge.
- A minimum clearance of 0.6m shall be provided between the outside swept path to objects such as road furniture (e.g. traffic islands) and utility poles.

- A minimum clearance of 2m is to be provided between the outside swept paths of any adjacent vehicles.

The 0.6m offset may not be required for local streets in urban areas, where space is restricted for local access/minor roads in rural areas where the shoulder is partly sealed. In that case, the Developer shall seek written approval from Council. Nevertheless, the vehicle swept path should not cross the centreline of a rural road.

In situations where space is restricted and turning speed is low, Council may approve the swept path of the design vehicle to encroach into a verge or traffic island with the wheel paths remaining on the pavement. This may occur when designing for a large bus to use a local street or when checking that a design layout can accommodate an occasional vehicle larger than the design vehicle.

However, in both cases, while restrictive intersection geometry may be desired to meet traffic management and environmental objectives on local roads, it is necessary to check the layout using the next larger design vehicle template to ensure that occasional use by vehicles larger than the chosen design vehicle is viable.

The above are the minimum requirements for design of intersections; however, Council reserves the right to nominate superior design requirements if deemed appropriate.

An interconnected street network is encouraged throughout the Municipality. Cul-de-sacs are not encouraged, especially within urban areas. However, where such a design cannot be avoided, minimum radii shall be 9m for urban residential streets and 11m for industrial and commercial streets.

3.5.1 Rural Intersections

Intersections must be designed according to the Council Approved Standard Intersections Type 1, 2, and 3, in accordance with the Standard Drawings, as follows:

Table 5: Rural Road Intersection Types

Intersection Type	**Local**	**Collector**	**Arterial**
Local	Type 1	Type 1/Type 2*	Type 3
Collector	Type 1/Type 2*	Type 2	Type 3
*To be assessed case by case			

3.5.2 Urban intersections

Table 6: Urban Road Intersection Types

Intersection Type	Local	Collector	Arterial
Local	12.5m Single Unit Truck/Bus	12.5m Single Unit Truck/Bus	12.5m Truck or 19m articulated*
Collector	12.5m Single Unit Truck/Bus	19m single articulated	19m articulated or 25m articulated*
Industrial/ Commercial (All roads)	19m single articulated	25m single articulated	25m single articulated
*To be assessed case by case			

3.6 Road Geometry

3.6.1 Pavement Crossfall

Two way crossfall is preferred for all roads as per Council's Standard Drawings. However, one way cross fall may be permitted when specific conditions are met and will be approved at the discretion of Council.

In rural areas, pavement crossfall and superelevation shall be designed in accordance with Austroads Guidelines.

In urban areas, pavement crossfall shall be designed with consideration of the following design requirements:

- A nominal 3% crossfall.
- Two way cross fall is preferred. One way cross fall may be permitted when the adjacent property is a dedicated drainage reserve or public reserve with specifically designed stormwater infrastructure to cater for the stormwater. All medians shall be designed with appropriate crossfall to accommodate stormwater drainage.
- Drainage from all properties on the 'high side' of a one way cross fall road must be connected to Council's underground system and all internal flows must be collected internally and discharged at this point.
- One way crossfall will not be permitted where private properties are adjacent to the low side.
- Superelevation must be in accordance with Austroads Guidelines.

3.6.2 Verges

Verge widths are specified in Section 3.3, Table 3.

The verge gradient is indicated on Council's Standard Drawings.

When designing verges, the following factors should be considered:

- Driveways, signs, street furniture, landscaping, and footpaths.
- Bus stop locations and design.

- All services are to be located in accordance with Council's Standard Drawings.
- In rural areas, cut and fill batters may be extended into the lot where the design cross section cannot be contained within the road reserve. In these cases, the batter slope should not exceed 1 in 4 unless, in special cases, geotechnical testing indicates that steeper slopes are sustainable and maintainable.

3.6.3 Gradients and Radii

Roads are to be designed to provide grades in accordance with Table 7 and with consideration for the natural/existing ground and conditions and best practice lot layout. Grades are to comply with the object and intent of the Disability Discrimination Act and the requirement and provisions of relevant standards.

Table 7: General Maximum and Minimum Longitudinal Grades

Grade Percentage, Location		**Residential**		**Industrial**
		Local	Collector/Distributor	All Roads
Desirable Maximum %		10	8	6
Absolute Maximum %		12	10	8
Desirable Minimum %		1.00	1.00	1.00
Absolute Minimum %	Straight alignment down to 60m radius bends	0.50	0.50	0.50
	All kerb returns and kerbs in the cul-de-sac head	0.75	0.75	0.75

The developer shall seek written approval from Council to design under the absolute values. These considerations will be approved only in special cases and must be addressed in the design report.

3.7 Pavement Design

Pavement design should be in accordance with these Standards, Austroads Guidelines: Guide to Pavement Technology and NT Government Standard Specification for Roadworks, unless otherwise specified. The Developer shall submit pavement design calculations for Council's approval prior to commencing construction. Refer to NT Government Roadworks Specifications for testing standards and requirements.

3.7.1 Pavement Design Loading

The Developer shall undertake an analysis of design traffic and is responsible for determining design traffic loadings and appropriate pavement structure. The minimum requirements for design loading and wearing course according to the road classification are shown in Table 8.

Table 8: Minimum Requirements for Design Loading and Wearing Course

Road Classification	**Minimum Design Loading (ESA)**	
	Residential	Industrial
Rural – Arterial/Collector	5.0×10^5	-
Rural – Local	5.0×10^4	-
Urban – Arterial	1.0×10^6	5.0×10^6
Urban – Collector	5.0×10^5	1.0×10^6
Urban – Local	5.0×10^4	5.0×10^5

Assessment of construction traffic shall include consideration of subdivision staging and construction vehicles and associated access for construction of infrastructure for new stages of development and construction vehicles through completed stages.

The minimum pavement design life is 40 years.

3.7.2 Wearing Surface

The minimum wearing surfaces on Litchfield Council roads are specified in the following tables. It is the responsibility of the Developer to provide a wearing surface design that accommodates the design loading, including construction traffic.

Table 9: Minimum Wearing Surface for Rural Areas

Asset Type	**Minimum Wearing Surface Design**
All Rural Road Types	Prime and single seal coat with 14/20mm aggregate (50/50 mix)
Intersections	Prime and single seal coat with 14/20mm aggregate (50/50 mix)
Cul-de-sac	Prime and 40mm compacted thickness asphalt to the end of the tangent point
Driveways	Prime and single seal coat with 10mm aggregate

Table 10: Minimum Wearing Surface for Urban Areas

Asset Type	**Minimum Wearing Surface Design**
Arterial and Collectors	Prime and 40mm compacted thickness asphalt
Local Roads	Prime and 25mm compacted thickness asphalt
Intersections	Prime and 40mm compacted thickness asphalt to the end of tapers
Cul-de-sac	Prime and 25mm compacted thickness asphalt

Table 11: Minimum Wearing Surface for Industrial/Commercial Areas

Asset Type	**Minimum Wearing Surface Design**
All road types and intersections	Prime and 40mm compacted thickness asphalt

3.7.3 Pavement Composition

The minimum pavement composition shall adhere to Table 12.

Table 12: Minimum Pavement Composition

Layer	Minimum Compacted Thickness	Material*	Compaction
Base	200mm	Fine Crushed Rock (FCR)	100% MMDD
Sub-Base (where applicable)	200mm	Naturally occurring gravel or FCR	98% MMDD
Sub-Grade	150mm	In Situ	95% MMDD
*Refer to NT Government Standard Specification for Roadworks for material specification			

3.8 Lot Truncation

Lot truncation is required at all corner blocks and shall be designed in accordance with Austroads Guideline: Guide to Road Design – Part 3 “Geometric Design”. The minimum truncation is 2m by 2m but may be increased to allow for intersection sight distances, verge width, and footpath installation.

3.9 School Sites

Council considers that parking, set down and pick up at school sites is a core requirement of the school design and should be accommodated on the school site. The design of subdivision roads abutting school sites must incorporate provision for safe routes to schools and crossing facilities as required.

3.10 Bus Routes and Bus Stops

Where the NT Government Public Transport Division requires bus routes and bus stops, the Developer shall provide an approved master plan developed at the planning stage in liaison with the Public Transport Division. This plan must show the ultimate and interim locations of proposed bus routes, nominated sheltered bus stops, and/or where bus stops include other types of street furniture (e.g. bus shelters, seats, bins, timetable totems, etc.).

3.11 Traffic Control Devices

3.11.1 Traffic Signs and Line Marking

All warning, regulatory, and direction signs are to conform to current Australian road rules and current versions of the Australian Standards, including:

- Austroads Guidelines:
    - Guides to Traffic Control Devices
    - Guide to Traffic Engineering Practice – Part 13 – Pedestrians.
    - Guide to Traffic Engineering Practice – Part 14 – Bicycles.
- AS1742.1 and 1742.2 Manual of Uniform Traffic Control Devices.
- Design for Access and Mobility (AS 1428 Parts 1 & 2).
- Other relevant publications and standards.

A Sign and Line Marking Plan is required and must indicate:

- The location and type of street name signs.
- All regulatory signs including speed signs where the default speed limit does not apply.
- All other hazard, warning and advisory signs.
- Line marking and pavement markers.
- Bicycle and shared path signage and line marking.

3.11.2 Street Name Signs

Council's Standard Drawings are to be used for the design of street name signs. The preferred location for street name signs is on the through road adjacent to the centreline of the intersecting road. Refer to Section 2.2.6.2 and Council policy "TS03 Place Names Policy" for further details on naming of new roads.

In addition, Litchfield Council's special intersection sign shall be used at each intersection in conjunction with the street name signs.

3.12 Service Conduits

Service conduits shall be designed and constructed by a suitably qualified individual. Service conduits includes communication, irrigation, and electrical cables or pipes under roadways, footpaths, access strips, and elsewhere as required. Design of these services is to be in consultation with the appropriate authority or as directed by Council. Conduits shall be constructed at the time of subdivision construction.

All conduit locations are to be marked on As-Constructed drawings and on site. Installation of conduits should not adversely impact the pavement compaction.

3.13 Kerbing

The choice of kerbing is dependent on the road use and stormwater requirements. All designs must comply with Australian Standards and Council's Standard Drawings.

Barrier kerb and gutter shall be used in the following urban areas:

- Residential distributors,
- Residential areas with single dwelling lots ≤1,000m^2 in area and/or multiple dwelling lots,
- Industrial and commercial areas.

Layback kerb and gutter shall be used in the following urban areas:

- Residential areas with single dwelling lots > 1,000m^2 to ≤4,000m^2 in area.

Gap kerbing shall be used in the following rural areas:

- At intersections.

3.14 Driveway Crossovers

All driveway crossovers must be designed and constructed in accordance with Council's Standard Drawings.

Council will determine the acceptable location or relocation of all driveway crossovers in accordance with the following criteria:

- The driveway location shall be positioned in consultation with Austroads Guidelines and is subject to Council approval.
- One driveway access may serve a maximum of 2 lots.
- Driveways shall be located to have minimal impact to on-street parking.
- Driveway locations must take into consideration the location of other services, including stormwater infrastructure, streetlights, and other service pits that may exist in the verge. Any changes to infrastructure to accommodate driveways are to be approved by and at no cost to Council. The alteration must also be approved by the Authority that owns the service infrastructure.
- Where footpaths exist, the material of that section of the driveway must be the same as the footpath.
- Council will only maintain one driveway crossover per lot. However, a second driveway crossover may be permitted subject to Council's approval. Construction and maintenance of a second driveway will be at the owner's expense.
- Should a box culvert be used as driveway crossover, the culvert must be 1200mm x 450mm or larger.
- Should concrete invert be used as driveway crossover, the approach to the invert shall have maximum gradient of 1:10 (Vertical:Horizontal).

Table 13 and Table 14 summarise Council's driveway requirements.

Table 13: Driveway Crossover in Urban Areas

Land Use and Access Type	Width	Driveway Material
Residential single access	3.5m	100mm concrete, SL82 mesh
Residential shared access	6.0m	150mm concrete, SL82 mesh
Commercial/Industrial*	6.0m	200mm concrete, SL82 mesh
*Wider driveways may be approved by Council subject to consideration of vehicle design and/or development requirements.		

Table 14: Driveway Crossover in Rural Areas

Land Use and Access Type	Width	Driveway Material
Residential single access	4.0m (4.88m*)	Prime and single coat seal 10mm nominal aggregate. 150mm Type 2 gravel base compacted to 100% MMDD. 150mm subgrade compacted to 95% MMDD.**
Residential shared access	8.0m (9.76m*)	
Commercial/Industrial	8.0m (9.76m*)	200mm concrete (with invert profile or finished surface as applicable to driveway type), reinforced with SL82 mesh. The minimum concrete driveway strength is 25MPa, broom finished concrete.
*Wider width is required where the driveway must accommodate a box culvert. **Gravel driveway crossovers for lots accessed from a gravel road may be approved by Council.		

3.15 Access for New Lots

Council prefers each new lot to have individual, unconstrained access.

Council does not support additional accesses for new lot(s) where an existing right-of-way currently serves a single lot.

Council does not support new right-of-way access arrangements where the right-of-way provides access for multiple lots.

However, upon review of individual circumstances, Council may support additional accesses for new lot(s) where an existing right-of-way currently serves multiple lots.

Council does not support adjacent battleaxe access design for new lots and Council will not approve driveway access for lots designed with two or more adjacent battleaxes.

Where single battleaxe designs are proposed in urban subdivisions, Council prefers the battleaxe width to be a minimum of 10m. Where single battleaxe designs are proposed in rural subdivisions, Council prefers the battleaxe width to be a minimum of 15m.

3.16 Pathways

In urban areas, pathway design and construction must comply with Council's Standard Drawings. All pedestrian accesses must meet or exceed Australian Standards for access and mobility.

3.16.1 Footpaths

Footpaths with Litchfield Municipality are to be made of concrete with a minimum compressive strength of 25MPa, broom finish, 100mm minimum thickness and SL82 reinforcement. Footpaths must be provided within the road reserve in accordance with the table in Section 3.3.

Grading of footpaths and shared paths is to be designed in accordance with relevant disabled access legislation and standards, including AS 1428 Design for Mobility and Access.

3.16.2 Shared Paths and Cycle Paths

The need for any form of shared path, cycle path, or on-road cyclist facility is to be determined by Council, in discussion with the Developer, prior to preparation of the construction drawings. Specifications for construction will be determined based on the requirements of the individual path.

3.16.3 Laneways

Laneways are prohibited within Litchfield Municipality.

3.17 Street Furniture

To enhance public amenity, the Developer shall ensure that adequate street furniture is placed at appropriate sites within the streetscape of a new development or subdivision. Such places may be at bus stops, near shops, or at busy pathway intersections. Items may include seating, rubbish bins, bollards, signs, and shelters.

In general, street furniture shall be provided in accordance with the following requirements:

- Items should be robust and vandal proof, built of durable materials, and, in the case of seating, either placed under shade trees or built from materials that do not overheat (e.g. aluminium).
- The colour palette of proposed street furniture is to be submitted and approved by Council.
- All seating is to have a concrete pad under each seat with a clearance of 1200mm from the front extremity of the seat and 1200mm each from the sides and back for wheelchair access. Paved access shall be provided between seats and adjoining footpaths and streets.
- All furniture installation is to conform to the relevant local and national building codes.

3.18 Hold Points

Hold points are points in the construction process where an inspection and clearance from Council is required prior to the Developer moving forward with the works.

Council must attend every hold point and is responsible for reviewing all information submitted by the Developer.

The Developer must give 48 hours advance written notice to Council by submitting an inspection request form to council@litchfield.nt.gov.au.

3.18.1 Urban Areas - Roads

Table 15: Road Construction Hold Points – Urban Areas

Hold Point	Developer Shall Provide	Council Will Review
Road Works		
1. Once sub-grade is completed	• Certified geotechnical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation.
2. Once sub-base is completed	• Certified geotechnical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation.
3. Once base-course is completed	• Certified geo-technical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation. .
Sealing		
1. Prior to sealing or asphalting	• Conformance test report in accordance with NTG roadworks specifications. • Design for asphalt mix.	• Pavement dry back. • Ball penetration. • ALD for aggregate. • Proposed application rate and/or asphalt design **(note that this information is required prior sealing)**.

3.18.2 Rural Areas - Roads

Table 16: Road Construction Hold Points - Rural Areas

Hold Point	Developer Shall Provide	Council Will Review
Road Works		
1. Once sub-grade is completed	• Certified geotechnical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation.
2. Once sub-base is completed	• Certified geo-technical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation.
3. Once base-course is completed	• Certified geo-technical report. • Conformance test report in accordance with NTG roadworks specifications.	• Grades. • Compaction. • Formation.
Sealing		
1. Prior to Sealing or Asphalting	• Conformance test report in accordance with NTG roadworks specifications. • Design for asphalt mix.	• Pavement dry back. • Ball penetration. • ALD for aggregate. • Proposed application rate and/or asphalt design **(note that this information is required prior sealing).**

3.18.3 Driveway Crossovers

Table 17: Driveway Crossover Construction Hold Points

Hold Point	Developer Shall Provide	At Inspection, Council Will Review
Concrete Invert		
1. Prior to pouring the concrete	• Adequate site access.	• Subgrade compaction. • Installation of reinforcement steel. • Thickness and width of the driveway.
Concrete Flat		
1. Prior to pouring the concrete	• Adequate site access.	• Subgrade compaction. • Installation of reinforcement steel. • Thickness and width of the driveway.
Driveway with Box Culvert		
1. Prior to pouring the concrete for the bottom slab	• Adequate site access.	• Subgrade compaction. • Installation of reinforcement steel. • Thickness and width of the slab.
2. Prior to pouring the concrete for headwalls and wingwalls	• Adequate site access.	• Installation of reinforcement mesh. • Dimensions and thickness.
3. After the installation of culverts, prior to backfill	• Adequate site access. • Adequate visibility for the culvert, headwalls and wingwalls.	• Culvert joints. • Headwall and wingwall joints. • Alignment of the culvert.
4. After the backfill, prior to sealing	• Conformance test for base-course material in accordance with NTG guidelines • Undertake proof-roll using adequate vehicles in accordance with NTG roadworks specifications.	• Check compaction of base-course • Check formations and grades • Proposed application rate and/or asphalt design **(note that this information is required prior sealing).**
Rural Flat Driveway		
1. Prior to sealing or asphalting	• Conformance tests for Base-course material in accordance with NTG guidelines • Undertake proof-roll using adequate vehicles in accordance with NTG roadworks specifications.	• Check compaction of base-course • Check formations and grades • Proposed application rate and/or asphalt design **(note that this information is required prior sealing).**

4 STORMWATER DRAINAGE

4.1 Design Criteria

This section sets out the standards required by Council for the design and construction of stormwater drainage systems in urban, rural, and industrial/commercial developments and subdivisions. The following standards are to be used:

- This Litchfield Council – Development and Subdivision Standards, which includes Standard Drawings as well as relevant Council policies.
- Austroads Guidelines, including Guide to Road Design – Part 5: Drainage.
- Australian Rainfall and Runoff.
- Queensland Urban Drainage Manual.
- Relevant Australian Standards.

The Litchfield Council – Development and Subdivision Standards, including Standard Drawings, take precedence over all other guidelines and standards. These Standards are designed with consideration for the environment, safety, and future maintenance requirements. When Council documents do not cover the works to be constructed, then other designs may be adopted with the approval of Council.

Design outside of these Standards may be considered if supporting documentation is provided that addresses Council's concerns for the environment, safety, and future maintenance, including all engineering aspects of the design and risk analysis. This assessment shall be included in the design report submitted with the initial plans. It is recommended that the applicant organise a meeting with Council prior to developing any designs that are not adequately covered by Council's documents.

4.2 Hydrology

For all developments that will have impacts on upstream or downstream flow, and for all subdivisions, hydrological calculations will be required.

Council requires Fraction Impervious, Coefficient of Runoff, and Time of Concentration design parameters to be used to develop Intensity Frequency Duration (IFD). IFDs shall be derived in accordance with the Australian Rainfall and Runoff database for the particular catchment and shall be used to determine design flow rates. Flow rates will be used to design the drainage system for minor and major storm events.

4.2.1 Fraction Impervious

Hydraulic calculations shall be based on fraction impervious parameters in Table 18.

Table 18: Fraction Impervious Parameters

Item	Land Use	Fraction Impervious
1	Normal Residential Lot ≤ 1,000m^2	0.60
2	Normal Residential Lot > 1,000m^2	0.40
3	Normal Residential Lot including half road	0.65
4	Road Reserve	0.85
5	Medium Density Residential Lots	0.85
6	High Density Residential Lots	0.90
7	Commercial Areas	1.00
8	Industrial Areas	0.90
9	Public Recreational Areas	0.50
10	Parkland, Public Reserve	0.10

4.2.2 Coefficient of Runoff

The Coefficient of Runoff shall be determined in accordance with the Australian Rainfall Runoff Standards. Full details of coefficients used shall be provided in calculation documents.

The effects of the fraction impervious areas on the coefficient of runoff “C” shall be consistent with Table 19.

Table 19: Coefficient of Runoff

Fraction Impervious	C for ARI 5	C for ARI 20	C for ARI 100
0.0 – 0.10	0.41	0.46	0.52
0.20	0.46	0.51	0.58
0.30	0.51	0.56	0.65
0.40	0.56	0.62	0.71
0.50	0.61	0.67	0.77
0.60	0.66	0.73	0.83
0.70	0.71	0.78	0.89
0.80	0.76	0.84	0.96
0.90	0.81	0.89	1.00
1.00	0.86	0.95	1.00

4.2.3 Time of Concentration

Time of concentration must be calculated as the time required for stormwater runoff to flow from the most remote part of the catchment to the point of interest or as the time taken from the start of rainfall until all the catchment is simultaneously contributing to the point of interest. Care should be exercised in adopting a time of concentration that is reasonable for the upper reaches of the drainage system within the developed catchment.

The general maximum time of concentration in urban areas shall be 20 minutes, unless justification is provided to the contrary. Similarly, a minimum time of concentration of 5 minutes can be used for an urban standard lots.

The time of concentration in rural areas shall be calculated in accordance with Australian Rainfall Runoff. Where the flow path traverses areas having different flow characteristics or various surface types, the flow-time of each portion of the flow path shall be calculated separately.

4.3 Major and Minor Drainage System

Development and subdivision design must address major and minor storm events through appropriate development of major and minor stormwater drainage systems, as applicable to the individual project. These systems must be designed to control and carry all storm flows in accordance with the determined hydrologic calculations and Average Recurrence Interval (ARI).

Drainage systems must be calculated by a method that complies with current Australian hydrologic engineering practice and calculations for both major and minor drainage systems must be provided to Council. In the absence of more appropriate methods, the Rational Method can be used to determine peak flows when catchments are not greater than 500Ha in urban developments and 25km^2 on rural developments.

To achieve the requirements for the Major Drainage System, it may be necessary to upgrade the capacity of the Minor Drainage System above the initial criteria.

4.3.1 Major Drainage System

This system caters for a ARI100 storm event.

4.3.2 Minor Drainage System

This system caters for a ARI 5 or ARI 20 storm event, as applicable.

4.4 Adjacent Catchments and Drainage Networks

Drainage systems are designed to consider all ultimate upstream and downstream characteristics to achieve a total system that does not adversely affect existing systems or properties within the stream flow path and catchment.

All post-development flows should be equal to or less than pre-development flows, to minimise the risk of flooding downstream due to a development or subdivision. The drainage system design aim is to maintain the characteristics of the pre-existing catchment by detaining and/or controlling storm flows or dispersing concentrated catchment outflows. The methods used, and the degree of outflow attenuation required, must be dependent on the magnitude of development and subdivision storm flows and the downstream watercourse characteristics.

Consideration shall be given to the impact of the proposed drainage system on existing drains, buildings, and downstream catchments.

Where a new development or subdivision is located at the upstream end of a catchment in common with existing developed land for which there is no master drainage plan, the existing Council drainage system may not have sufficient capacity to carry the design flows generated by the new development. In these circumstances, the Developer is to prepare and submit an overall drainage plan, which should examine the complete downstream drainage network and determine the maximum quantity of stormwater runoff that can be discharged into the existing network. The drainage plan shall be designed to cater for the ultimate flow from the upstream catchment.

If the capacity of the existing network is exceeded, then the surplus water shall be managed within the new development or subdivision, or the existing network shall be upgraded to the satisfaction of and at no cost to Council.

For staged developments, the trunk drainage system shall be constructed from the downstream end of the catchment at the time of development, regardless of where the actual development works commence.

The drainage easement and/or reserves downstream from the project area shall be incorporated into the design where flows are generated from the project area.

4.5 General Drainage Infrastructure

Some types of drainage infrastructure occur in both urban and rural areas of the Municipality. Design specifications for these types of drainage infrastructure are detailed in the following sections.

4.5.1 Roads

Roads are primarily to cater for vehicular and pedestrian traffic, as well as providing access to abutting properties. Roads may be used to convey stormwater drainage; however, roads are not

considered primary drains or floodways. Public amenity, usability, risk, and safety are to be paramount considerations in drainage design.

Roads within Litchfield Municipality must be designed to cater for ARI 100 storm events.

Stormwater flow may not exceed a maximum overtopping depth of 150mm above the crown of the road, nor should Depth x Velocity exceed 0.32.

Where the depth of flow particularly within road reserves can be effectively reduced by the introduction of more underground drainage and/or capture points, then these features will be required.

4.5.2 Detention Basins

Council discourages the use of detention basins where other stormwater drainage methods are possible. However, where another drainage infrastructure measure is not available, detention basins may be permitted and are recommended in combination with other WSUD features. Public amenity, usability, risk, and safety are to be paramount considerations in drainage design.

Detention basins must be designed to cater for ARI 100 storm events.

Stormwater flow depth in detention basins that abut a road should not rise above subgrade level. For detention basins that do not abut a road, a 150mm freeboard from the top of batter shall be maintained at all times.

In addition, all batters shall be constructed with a maximum 1:4 (vertical:horizontal) slope. If a property fence is to be installed on private property adjacent to batters of Council's table drain, Council requires a minimum 1.5m offset between the top of the batter and the property fence.

With the exception of natural ornamental lakes and wetlands, all other detention basins are to be designed to detain water only during storm conditions and for no more than 7 days. To avoid mosquito breeding and associated issues, all drainage systems and associated structures should be designed in consultation with the NT Environmental Protection Authority (NT EPA) and NT Department of Health – Medical Entomology Section.

4.6 Urban Drainage

Stormwater drainage in urban areas is required to be collected within the lot and connected underground into Council's stormwater drainage system of pipes, pits, drains, and the road network.

Drainage in urban areas shall be designed to cater for ARI 5 or ARI 20 storm events, depending upon the specific type of infrastructure, as detailed in the following sections.

Drainage shall not be directed from one lot to another lot in any form of discharge.

Council prefers to maintain native vegetation and avoid clear cutting of sites wherever possible. Where regrading of the lot can be easily achieved (less than 5% cross slope), the lot shall be graded towards the adjacent road reserve, open space, or drainage reserves. In other cases, runoff shall be captured within the lot and conveyed underground into Council's drainage system.

Sediment and erosion control measures shall be put in place on all lots until the lots are fully developed and landscaped.

4.6.1 Pipes

All pipes must meet the following requirements:

- The minimum pipe diameter for a drain located within the road reserve is 375mm or a size that caters for an ARI 5 storm event, whichever is larger.
- The minimum pipe strength is Class 2 reinforced concrete pipe or equivalent.
- Sealed joints are to be used for all drainage lines – external bands or rubber ring joints.

4.6.2 Pits

All pits must be designed to cater for an ARI 5 storm event.

All pit designs must be in accordance with Council's Standard Drawings. However, regardless of standard details, internal dimensions for all drainage pits shall be in accordance with AS3500.3.2 and work health requirements for access into drainage structures.

All access covers and grates are to be Class D AS3996. Alternatives, including precast concrete inlet structures, may be used, subject to approval by Council.

Grates are to be avoided as they are susceptible to being blocked; if they are included, then an alternative means for the flow to enter the system must be incorporated in the design. Cyclists, pedestrians, and vehicles must also be able to safely traverse the system.

All pits deemed to be at high-risk of vehicles driving over the pits must be designed to withstand the expected loads.

To avoid mosquito breeding and associated issues, all drainage systems and associated structures should be designed in consultation with the NT EPA and NT Department of Health – Medical Entomology Section.

4.6.2.1 Side Entry Pits

Side entry pits are to be designed with the following criteria:

- May be either side entry or combined grated/side entry. Grated entry shall only be installed if no other options are available.
- Placed at low points located immediately upstream from intersections on the side road of the intersection.
- Placed on the upstream sides of pedestrian crossings to limit the flow to 500mm maximum width for the minor design storm in these locations.
- Include the use of deflectors within the gutter.
- Each drainage structure shall have a minimum fall across the bottom as indicated in Council's Standard Drawings.
- Spacing and size designed to ensure minimum flow widths and depths as specified are achieved.
- Located to avoid conflict with driveways on all new lots.
    - To avoid such conflicts, an overall plan shall be produced prior to commencement of works that shall show the nominated location for driveways in each new lot.
    - Where a conflict occurs, any stormwater pit relocations shall be undertaken by the Developer at no cost to Council.
- The clearance between the kerb invert and the underside of the lid, or lid support, where applicable, shall be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter bar shall be placed across the opening for safety purposes.
- Should a pre-cast pit be used, 3% stabilised sand is required for backfill.

4.6.2.2 Junction Pits or Manholes

Junction pits and manholes are to be designed with the following criteria:

- When side entry pits are not suitable, junction pits or manholes are to be constructed at all pipe junctions and where pipes change direction, diameter, or grades.
- The maximum distance between junction pits, manholes, and/or side entry pits is to be 90m. Closer spacing may be required at the discretion of Council.
- These features are discouraged within the trafficked part of the road reserve.

4.6.2.3 Letterbox Pits

Letterbox pits are to be designed with the following criteria:

- Letterbox pits are to be constructed within the invert of open drains or at low points in open space reserves to contain stormwater flows.
- Appropriate erosion control measures, such as stone pitching, must be included.
- Appropriate safety measures must also be included, considering flow velocity at the pit, height of the pit opening etc.
- The clearance between the kerb invert and the underside of lid, or lid support, where applicable, shall be a maximum of 100mm. Where the inlet clearance is greater than 100mm, a 12mm diameter bar shall be placed across the opening for safety purposes.

4.6.2.4 Underground (Blind) Pits

Underground or blind pits or junction chambers are not acceptable. All pits or chambers shall extend to and allow access from the surface.

4.6.2.5 Grated Inlet Pits

Grated inlet pits are not acceptable within the carriageway on Council's road reserve or within Council-owned or private car parking areas. The use of grated inlets pits in other areas shall require approval of Council. Within Council land, appropriate safety measures (e.g. padlocks) shall be incorporated into the design and shall be approved by Council.

4.6.2.6 Bandage Joints

Bandage joints are to be designed with the following criteria:

- Bandage joints are not acceptable for pipe joints on straight runs or at deflections.
    - Manufactured splayed joints are to be utilised for pipe deflections.
    - Pipes may be laid on curves subject to pipe manufacturer's recommendations and Council approval on the jointing.
- Bandage joints may only be used for pipe connections where a proprietary product is not available.
    - The diameter of the joining pipe must be no more than one third that of the main drainage pipe.
    - A pit/inspection opening must be located within 5m of the joint on either of the lines.

4.6.3 CCTV Inspection

CCTV inspections are required for all new underground stormwater drainage systems; additionally, CCTV inspections may be required for existing underground stormwater drainage systems for developments and subdivisions where Council has no record of compliance with Council's stormwater drainage standards.

The cost of inspecting the system will be the responsibility of the Developer. In the event that there are defects within the system, the Developer will be required to undertake all necessary rectification works.

Identification of defects will be dependent on the results of onsite inspections and the certified construction report. The Developer shall arrange with Council a suitable time for the inspection and the Developer must ensure the pipes are clean and accessible for the inspection.

4.6.4 Subsoil Drainage and Groundwater

4.6.4.1 Subsoil Drainage

Subsoil drains are to be provided to all road infrastructure in urban areas, including roundabouts and islands, to protect road pavements from the effects of groundwater seepage and are to be located and constructed as per Council's Standard Drawings.

The Developer shall be responsible for undertaking a detailed investigation of the site to determine the scope of subsurface drainage works required.

Where necessary, subsoil drainage shall also be incorporated into new lots, verges, pathways, drainage reserves, and open space to ensure adequate protection of buildings, structures, and public amenities from groundwater.

4.6.4.2 Groundwater

A large part of the available land for development within the Municipality is low lying and susceptible to groundwater and tidal influences. Groundwater level must be taken into consideration for drainage and all other aspects of sustainable design for the development or subdivision. The following issues shall also be taken into consideration:

- The effect of drainage measures on aquifers.
- Adequate drains for road construction and maintenance purposes.
- Adequate separation of future building floor levels from the groundwater.
- The effects of salinity and acid sulphate.
- Climate change and rising sea levels.

If groundwater seepage problems occur in the developed area within the stipulated Defects Liability Period, the Developer is responsible for carrying out remediation works to ensure that each lot remains suitable for its intended use.

Any failure resulting from high wet season groundwater levels shall be reinstated, together with any additional subsoil drainage required, by the Developer at no cost to Council.

4.6.5 Urban Drainage Easements

All attempts should be made to manage stormwater drainage flows within Council's road reserve corridor and associated underground drainage system. The use of drainage easements is not encouraged within urban areas.

Should a drainage easement be determined to be required, the minimum easement width is to be 3.0m for pipe diameters of 450mm or less and depths up to 1.5m. An increase in easement width shall be provided for larger pipes and depths as advised by Council.

In situations where the new development or subdivision is at the upstream end of privately owned land, arrangements are to be made by the Developer with the owner of the downstream land to provide drainage rights and easements as required over the route of the drain and to construct or upgrade the drainage system as required to the satisfaction of, and at no cost to, Council. These easements shall be in favour of, and at no cost to, Council.

In urban areas, Council will not take possession or accept drainage at the rear of the lot nor will it accept responsibility for easements over the drainage system.

4.7 Rural Drainage

Stormwater drainage in rural areas is to sheet flow across the lot into Council's stormwater drainage system of open drainage channels (which may be within the road reserve), floodways, and natural water bodies.

Drainage within individual lots shall be designed to cater for ARI 5 storm events. Other drainage infrastructure in rural areas may be required to cater for higher ARI storm events, as detailed in the following sections.

Council prefers to maintain native vegetation and avoid clear cutting of sites wherever possible.

Sediment and erosion control measures shall be put in place on all lots until the lots are fully developed and landscaped.

4.7.1 Table Drains

Table drains are open channel drains within Council's road reserve and should be designed to collect and control all storm flows without significant damage to road pavements and ancillary structures, property accesses, watercourses, and all constructed drains and ancillary structures.

Grassed table drains are preferred; concrete table drains are not encouraged within rural areas and must be approved by Council.

Table drains should be designed to cater for ARI 5 storm events.

Table drains are to comply with the following requirements:

- Table drains shall be trapezoidal in shape, with batter slopes not exceeding 1:4 (vertical:horizontal); however, 1:6 is desirable where this slope can be achieved.
- All batters and disturbed areas shall be stabilised compacted to 90% MMDD. Topsoil and establishment of grass is required with a minimum of 60% cover.
- If a property fence is to be installed on private property adjacent to batters of Council's table drain, Council requires a minimum 1.5m offset between the top of the batter and the property fence.
- A minimum 150mm freeboard shall be maintained in all flows. Freeboard shall be increased on bends to account for dynamic effects.
- Depth and velocity limits must be maintained at all times.
- Drop structures shall be implemented on grassed table drains to control velocities to less than 1.0m/s.
- The longitudinal slope for grassed table drains shall between 0.6% and 1%.
- Scour protection will be required at changes of direction, at drop structures, and at the inlets and outlets to pipe or culvert structures.
- Appropriate safety measures shall be provided to protect the public from being trapped within a drain during flash flooding. Accordingly, risk assessment of the drain should be provided as part of the stormwater management plan.
- Warning Sign(s): "DANGER – WATER LEVEL MAY RISE QUICKLY DUE TO STORMS" are to be installed where required.

4.7.2 Culverts

Box culverts are required to convey stormwater drainage under roads and driveways in the rural area and should be designed in accordance with Council's Standard Drawings. Pipes are not accepted in rural areas.

Culverts are to be designed with the following criteria:

- Cross road culverts are to be designed to cater for ARI 20 storm events.
- Culverts under driveway crossovers are to be designed to cater for ARI 5 storm events.
- Where the road side table drain limits the size of culvert, the absolute minimum height of culvert permitted is 450mm.
- Appropriate protection measures for both upstream and downstream flows are to be installed.
- Culvert headwalls and wingwalls are to be designed with a clear zone width in accordance with Austroads Guidelines: Guide to Road Design – Part 5: Roadside Design Safety and Barriers.

4.7.3 Floodways

Where a natural low point exists within an existing or proposed new road, a floodway may be required to manage stormwater drainage flows across this point.

Floodways are to be designed to cater for ARI 100 storm events.

Floodways are to be designed with the following criteria:

- The floodway shall have an appropriate pavement strengthening method approved by Council.
- Appropriate upstream and downstream protection measures must be constructed.
- Concrete margins are required at both the upstream and downstream edge of pavement and seepholes are required to be installed only on the downstream margin.
- Stormwater flow may not exceed a maximum overtopping depth of 150mm above the crown of the road, nor should Depth x Velocity exceed 0.32.
- Warning sign(s) for floodways, including depth markers and "Water Over Road" signs, are to be installed where required.

4.7.4 Rural Drainage Easements

All attempts should be made to manage stormwater drainage flows within Council's road reserve corridor and associated table drains. The use of drainage easements is not encouraged within rural areas.

Should a drainage easement be determined to be required, the width is to be determined by the storm flow for which the drainage easement caters.

Where a direct connection between the proposed new development or subdivision and Council's existing drainage system is not available within Council's road reserve, a drainage easement may be permitted across a private lot to connect to Council's drainage system.

In situations where the new development or subdivision is at the upstream end of privately owned land, arrangements are to be made by the Developer with the owner of the downstream land to provide drainage rights and easements as required over the route of the drain and to construct or upgrade the drainage system as required to the satisfaction of, and at no cost to, Council. These easements shall be in favour of, and at no cost to, Council.

In rural areas, rear lot drainage may be permitted in special circumstances and must be approved by Council.

Drainage easements are to be designed to cater for ARI 100 storm events.

4.7.5 Drainage Reserves

Drainage reserves are parcels of land owned by Council where the sole use is for stormwater drainage. While there are some legacy parcels within the Municipality, Council does not encourage this form of drainage for new developments and subdivisions.

Should drainage reserves be approved by Council, the reserve must be designed to ensure public safety and amenity is maintained as a priority.

Drainage reserves must be designed to cater for ARI 100 storm events.

Drainage reserves must contain vegetation and cannot be lined with impervious surfaces.

4.7.6 Natural Watercourses

Council's stormwater drainage system may include natural watercourses, lagoons, perched swamps, and similar natural features. Generally, these features must be retained in their natural state in order to maintain the existing catchment outflow characteristics and groundwater aquifer inflow characteristics. However, where works are required to manage stormwater drainage in these areas, the methods must be approved by Council and the relevant NT Government Department.

4.8 Potentially Hazardous Land Uses

Land uses that deal with substances that may be potentially harmful to the natural environment if captured in stormwater runoff should have a Construction and Environmental Management Plan (CEMP) in place to manage emergency situations. Typically, the CEMP will be a requirement of a Development Permit issued for the site. Example land uses include, but are not limited to, service stations and motor repair stations.

For these land uses, stormwater quality must be achieved by employing water treatment and filtration principles where possible and minimising the impacts of erosion and sediment on the environment.

4.9 Water Sensitive Urban Design (WSUD)

WSUD is a holistic approach to the planning and design of urban development that aims to minimise the impacts of urban developments on the natural water cycle and protect the health of aquatic ecosystems. WSUD promotes the integration of stormwater, groundwater, water supply and wastewater management and is supported by the following principles:

- Reduce both the peak flow and total volume of stormwater runoff.
- Control pollution and minimise effect on downstream waterways and the environment.
- Collect stormwater and reuse (stormwater harvesting).
- Protect and enhance natural water systems (creeks and rivers etc.).
- Treat urban stormwater to meet water quality objectives prior to reuse and/or discharge to public infrastructure and/or natural waterways.
- Match the natural water runoff regimes as closely as possible (where appropriate).
- Reduce potable water demand through water efficient fittings and appliances, rainwater harvesting and wastewater reuse.

- Minimise wastewater generation and treat wastewater to a standard suitable for effluent reuse opportunities.
- Integrate stormwater management into the landscape, creating multiple use corridors that maximise the visual and recreational amenity of urban development.

Should WSUD requirements be identified during the assessment of the development by any party, the Developer should describe the proposed features, addressing how the WSUD targets will be achieved.

The following guidelines and strategy reports in their current form should be consulted in preparing a WSUD strategy suitable for the intended development or subdivision:

- NT EPA – A Stormwater Strategy for the Darwin Harbour Region.
- Department of Environment and Natural Resource – Darwin Harbour Water Quality Protection Plan.
- ANZECC Guidelines for Fresh and Marine Water Quality.
- Australian Guidelines for Urban Stormwater Management (ANZECC, 2000).

Compensating basins, detention basins, nutrient stripping basins, gross pollutant traps, sedimentation and erosion control, and silt basins are to be considered for incorporation where possible. These are to be designed in accordance with Australian Rainfall and Runoff and other relevant publications and are to be sited to suit the requirements of the drainage system. Council may require additional restrictions on stormwater quantity discharge, including reducing peak flows to the developed state from a catchment.

All WSUD elements that may hold water for periods of time shall be designed and located so as to ensure the safety of the public (especially children) and to restrict mosquito breeding and the impact of mosquitos on residents.

Stormwater harvesting through detention and reuse should be considered for all new developments, in particular, to irrigate reserves and open spaces. Applications of third pipe and bores are to be considered in the WSUD strategy. Where harvesting is not proposed, reasons for its omission shall be discussed in the WSUD strategy and shall be subject to the approval of Council.

Stormwater from new developments and subdivisions is to be managed within the development or subdivision boundary. Therefore, all WSUD treatments must be within the development or subdivision boundary.

Water quality is important for Council and should be suitably addressed by a qualified water quality professional and discussed with Council.

4.10 Hold Points – Drainage

Hold points are points in the construction process where an inspection and clearance from Council is required prior to the Developer moving forward with the works.

Council must attend every hold point and is responsible for reviewing all information submitted by the Developer.

The Developer must give 48 hours advance written notice to Council by submitting an inspection request form to council@litchfield.nt.gov.au.

4.10.1 Urban Areas

Table 20: Drainage Construction Hold Points – Urban Areas

Hold Point	Developer Shall Provide	Council Will Review
Underground Stormwater Infrastructure		
1. Prior to trench/culvert backfilling	• Adequate site access. • Adequate visibility for the pipe and bedding material.	• Trench formation and joint sealing in accordance with approved specifications. • Bedding material in accordance with approved specifications. • Trench depth and pipe cover. • The conditions of the pipe to pipe joint and the pipe to pit joint. • Integrity of the pipe and pit and the alignment of the pipes. • Invert level of the pipe and pit.
2. After subsoil drainage laid and prior to backfill	• Adequate site access.	• Soil types, bedding material, and pipe conditions in accordance with approved specifications.

4.10.2 Rural Areas

Table 21: Drainage Construction Hold Points – Rural Areas

Hold Point	Developer Shall Provide	Council Will Review
Culvert/Stormwater Infrastructure		
1. Prior to trench/culvert backfilling	• Adequate site access.	• Trench formation and joint sealing in accordance with approved specifications.

5 LANDSCAPING

5.1 Design Criteria

This section sets out the standards required by Council for the design and construction of landscaping of roads and pathways, as well as public open spaces, in urban, rural, and industrial/commercial developments and subdivisions. Landscaping works are to conform to the following publications unless specified otherwise:

- This Litchfield Council – Development and Subdivision Standards, which includes standards drawings as well as relevant Council policies.
- AS/NZS 3500 Plumbing and Drainage.
- AS 4419 Soils for Landscaping and Garden Use.
- NT Government Standard Specifications for Roadworks – Section 16 Landscaping.

5.2 Landscaping in Road Reserves

All road verges shall contain grass in accordance with these Standards. Additionally, road verges in urban areas shall contain trees evenly spaced along the verge, with the exact spacing between trees determined at the detailed design stage, in conjunction with Council, based on the mature canopy size of the selected tree species.

Trees shall not be planted:

- Within 5m of a light pole or side entry pit,
- Within 1.5m of a fire hydrant,
- On the truncation or within the tangent points of any intersection.
- Where the location will ultimately obscure traffic signs, signals, or other essential roadside features.

5.3 Landscaping in Public Open Spaces

Within public open spaces, a range of plants shall be used to create high quality spaces, with an appropriate balance and mix of upper canopy trees to provide shade, shrubs, and grass, and with existing trees retained where possible.

The designated locations of proposed new landscaping materials shall be agreed with Council at the time of public open space design, depending upon the specific requirements of the space.

The Developer shall coordinate with Council to create an approved species list prior to installing any new plants. The timing of the landscape works is critical to the achievement of a successful open space area and approved plant material will need to be ordered well in advance.

Near play equipment and seating areas, as well as along pathways, shade trees shall be grouped and provided for visual amenity and physical comfort.

Planting of trees and shrubs shall address the principles of Crime Prevention Through Environmental Design (CPTED).

African mahogany trees are not appropriate shade trees and where these trees already exist near a proposed playground and/or seating area, the trees shall be removed in accordance with any statutory requirements.

Existing native trees shall be a minimum of 3m, but may require greater distances, from built infrastructure and trenches in accordance with Australian Standard AS4970-2009 Protection of Trees on Development Sites.

5.4 Topsoil

Topsoil may be from the subject site or imported to the subject site.

The Developer shall strip the existing topsoil and either stockpile the soil at the location nominated in the Erosion and Sediment Control Plan or windrow the soil beside the road formation. To the maximum degree practicable, topsoil should not be mixed with subsoil during the stripping and stockpiling procedure.

The top 50mm of soil should be stockpiled separately and re-spread as the top layer. However, if the soil contains excessive weed seed, this top 50mm layer may need to be buried or otherwise treated to prevent the spread of weeds.

As it is desirable to retain the viable seed content of the soil, stockpiling should consist of long low mounds no greater that 1m to 1.5m in height. For seed viability, stripped topsoil should be used as soon as possible and preferably should not be stockpiled for more than 12 months. Long-term stockpiles may need to be mulched or temporarily vegetated to prevent weed infestation and loss of material.

Soils may need adjustment with a combination of fertilisers and ameliorants to improve both the short and long term success of vegetation establishment. Fertilisers must be applied in accordance with manufacturer's recommendations, or site specific specialist advice.

Prior to the application of the topsoil, the Developer shall lightly rip the finished earthworks to a depth of 50-100mm, ensuring ripping operations occur along the contour.

The topsoil shall be spread to a lightly compacted (i.e. firm) depth of about 40mm to 60mm where the slope exceeds 1:6 (vertical:horizontal) and 75mm elsewhere. Where it is desirable to re-establish the entrapped seed content of the soil, the topsoil should be re-spread in the reverse sequence to its removal so that the original upper 50mm soil layer is returned to the surface.

If existing stripped topsoil is limited, the Developer shall import clean, weed free topsoil as required. Imported topsoil shall conform generally to AS4419 Soils for Landscaping and Garden Use and shall meet the following requirements:

- Be free draining,
- Be red brown or black sandy loam,
- Contain no grass or weed growth,
- Have maximum stone size of 50mm.

The Developer shall utilise a pad foot roller (not vibrating) to complete one pass over the topsoil area to introduce surface roughness.

The placing of topsoil shall consider the appropriate time of the year for local weather conditions. The Developer shall re-spread stripped topsoil or spread imported topsoil prior to 30th of September of each year to allow the best opportunity for germination of seeds.

5.5 Grass

The Developer shall grass the site prior to 30th of September of each year to allow the best opportunity for germination of seeds.

The developer shall establish and maintain all grassed areas during the Defects Liability Period and shall reseed areas that fail to germinate and propagate after 28 days.

The developer shall ensure that an even strike of grass grows at an acceptable rate. The developer is advised to undertake soil testing to identify properties of topsoil and subsoil and any subsequent deficiencies for the intended grass species. Soils should be adjusted with a combination of fertilisers and ameliorants to improve both short and long term success of their re-vegetation.

The developer shall maintain and mow the grass to a maximum height of 150mm in rural areas and 70mm in urban areas.

5.5.1 Grass Seed Mix

Grass seed mix shall be applied as per the following table:

Table 22: Grass Seed Mix

Water Regime	Seed Type	Percentage by Weight	Mixture Application Rate
Dry grassland areas	Cynadon dictylon (Couch)	30	Minimum 300 kg per hectare
	Paspalum notatum pensicola	35	
	Paspalum notatum Argentina*	35	
*If Argentina is not available at the time of construction, Bermuda Couch can be substituted.			

5.5.2 Grass Cover

The Developer shall meet Council's required grass cover rate, as detailed in the following table and the following schematic drawings illustrating 1%, 5%, 10%, 20%, 40%, 60%, and 80% grass cover.

Table 23: Grass Cover Rates

Location		**Grassing Extent**	**Grass Cover Rate (minimum)**
Urban Areas	Verges	On all verges.	100%
	Other Disturbed Areas of Site	All disturbed areas that may or will scour, plus 500mm past the affected area.	100%
	Public Open Spaces	As specified in approved for-construction drawings.	100%
Rural Areas	Verges	On all verges.	80%
	Road Shoulders	Minimum 500mm clearance to seal. Minimum 500mm wide on shoulder. The finished level of the topsoil must be the same as the shoulder with a 4% slope away from the seal edge as per Council's Standard Drawings.	80%
	Table Drains	On both sides of the drain (invert of the drain to be assessed by the Developer's engineer) plus extend to either side of the top of the drain.	80%
	Other Disturbed Areas of Site	All disturbed areas that may or will scour, plus 500mm past the affected area.	80%

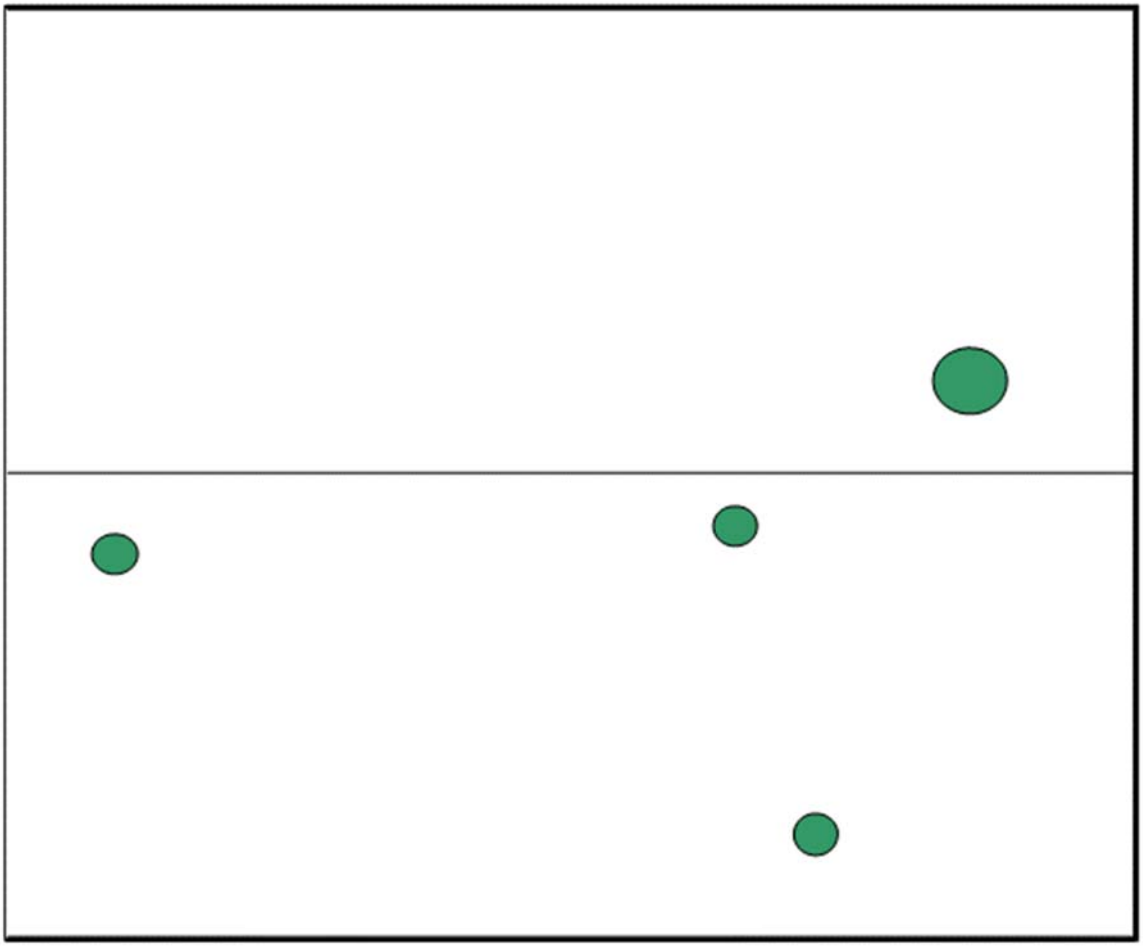


Figure-3: Schematic of 1% Grass Cover

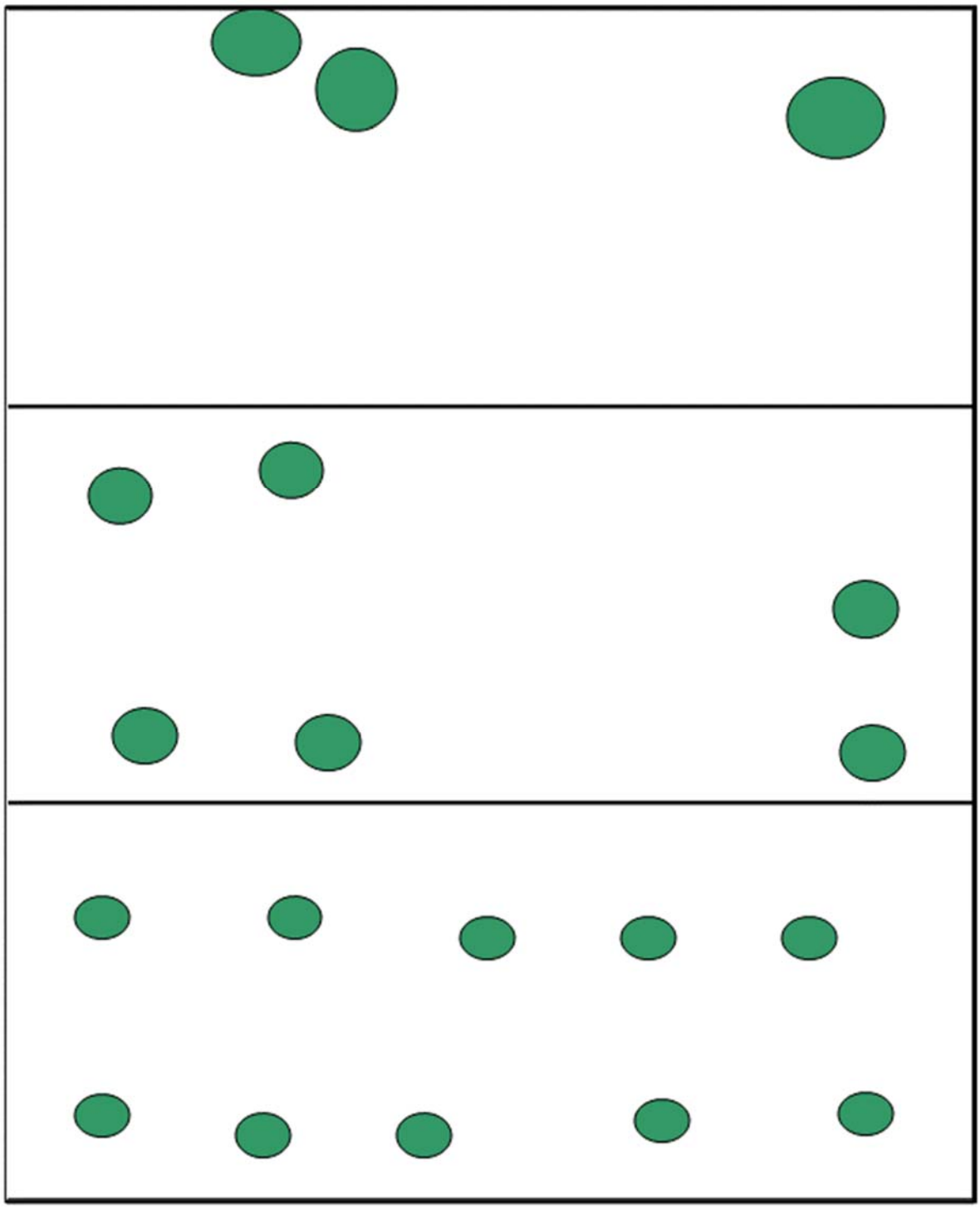


Figure-4: Schematic of 5% Grass Cover

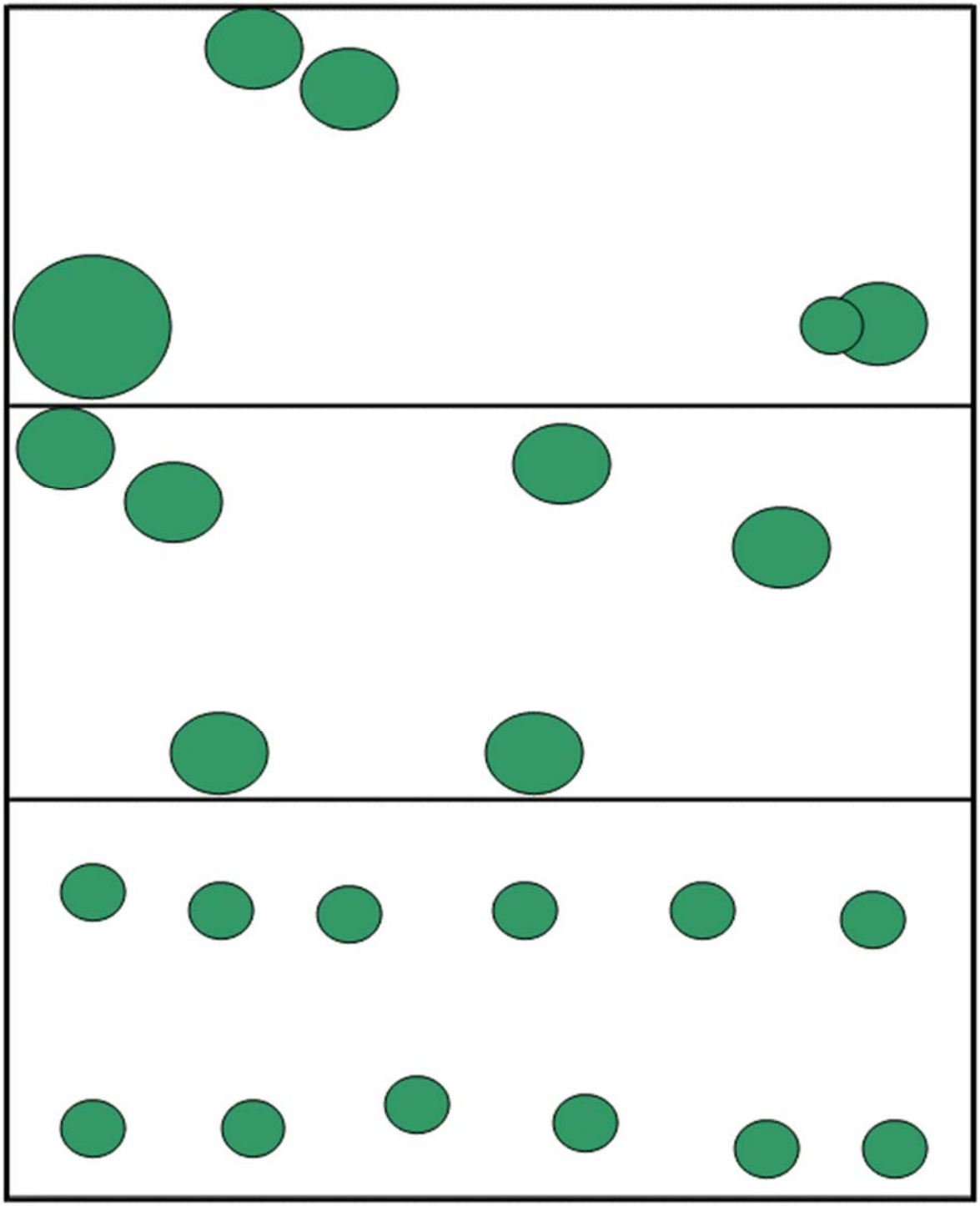


Figure-5: Schematic of 10% Grass Cover

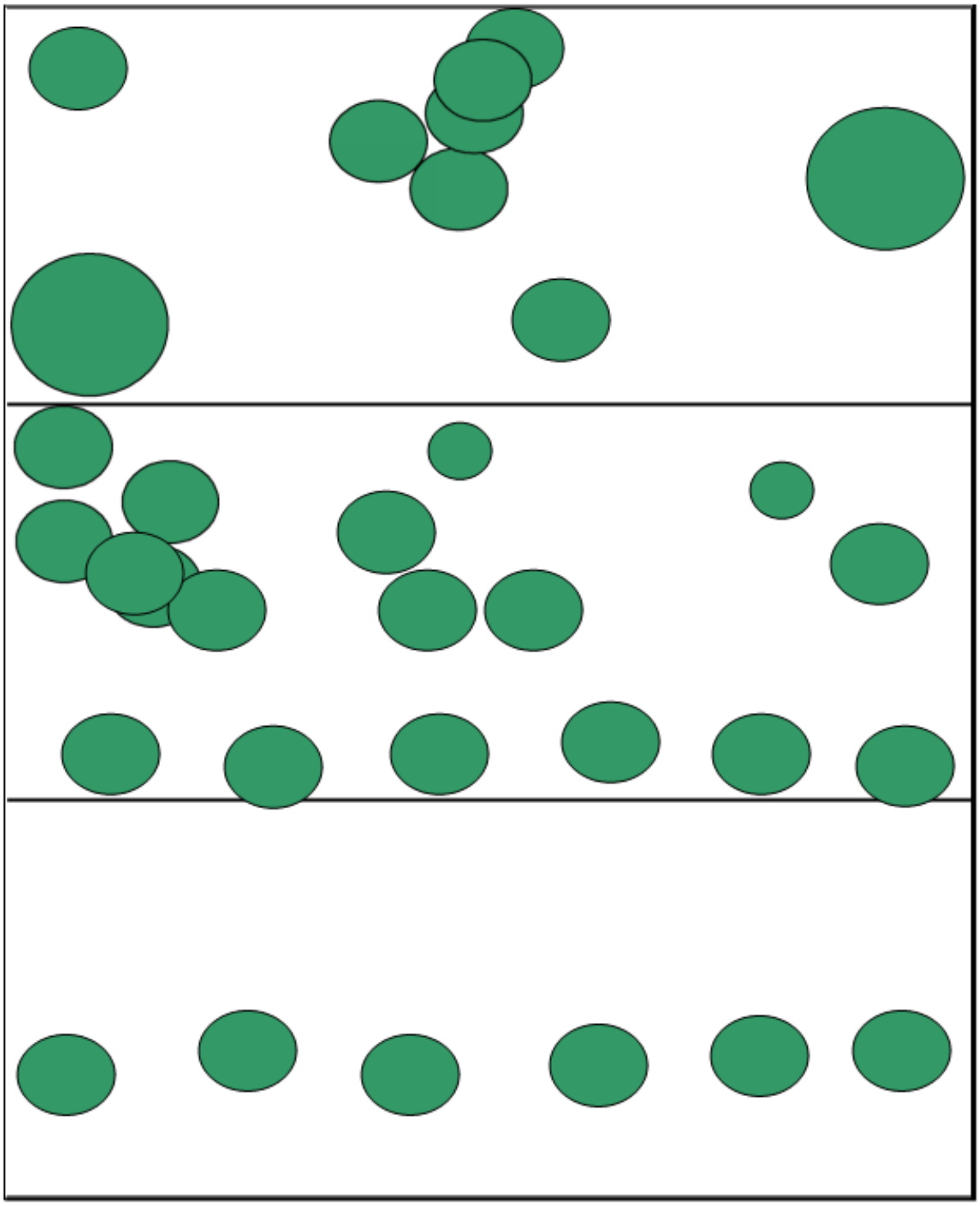


Figure-6: Schematic of 20% Grass Cover

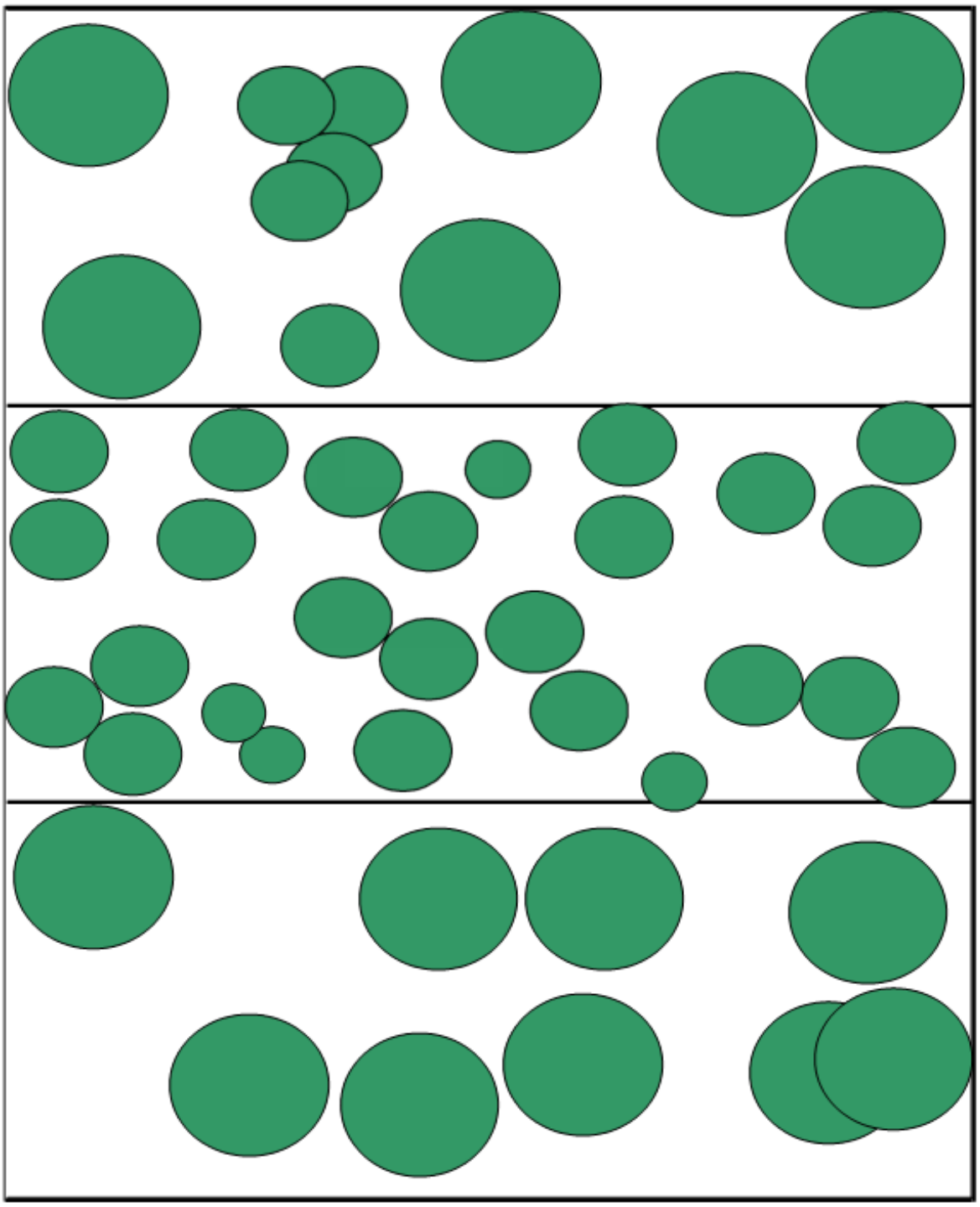


Figure-7: Schematic of 40% Grass Cover

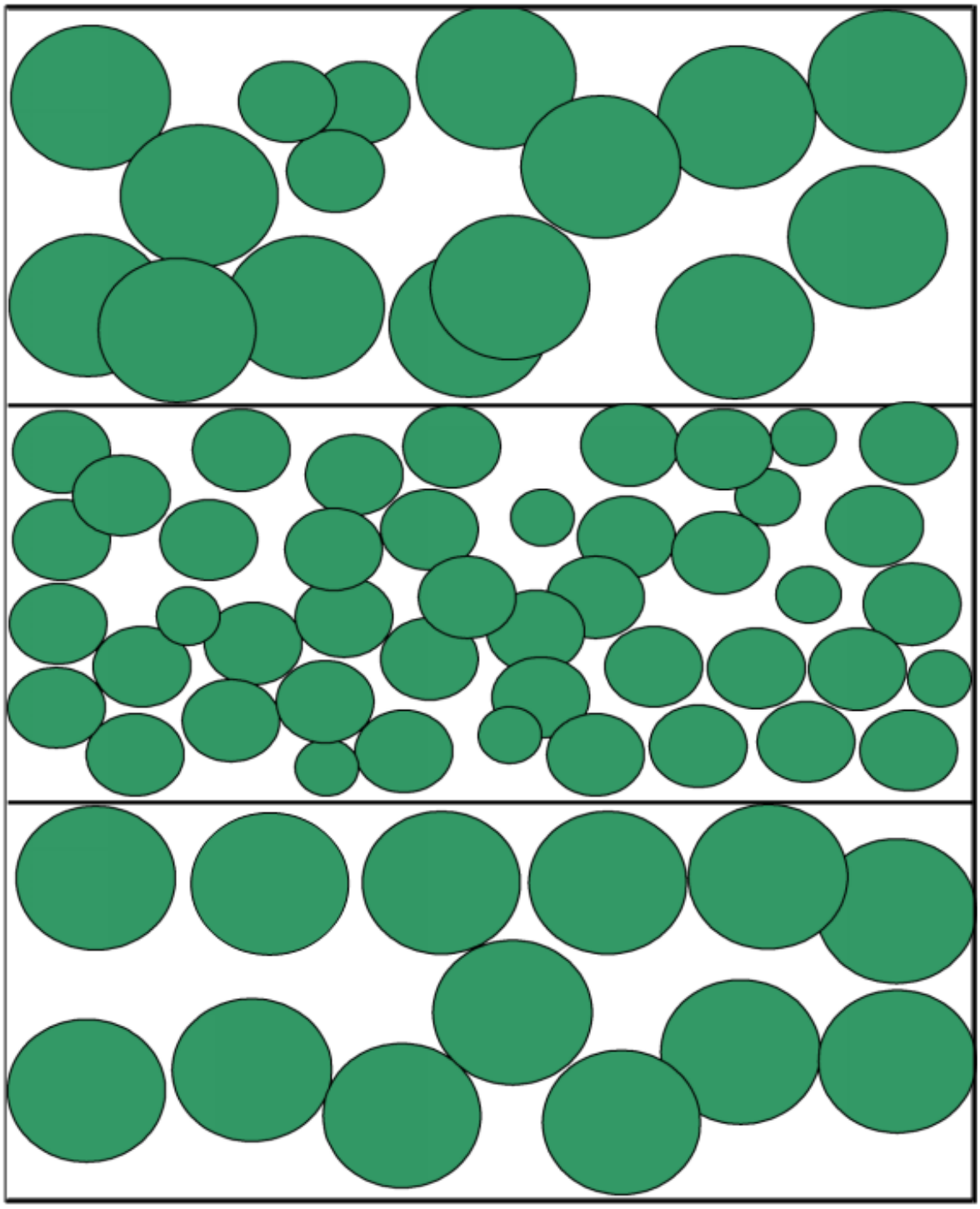


Figure-8: Schematic of 60% Grass Cover

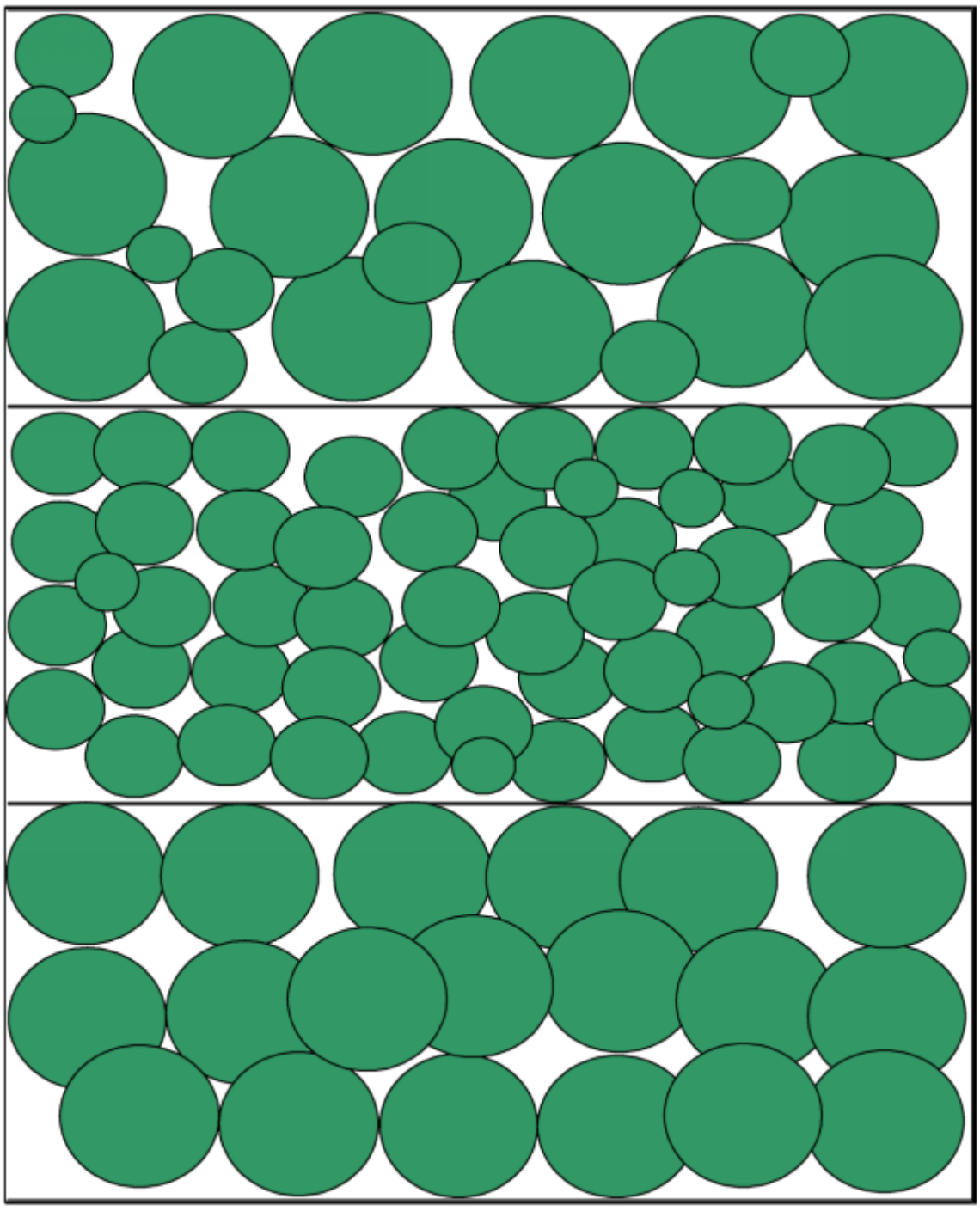


Figure-9: Schematic of 80% Grass Cover

5.5.2.1 Open Unlined Drains

For open unlined drains, grass cover is not required on the invert of any open unlined grading if the longitudinal gradient is 0.5% or less, as illustrated in the following image.

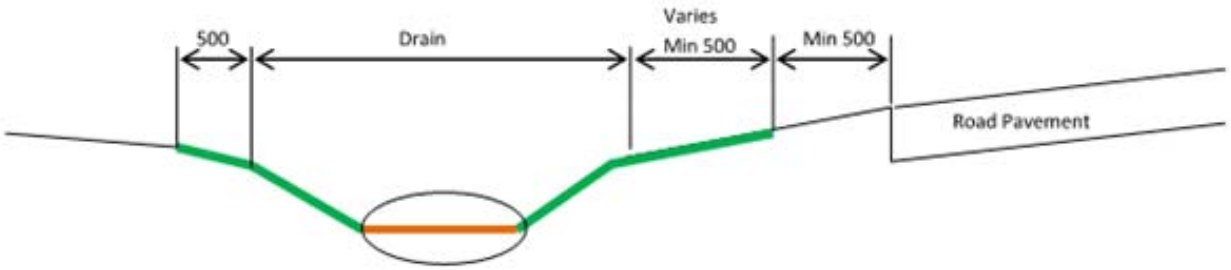


Figure-10: Schematic of Open Unlined Drain with Longitudinal Grade < 0.5%

5.6 Trees

Within verges in urban areas and as specified within public open spaces, the Developer is required to provide trees that have the following characteristics:

- Sturdy and well hardened trunks and/or stems,
- A well-developed and vigorous root system,
- A minimum of three months in their container,
- Obviously sound, healthy, and vigorous, and
- Free from insect pests, plant diseases, sun scalds, fresh abrasions of the bark, or other disfigurements.

5.6.1 Planting Requirements

The Developer shall accurately set out the locations for trees to be planted in accordance with Council's approved drawings.

The Developer is required to supply trees in accordance with Council's approved tree list, as noted in Section 5.4.3.

The Developer shall not use chemicals on site for plant treatment. Containerised plants shall be well watered prior to despatch from the nursery and shall remain in the containers until required for planting. Trees that are not immediately planted shall be stood upright on level ground, protected and maintained in good condition by the Contractor.

Developer shall immediately remove any dead, dying or diseased trees from the site and replace with new trees of approved species.

The Developer shall maintain the integrity of the tree root zone and the surrounding earth mould and shall place fertiliser in the hole adjacent to, but not in contact with, the root zone of the tree. Fertiliser shall be utilised in accordance with NT Government Standard Specification – Section 16 Landscaping.

The Developer shall backfill the hole so that the tree is contained firmly in the ground in a vertical position and shall water the backfill material immediately after surface fertilisation to ensure no air voids or loose material surround the plant root zone.

The Developer shall maintain each planting area in a moist condition to promote healthy growth during the Defects Liability Period. The Developer shall also weed and prune as required to maintain trees in a healthy condition.

The Developer shall supply organic mulch that is free from weeds, seeds, sticks, stones, insects, diseases, and other deleterious matter in a 100mm thick compacted layer for a 500mm radius from the main trunk with a gap of 50mm retained between the main trunk and the mulch.

Where trees are located less than 3m from built infrastructure (roads, pathways, shelters, buildings etc.), root barriers will be required.

5.6.2 Approved Tree Species

The Developer is required to select trees for road verges in urban areas from Council's approved tree species, found in the following table. Should a different tree species be proposed, a species analysis report prepared by a qualified landscaping architecture is required to be submitted for Council approval.

Table 24: Approved Tree Species for Road Verges in Urban Areas

Approved Tree Species for Road Verges in Urban Areas		
Botanical name	**Common Name**	**Notes**
Adansonia gregorii	Boab	Tropical Australian Native
Adenanthera pavonina	Red Beantree	Darwin Native
Albizia lebbeck	Siris	Darwin Native
Allosyncarpia ternata	An-binik	Tropical Australian Native
Alphitonia excelsa	Red Ash	Darwin Native
Alstonia actinophylla	Milkwood	Darwin Native
Calophyllum inophyllum	Indian Doomba Oil	Tropical Australian Native
Calophyllum sil	Alligatorbark	Tropical Australian Native
Casuarina equisetifolia	Horsetail Sheoak	Darwin Native
Cerbera odollam	Othalanga	Exotic
Euodia elleryana	Pink Doughwood	Darwin Native
Ficus opposita	Sandpaper Fig	Darwin Native
Ficus platypoda	Rock Fig Tree	Darwin Native
Ficus virens	Mountain Fig	Darwin Native
Flacourtia indica	Governors Plum	Tropical Australian Native
Ganophyllum falcatum	Scaly Bark Ash	Darwin Native
Horsfieldia australiana	Cape Nutmeg	Darwin Native
Leptospermum longifolium	Whitewood	Darwin Native
Maranthes corymbosa	Sea Bean	Darwin Native
Melaleuca cajuputi	White Samet	Darwin Native
Melaleuca leucadendra	Paperbark	Darwin Native
Melaleuca viridiflora	Broad-leaved Tea	Darwin Native
Mimusops elengi	Red Coondoo	Darwin Native
Myristica insipida	Australian Nutmeg	Darwin Native
Peltophorum pterocarpum	Yellow Poinciana	Darwin Native
Planchonia careya	Cocky Apple	Darwin Native
Petalostigma pubescens	Quinine Bush	Darwin Native

Approved Tree Species for Road Verges in Urban Areas *continued*		
Botanical name	**Common Name**	**Notes**
Plumeria obtusa	Singapore Graveyard Flower	Exotic
Polyalthia australis	Cape Canary Beech	Darwin Native
Pongamia pinnata	Indian Beech	Darwin Native
Pterocarpus indicus	Burmese Rosewood	Exotic
Pterocarpus indicus 'Pendula'	Burmese Rosewood	Exotic
Samanea saman	French Tamarind	Exotic
Saraca indica	Ashoka	Exotic
Saraca thaipingensis	Yellow Ashoka	Exotic
Sesbania grandiflora	Australian Corkwood	Exotic
Sterculia quadrifida	Orange Fruited Sterculia	Darwin Native
Syzygium armstrongii	White Bush Apple	Darwin Native
Syzygium eucalyptoides sspeucalyptoides	Wild Apple	Darwin Native
Syzygium fibrosum	Small Red Apple	Tropical Australian Native
Syzygium forte	Watergum	Darwin Native
Syzygium nervosum	Daly River Satinash	Darwin Native
Syzygium suborbiculare	Rolypoly Satinash	Darwin Native
Tabebuia argentea	Silver Trumpet	Exotic
Tabebuia pallida	Cuban Pink Trumpet	Exotic
Tabebuia rosea	Rosy Trumpet	Exotic
Tamarindus indica	Tamarind	Tropical Australian Native
Terminalia ferdinandiana	Kakadu Plum Seed	Darwin Native
Terminalia platyphylla	Wild Plum	Darwin Native
Terminalia sericocarpa	Bandicoot	Darwin Native
Wrightia pubescens	Mentaos	Darwin Native
Xanthostemon paradoxus	Bridal	Darwin Native

5.7 Irrigation

Within Council road reserves, irrigation systems are not required and will not be owned or maintained by Council.

Within public open space areas, requirements for irrigation shall be confirmed with Council on a case-by-case basis at the detailed design stage.

5.8 Control of Weeds

The developer shall ensure all areas disturbed as a result of the development or subdivision are weed free prior to Clearance of General Conditions, and for subdivisions, these areas shall remain weed free for the duration of the Defects Liability Period. Weeds are to be identified as declared weeds listed under the NT Weeds Management Act or as otherwise agreed between the Developer and Council.

6 WASTE

Council is responsible for ensuring that suitable waste collection methods are provided within the boundaries of the subject site for development within the Municipality.

For smaller residential developments, it is expected that waste will be collected, stored, and transported to Council's waste transfer stations by the residents.

For commercial and industrial lots and for residential lots with four or more dwellings, it may be desirable for the site users to contract with a waste collection company to collect waste from the site. For these uses, the Developer is to provide a dedicated waste bin collection area on the site that must be reasonably sized for the development. The collection area should consider both general waste and recycling collection. All bins must be individually accessible. For residential units, the collection area should provide space for 240 litres each, per dwelling, per week for general waste and recyclables for each residential dwelling. Bins for residential lots with more than four units shall not be permitted to be lined on Council's road reserve for collection.

The Developer is to ensure that there is a sufficient space for a garbage truck to enter and exit the site in a forward gear. Council may ask that the vehicle swept path be provided to demonstrate compliance with this requirement.

7 LIGHTING

Council owns and maintains lighting within road reserves and public open spaces owned by Council.

In 2016, ownership of street lighting within Council's road reserve was transferred to Council from Power and Water Corporation (PWC). Responsibility for asset maintenance and replacement activities becomes Council's responsibility on 1 January 2018.

The Developer is to provide lighting of streets, traffic management treatments, parks, walkways, footpaths, shared paths, and public areas within the proposed development or subdivision in accordance with current Australian Standards for illumination and the requirements of Council and PWC for equipment, materials, installation and other issues.

Provision of new street lights may not be restricted to roads only within the development or subdivision but may be extended to include existing roads providing access to or affected by the proposed development or subdivision.

Council is responsible for the operating costs of lighting of streets and public areas only after the works have been placed under Defects Liability Period by Council and the Developer has arranged to have the works transferred into Council's name.

In the case of lighting located on Council property or land to be transferred to Council, such as a park created under a subdivision, the lighting for the space is to be separately metered. The meter is to be registered in Council's name as soon as the works are placed under Defects Liability Period.

Council will review and approve a lighting design on the basis that the designer certifies that the lighting design complies with these Standards, PWC requirements and Australian Standards. Approval of lighting design documentation by Council does not absolve the designer from compliance with these Standards, PWC requirements or Australian Standards.

7.1 Design and Approval

Lighting shall be designed by a suitably qualified lighting design engineer able to sign compliance certificates as per the requirements of AS1158 Lighting for roads and public spaces.

The Developer is to confirm all road and pathway classifications with Council prior to commencing lighting design as appropriate lighting design subcategories shall be selected based on the agreed road and pathway classifications.

The Developer shall submit a street and public space lighting plan that indicates the road classification and proposed lighting subcategory to Council for approval.

All documentation must be prepared using A1 sheets with drafting symbols compliant with Australian Standards.

Public space lighting designs must be documented on the Developer's drawing sheets with drawing numbers and pole and luminaire numbers provided by Council. The Developer shall coordinate this step with Council.

The Developer shall ensure that the connection to PWC infrastructure for transmission of power is compliant with PWC standards.

The Developer shall submit public space lighting design drawings to Council, together with a copy of a "Statement of Design Compliance" confirming that the lighting design for roads and public spaces complies with the nominated Australian Standards and these Standards, for approval.

The Developer shall provide certification that the constructed street and public open space lighting complies with the Australian Standards and lighting subcategories agreed with Council.

The Developer must provide PWC and Council with "As Constructed" drawings in accordance with PWC and Council requirements.

7.2 Design Criteria

7.2.1 General

This section sets out the minimum standards required by Council for the design and construction of lighting for roads and pathways in urban, rural, and industrial/commercial subdivisions. The following standards and policies are to be used:

- This Litchfield Council – Subdivision and Development Standards document, which includes Standard Drawings as well as relevant Council policies.
- AS1158.1.1 Lighting for roads and public spaces - Vehicular traffic (Category V) lighting - Performance and design requirements.
- AS1158.3.1 Lighting for roads and public spaces - Pedestrian area (Category P) lighting - Performance and design requirements.
- AS4228-1997 Control of the obtrusive effects of outdoor lighting.
- AS3000 Wiring Rules.
- The technical and safety requirements imposed under the Northern Territory Electricity Reform (Safety and Technical) Regulations (Safety Regulations)
- Crime Prevention Through Environmental Design (CPTED) principles.
- Power and Water Corporation - Streetlighting design standards for connection to PWC infrastructure for transmission of power.
- NT Department of Planning, Infrastructure and Logistics (DIPL) standards and specifications

These Standards, including Standard Drawings, and Council policies take precedence over all other guidelines and standards. When Council documents do not cover the works to be constructed, then other documents may be adopted with the approval of Council. Design outside of these Standards may be considered if supporting documentation is provided, including all engineering aspects of the design and risk analysis; however, compliance with Australian Standards is mandatory. This assessment shall be included in the design report submitted with the initial plans.

It is recommended that the applicant organises a meeting with Council prior to developing any designs that are not adequately covered by Council's documents.

All lighting infrastructure must be smart ready.

When designing lighting arrangements, the Developer shall take into account the surrounding environment and lighting needs, including the possibility of nuisance light and light spill.

Consideration is to be given to complementing and integrating proposed lighting into the proposed and existing streetscape works, particularly the location with respect to the mature development of street trees. Lighting should be designed and located so that it is resistant to vandalism.

Where existing power poles are correctly sited and can be used to meet lighting design requirements, reuse of the existing arrangement is encouraged. All new or relocated poles are to be located in accordance with AS 1158.

The Developer shall use PWC standard equipment and arrangements in order to minimise future maintenance costs, as the standard equipment is consistent across the area and is familiar and readily available to local contractors.

All light poles shall be uniquely numbered. The Developer shall obtain appropriate light pole numbers from Council at the design stage.

7.2.2 Lighting of Road Reserves

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

- Lighting subcategories must be appropriate for the road classifications agreed with Council and the specifics of the situation.
- Lighting must be provided for:
  - Straight sections,
  - Curves,
  - Intersections and junctions,
  - Pedestrian refuges,
  - Cul-de-sacs,
  - Traffic management treatments, and
  - Pedestrian crossings.
- Light poles must be coordinated with all other infrastructure within the road reserve, including stormwater pits, pedestrian crossing points, or driveway crossovers.
- Lighting must be provided near bus stops and interchanges, major road intersections, municipal facilities, and public telephones.
- Light poles shall be aligned with common lot boundaries where possible.
- Non-frangible poles shall not be installed within the clear zone.
- Lighting designs shall consider surrounding areas, including adjacent development types and public safety.
- Luminaires, poles, outreaches, rag bolt assemblies, and pole foundations shall comply with the requirements of the regulatory power authority and Australian Standards.
- Luminaries shall incorporate 7 pin NEMA bases.
- All lighting shall be LED; with consideration to energy efficient and low power options considered.

For urban areas, light poles shall be a minimum of 1m from any driveway edge and underground service road crossings.

For rural areas, light poles shall be a minimum of 5m from any driveway edge and underground service road crossings.

7.2.3 Lighting of Public Open Space Areas

Design criteria for public open space lighting are as follows:

- Lighting subcategories must be appropriate for the pedestrian area classifications agreed with Council and the specifics of the situation.

- Lighting must be provided for intersections and changes of direction.
- The spacing of light poles must be determined based on the agreed luminaire and the agreed lighting subcategory.
- A dedicated meter panel/switchboard, in accordance with PWC requirements, is required for the lighting and controls for each Council park. The meter panel/switchboard shall be fully enclosed in a weatherproof metal enclosure with hinged escutcheon panel, a hinged lockable door for each section, and separate key operated locking mechanisms for each door with separate keys provided to Council.
- The switchboard must incorporate a fully segregated main switch lockable in the OFF position only, earthing, controls and circuit breakers for public open space lighting circuits.
- Luminaires, poles, outreaches, rag bolt assemblies, and pole foundations shall comply with the requirements of the regulatory power authority and Australian Standards.
- Luminaries shall incorporate 7 pin NEMA bases.
- All lighting shall be LED; with consideration to energy efficient and low power options considered.
- Lighting must be designed to be vandal resistant by specification and arrangement.
- All areas offering concealment must be illuminated to allow facial recognition from 15 metres.
- Entry points to pathways and cycle ways must be highlighted by placement of a street light nearby.
- Lights must be placed at each end and at each bend of a walkway and lighting must be designed in accordance with the requirements for the lighting subcategory agreed with Council.
- All public open space areas intended to be used or traversed at night should allow appropriate levels of visibility and conform to CPTED principles especially to clearly illuminate the faces of all users of public open space areas.
- Alternatives to reticulated power should be considered (e.g. solar, battery), provided that the rated service life of equipment is not less than 10 years, and shall be approved by Council.

7.3 Traffic and Pedestrian Considerations

The use of rigid, frangible, slip base and vehicle impact absorbing light poles (VIAC) is determined based on traffic speed, pole location and the expected level of pedestrian activity. Refer to Austroads Guide to Road Design Part 6B: Roadside Environment.

In general, the following requirements shall apply:

- Rigid poles may only be used when located outside the clear zone.
- Slip base mounted poles should be used where vehicle speeds are in excess of 70km/hr.
- VIAC poles should be used where there is a high likelihood of pedestrian activity. Slip base mounted poles shall not be used in such situations.

8 PUBLIC OPEN SPACE

8.1 Design Criteria

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

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

The Developer should consult with Council prior to any detailed design to discuss the brief for the landscape design.

Modern open space planning aims to integrate parklands within a subdivision with all the other features and services at the design stage. The landscape design concept must consider the allocation, shape, and size of park areas, while considering vehicle and pedestrian access points, the adjacent streetscape, and public safety.

All public open spaces shall be designed with consideration for all other engineering works and shall actively support the principles of Crime Prevention Through Environmental Design (CPTED).

The Developer shall prepare design drawings that fully describe the treatments for all open space areas, including drains and streets within the area of development. Designs shall comply with these Standards, all relevant Australian Standards, statutory requirements, and any other specific directions issued by Council.

The Developer shall liaise with Council in determining appropriate designs for open space areas and shall consider the specific needs of the development with respect to natural landform, environmental and ecological issues, remnant vegetation, and the character of adjacent existing developments and likely future developments.

The Developer shall provide a public open space master plan that clearly demonstrates the following elements:

- The location, function, and size of the different types of open space areas, including a summary table of the total area and the proportion of the area designated to different types of open space (active, passive, drainage, etc.).
- How the proposed open space functions and coordinates with the open space in adjoining residential areas. In particular, consideration must be given to the range of recreation activities and play equipment to be provided across the open space system.
- How the proposed network of pedestrian and cycle paths in the development link to each other and adjoining development, with a clear hierarchy of pedestrian movement to key destinations such as schools, shopping centres, sporting facilities, and community facilities.
- The location of an appropriate amount of vehicle and bicycle parking to adequately service the subject space.

- A landscaping arrangement that clearly notes the location and species of existing and proposed new trees, shrubs, and grass.
- Layout of lighting, including lights required to meet CPTED requirements.
- Appropriate park furniture and access to comply with regulations for disability access.
- The type, location, and colour palette of all park furniture and any play equipment.

Landscaping requirements for public open spaces is detailed in Section 5.3.

8.2 Open Space Calculations for Urban Subdivisions

All urban subdivisions are required provide areas of public open space in accordance with Northern Territory Planning Scheme requirements.

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

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

8.3 Open Space Functions

Open spaces can be designed for a variety of active and passive functions. Active spaces may provide areas for informal and formal play, and may include playground equipment, formal sporting grounds, walking trails and cycling trails. Passive spaces may provide areas for seating, picnicking, and relaxing and may provide a visual relief from the urban environment by using natural features, such as remnant vegetation or wetlands. Many open spaces may combine active and passive features. The Developer shall coordinate with Council to determine the most appropriate combination of uses for each open space area prior to detailed design.

8.4 Open Space Hierarchy

Public open spaces can be classified in a hierarchy, depending upon their size, intended use, and catchment. Different types of spaces shall incorporate different features and shall have different requirements for park furniture.

Within Litchfield Council, three types of public open spaces are typically found:

- Pocket Parks,
- Neighbourhood Parks, and
- Regional Parks and Reserves.

8.4.1 Pocket Parks

Pocket parks are smaller open spaces focussed toward providing a nearby space for local community members. The catchment is generally 500m or a 10-minute walk. The space is usually

utilised for short periods of time and can provide active and passive play spaces, while not providing for organised sporting events.

8.4.2 Neighbourhood Parks

Neighbourhood parks are larger open spaces that cater for a larger segment of the community than just the immediate local population, typically providing for an entire suburb. These spaces are designed to be accessed by walking, cycling, and driving. Neighbourhood parks can cater for a range of both active and passive play spaces and may include spaces for smaller organised sporting activities and/or natural areas with limited facilities.

8.4.3 Regional Parks and Reserves

Regional parks and reserves are large open spaces designed to cater for the whole of community. People will travel further distances, primarily by vehicle, to access these spaces. These spaces are generally used for longer periods of time and typically cater for both active and passive play spaces at the same venue, including providing areas for organised sporting events.

8.4.4 Design Elements by Open Space Type

The typical sizes, appropriate features, and standard amounts and locations of park furniture for each open space type are detailed in Table 25.

Table 25: Park Features and Furniture

Open Space Type	Size	Appropriate Features*	Park Furniture	
			Item	**Minimum Amount**, Location**
Pocket Parks	Minimum 2,000m^2 to ≤ 1Ha	• Trees and landscaping (including irrigated grassed areas) • Seating • Shelters • Play spaces and equipment • Paths • Waste bins • Lighting • Disability access	Sign with park name and Council logo	1
			Tables and shelters	1
			Seating	2, separate locations
			Waste bins	2, strategically located
			Water bubbler	1
			Playground features	1
			Shade structure	1, covering the playground
Neighbourhood Parks	> 1Ha to ≤ 5Ha	• All items as per Pocket Parks • Drinking fountains • Small sporting/activity areas (e.g. half court, skate parks, ovals)*** • Natural areas (e.g. creeks, wetlands, remnant vegetation) • Walking trails • Cycling paths • Wayfinding and interpretive signs • Public toilet facilities • Car parking • Fencing	Sign with park name and Council logo	1
			Tables and shelters	2
			Seating	4, separate locations
			Waste bins	4, strategically located
			Water bubbler	2
			Play equipment, including rubber soft fall with concrete kerbing	2, junior and youth equipment
			Shade structures	2, covering the playgrounds

Regional Parks and Reserves	> 5Ha	• All items as per Pocket Parks and Neighbourhood Parks • Barbeque facilities • Formal gardens/landscaped event spaces • Dog parks • Larger sporting/activity areas (e.g. BMX, full size ovals/sporting fields, horse exercise yards)***	Sign with park name and Council logo	1
			Tables and shelters	5
			BBQ's	As specified by Council at detailed design stage
			Seating	8, separate locations
			Waste bins	10, strategically located
			Water bubbler	4
			Play equipment, including rubber soft fall with concrete kerbing	3, junior to youth
			Inclusive play equipment	
			Shade structures	3, covering the playgrounds

*Features required for each public open space area shall be confirmed with Council during detailed design. Different open spaces may require different combinations of the noted appropriate features.

**At the detailed design stage, consultation with Council is required to confirm the total amount of each feature required within each open space area depending upon the overall size and intended function of the individual space.

***At the detailed design stage, consultation with Council is required to confirm additional features required to support sporting/activity areas (e.g. oval size, tiered seating, change rooms, club rooms, kiosks).

8.5 Park Furniture

The Developer shall ensure that a range of park furniture is placed at appropriate sites throughout all open space areas to service both passive and active pursuits. The design and location of park furniture shall be approved by Council as a part of the public open space master plan for the site.

Items should be robust and vandal proof, built of durable materials, and typically be built from materials that do not overheat.

Places where people gather (e.g. near play equipment or at park entrances) need waste bins, seating, and shade cover.

The designs for park furniture shall incorporate requirements for disability access.

8.5.1.1 Seating

Seating shall be placed under shade trees or shelters and shall be of a design that discourages use by vagrants.

All seats shall have paved links to all adjoining pathways. All seating shall have a concrete pad under the seat with a clearance of 1200 mm from the front extremity of the seat and 200 mm each from the sides and the back. Slabs shall extend to allow wheelchair to park near seats and move around tables.

8.5.1.2 Play Equipment and Features

The Developer shall provide a range of play opportunities and equipment or features for users of a variety of ages. The Developer shall liaise with Council prior to commencement of open space design to agree on necessary play equipment or features and appropriate age group areas.

The overall approach to provision of play equipment and recreation range should be outlined in the public open space master plan and approved by Council.

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

- Open space is to be provided with play equipment/features that meet the relevant Australian Standards, including AS 4486.1-1997 and AS 4685.1-6-2004 at a rate that is consistent with Table 25 and confirmed by Council.
- All play equipment is to be installed with impact absorbing surrounds to Australian Standards. All playgrounds within Neighbourhood Parks and Regional Parks and Reserves shall have rubber impact absorbing surrounds in accordance with Australian Standards.
- All playgrounds are to include shade structures over the playground. Bins and shaded seating shall be provided nearby.
- Consideration should be given to the inclusion of youth oriented equipment (e.g. basketball hoop and hardstand area, hitting wall, adventure play equipment, skate facilities etc.).
- Playground areas shall have adequate separation from traffic conflict areas (vehicle, bike and pedestrian traffic) and large open stormwater drains.
- Adequate drainage is to be provided to all playground areas and shall include subsoil drainage.
- The design and location of play equipment is to consider the CPTED controls.

8.5.1.3 Shade Structures

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

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

8.6 Access and Circulation

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

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

Pathway construction shall be in accordance with Section 3.16 of these Design Guidelines.

Pathways in open space areas will need protection provided by planted shade trees.

Pathways shall include rest areas and/or shelters in strategic locations, such as at the junction of pathways or viewing areas.

Pathways shall be designed to comply with all requirements for disability access and CPTED principles.

8.7 Naming of Public Open Spaces

Should new public open spaces be created as part of a subdivision, approval for the proposed park name is required from the NT Place Names Committee. Prior to issuing approval for a park name within Litchfield Municipality, the Place Names Committee must seek the view of Council.

Any proposed park name must be reviewed and accepted at a Council meeting. Council supports the Place Names Committee's guidelines for naming of places and naming rules and will review the proposed name in line with those directives. The Developer shall submit the proposed park name and supporting information as noted in the NT Place Names Committee directives in writing to Council.

To avoid delays in the naming process, it is recommended that the Developer seek Council's approval a minimum of 8 weeks prior to submission of the proposed park name to the NT Place Names Committee.

FORMS

Form A – Nominated Developers Representative

Form B – Plan and Report Review Application

Form C – Works Permit – Works Associated with a Development Permit

Form D – Inspection Request

Form E – Clearance of General Conditions and Release from Defects Liability Period

Form F – Value of Assets Spreadsheet (This Form Can Be Found Under Separate Cover As An MS Excel Spreadsheet)

Form G – Outstanding Works Bond Application

Form A

Nominated Developer's Representative

Site Information

Development Permit Number: DP……/……

Lot/Section Number.....Hundred of:.....

Property Address: ……..…..…..

Details of Nominated Developer's Representative

Full Name of Nominated Person: ……..

Company/Organisation: ……...

Postal Address: ……

Email: ……..

Phone: ……..Mobile: ……

Billing Details

Full Name: ……Phone/Mobile: ……

Company/Organisation Name: ……

Company/Organisation ABN: ……..

Postal Address: ……..……

Email: ……..

The Nominated Developer's Representative is the single person that Litchfield Council will deal with directly through the life of the development.

Nominating a single contact person will ensure there are no gaps or overlaps in communication with Council during the development process.

If you wish to change the Nominated Developer's Representative during the life of the development, please submit a new form to Council. Please note the intent is for only one person to be designated as the contact person at any time. If the nominated contact person will be temporarily away, please notify Council of a new contact person and the time period of the replacement.

Form B

Plan/Report Review Application

- ☐ Driveway Access Plan
- ☐ Stormwater Management Plan
- ☐ Construction and Environmental Management Plan (CEMP)
- ☐ Traffic Impact Assessment
- ☐ Traffic Management Plan
- ☐ Road Safety Audit

Note: If approvals for driveway access and stormwater plans are required, information related to both items may be shown on the same plan. In this instance, separate fees will continue to apply for each item reviewed.

Site Information

Development Permit Number: DP……/……..…

Lot/Section Number…….Hundred of:.....

Property Address: ……..…..…..

Applicant's Details

Full Name: ……Phone/Mobile: ……

Company/Organization: ……...

Postal Address: ……

Email: ……..

Billing Details (Not Applicable for Subdivisions)

Full Name: ……Phone/Mobile: ……

Company/Organisation Name: ……

Company/Organisation ABN: ……..

Postal Address: ……

Email: ……..

Once the application is lodged with Litchfield Council, an invoice for assessment of the plan(s) will be issued using the above "Billing Details", if applicable. Fees for plan assessment can be found on Council's website in "Fees and Charges". Once payment for the invoice is made, it is the applicant's responsibility to provide Council with a copy of the receipt and/or the receipt number. **Please note that if fees are applicable, assessment of the plans will not occur until Council has been notified of the receipt information.**

This application form is for approval of the plans or reports only. **Prior to carrying out any physical works within Council's road reserve, including installation of driveways and stormwater connections, the applicant is required to obtain a Works Permit – Works Associated with a Development Permit to carry out work within Council's road reserve.**

Plan/Report Requirements (Please check all relevant items are provided):

All Plans/Reports shall:

- ☐ Include the Development Permit number and the address of the property.

Driveway Access Plans shall:

- ☐ Be drawn to scale.
- ☐ Include a north arrow.
- ☐ Clearly demonstrate the location of all driveway access points to the site, including dimensions from the property boundaries.
- ☐ Show the proposed material type, material thickness/preparation, and width of all driveways, as well as identifying whether the crossover will be an invert or require a culvert. The sizes and technical specifications for driveways shall be in accordance with these Standards, including Standard Drawings.
- ☐ Illustrate any potential obstacles (e.g. power poles, stormwater pits, sewer pits, and trees) and distances from these obstacles to the proposed driveway.
- ☐ Show dimensions between each driveway access if multiple driveways are proposed.
- ☐ Show the distance from the edge of the driveway to any intersection or any other driveway within 100m of that driveway.

Stormwater Management Plans shall:

- ☐ Be drawn to scale.
- ☐ Include a north arrow.
- ☐ Be prepared by a suitably qualified professional engineer.
- ☐ Include details of site levels (e.g. indicative levels or contour lines). Both existing site levels and designed site levels are required. Contour lines should be provided at an appropriate height difference to clearly show how the existing land and the developed land rises and falls. Typically, a contour height difference of 0.2 m for existing levels and 0.1 m for design levels will be acceptable; however, Council may require greater detail to be shown.
- ☐ Show the flood level lines (ARI 100) defining the areas of inundation.
- ☐ Include hydrologic calculations.
- ☐ Show direction of stormwater flow.
- ☐ Show details of surfaces across the lot (e.g. paved, concreted, bituminised, grassed, gravelled and asphalted etc.).
- ☐ Show how the stormwater is collected to the extent of the lot boundaries, including all proposed stormwater infrastructure (e.g. open channels, underground pipe, pits, concrete invert, detention and/or detention basins, kerb and gutters, etc.). The sizes and technical specifications for the proposed stormwater infrastructure shall be in accordance with these Standards.
- ☐ Show cross-sections of the proposed stormwater infrastructure features.
- ☐ Show the location and details of the point of discharge. If an underground connection is used, the Developer shall use the NT Department of Infrastructure, Planning and Logistic's (DIPL) standard drawing for connection details. Where DIPL's Standard Drawings are not applicable, design criteria for stormwater connections shall comply with Australian Standards and best industry practices and must be designed by a professional engineer.
- ☐ Show all proposed drainage easements and responsibility for each.

Construction and Environmental Management Plans shall:

- ☐ Be prepared by an independent qualified professional person and/or organization.
- ☐ Include overall environmental objectives for the operation of the use and techniques for their achievement.
- ☐ Include procedures to ensure that no significant adverse environmental impacts occur as result of the use.
- ☐ Include proposed monitoring systems.
- ☐ Identify all possible risks of operational failure and response measures to be implemented.
- ☐ Include day to day management requirements for the use, including waste management.

Traffic Impact Assessments shall:

- ☐ Be prepared by a registered traffic engineer.
- ☐ Clearly reference all the source of data used in the report and analysis software used.
- ☐ Be undertaken in accordance with Austroads Guideline: Guide to Traffic Management – Part 12: Traffic Impacts of Developments.

Traffic Management Plans shall:

- ☐ Be prepared by a person who holds a valid WZ1 certificate, and include the certificate number.
- ☐ Be prepared in accordance with Austroads Guidelines standard format.
- ☐ Include a risk analysis matrix.
- ☐ Include the traffic control diagram.

Road Safety Audits shall:

- ☐ Be prepared by an independent licenced road safety auditor, and must include the licence number of the auditor.
- ☐ Reference all risks identified in the report in accordance with relevant Austroads Guidelines and/or Australian Standards.
- ☐ Include photos and/or site plan for each identified risk.
- ☐ Include a risk analysis matrix and recommended remediation method.
- ☐ Include developer's responses to each recommended remediation method including a timeframe.

Form C

Works Permit - Works Associated with a Development Permit

Period of Works From…….. To …….

Description of Works: ……

……

……

Date Issued: …….. Permit Number: ……

Special Conditions: ……

……

Council Use Only

The applicant agrees to the attached Conditions of Approval and any special conditions on the permit.

Site Information

Development Permit Number: DP……/……

Lot/Section Number…….Hundred of:.....

Property Address: ……

Applicant's Details

Full Name: ……Phone/Mobile: ……

Company/Organisation: ……

Postal Address: ……

Email: ……

Billing Details

Full Name: ……Phone/Mobile: ……

Company/Organisation Name: ……

Company/Organisation ABN: ……

Postal Address: ……

Email: ……

Documents Required for Submission with this Form:

- ☐ For-construction Drawings for the Proposed Works (e.g. Dimensioned Site Plan illustrating Proposed Works)
- ☐ Public Liability Insurance Certificate
- ☐ Copy of the Site Supervisor's White Card
- ☐ Traffic Management Plan/Traffic Control Guidance Plan
- ☐ Worker's Compensation Insurance Certificate

Conditions of Approval for Works Permit – Works Associated with a Development Permit

- It is the responsibility of the applicant to provide a minimum notice to Council of 5 working days to enable appropriate assessment of the Works Permit application.
- The Permit Holder assumes all responsibility for knowledge of and adherence to Litchfield Council's Development and Subdivision Standards and all other Council requirements.
- The issue of the Works Permit is subject to the standard conditions of approval stated on the permit and any other special terms and conditions associated with works deemed to be necessary and stated by Council.
- The Works Permit Form must clearly state the type of works being carried out and include all attachments. A plan showing location of the works, depths, and offsets in respect to the roads, drains, and fence line is to be provided to Council.
- The Developer accepts complete responsibility for determining the location of all services and equipment under the responsibility of other service authorities in the vicinity of the works described and to take all steps necessary to protect any such equipment and services which may by located within the area. (Dial before you Dig 1100).
- Should the Developer seek to install or relocate services, Council will require the for-construction drawings to be approved by the relevant authority (e.g. Power and Water Corporation) prior to the commencement of any works. The approval must contain the stamp, name, signature, and contact number of the person providing the approval.
- The Developer and all contractors must observe all necessary safety precautions and requirements relating to the use of signs, barriers, hoardings, and warning devices for works in progress as currently specified by the standards Association of Australia, Work Health and Safety and as directed by Council.
- Liability insurance for an amount not less than $5,000,000 in the name of the permit holder and Litchfield Council will be provided with the Works Permit Application.
- The Developer shall maintain any works in a condition suitable for the safe and comfortable passage of vehicles and pedestrians at all times until the works are fully reinstated, whether the reinstatement is to be performed by Council or the permit holder.
- Traffic/Pedestrian Management Plan & Diagrams shall comply with AS 1742.3 – 2009 and shall be issued by a person with Level 1 Work Zone Traffic Management Accreditation. This plan must be submitted with the Works Permit Form for all requested works. All persons setting up and operating traffic control must have Level 2 & 3 Work Zone Traffic Management Accreditation.
- Council shall at all times be indemnified against claims of all types as a result of actions by the Permit Holder. Permits will be issued to applicants on an individual job basis.
- No trees or vegetation on the verge/drainage area are to be damaged in any way. No trees or vegetation are to be permanently removed without the express permission of Council. Should permission for permanent tree or vegetation removal be provided, it shall be confirmed in writing on the permit.
- Authorisation is given for Council to deduct charges incurred by the Council as a result of Council being required to undertake any reinstatement works or any part thereof for any cause whatsoever from any security deposits.
- The permit to access may be revoked if weather conditions do not permit trafficable vehicular or pedestrian use within any given area.

Form D

Inspection Request

Proposed Inspection Date: ……Time: ……..

Date Request Submitted: ……..(minimum 48 hours prior to above date)

Roads

- ☐ Sub-grade completion
- ☐ Sub-base completion
- ☐ Base-course completion
- ☐ Prior to sealing/asphalting

Driveway Crossover – Concrete Invert

- ☐ Prior to pouring concrete

Driveway Crossover – Box Culvert

- ☐ Prior to pouring concrete for bottom slab
- ☐ Prior to pouring concrete for headwalls
- ☐ After installation of culvert, prior to backfill
- ☐ After backfill, prior to sealing

Driveway Crossover - Rural Flat

- ☐ Prior to sealing/asphalting

Urban Area - Underground Stormwater

- ☐ Prior to trench/culvert backfilling
- ☐ After subsoil drainage, prior to backfill

Rural Area – Culvert/Stormwater

- ☐ Prior to trench/culvert backfilling

Site Information

Development Permit Number: DP……/……

Lot/Section Number……Hundred of:.....

Property Address: ……..…..

Applicant's Details

Full Name: ……Phone/Mobile: ……

Company/Organisation: ……...

Postal Address: ……

Email: ……..

Billing Details (Not Applicable for Subdivisions)

Full Name: ……Phone/Mobile: ……

Company/Organisation Name: ……

Company/Organisation ABN: ……..

Postal Address: ……

Email: ……..

Form E

Clearance of General Conditions/ Release from Defects Liability Period

Clearance of General Conditions

- ☐ Final Inspection (Developments)
- ☐ Defects Liability Period Inspection (Subdivisions)

Release from Defects Liability Period

- ☐ Final Inspection (Subdivisions)

Application Date: ……..…….....Inspection Date: .....

Site Information

Development Permit Number: DP……/……...

Lot/Section Number……Hundred of:.....

Property Address: ……..…….....

Applicant's Details

Full Name: ……Phone/Mobile: ……

Company/Organisation: ……...

Postal Address: ……..……

Email: ……..

Billing Details

Full Name: ……Phone/Mobile: ……

Company/Organisation Name: ……

Company/Organisation ABN: ……..

Postal Address: ……..……

Email: ……..

For Clearance of General Conditions for a development, please also submit the As-Constructed Drawings in PDF format.

For Clearance of General Conditions for a subdivision, please also submit the As-Constructed Drawings in PDF format, a completed Form F – Value of Assets, and the proposed cadastral survey plan including all easements.

Form F

Value of Assets Spreadsheet

This form can be found under separate cover as an MS Excel Spreadsheet.

Tel (08) 8983 0600 • **Fax** (08) 8983 1165 • **Email** council@litchfield.nt.gov.au
7 Bees Creek Road, Freds Pass NT 0822 • PO Box 446 Humpty Doo NT 0836 • www.litchfield.nt.gov.au
ABN: 45 018 934 501

Form G

Outstanding Works Bond Application

Site Information

Development Permit Number: DP……/……...

Lot/Section Number……Hundred of:.....

Property Address: …….....….....

Applicant's Details

Full Name: ……Phone/Mobile: ……

Company/Organisation: ……

Postal Address: ……..……..

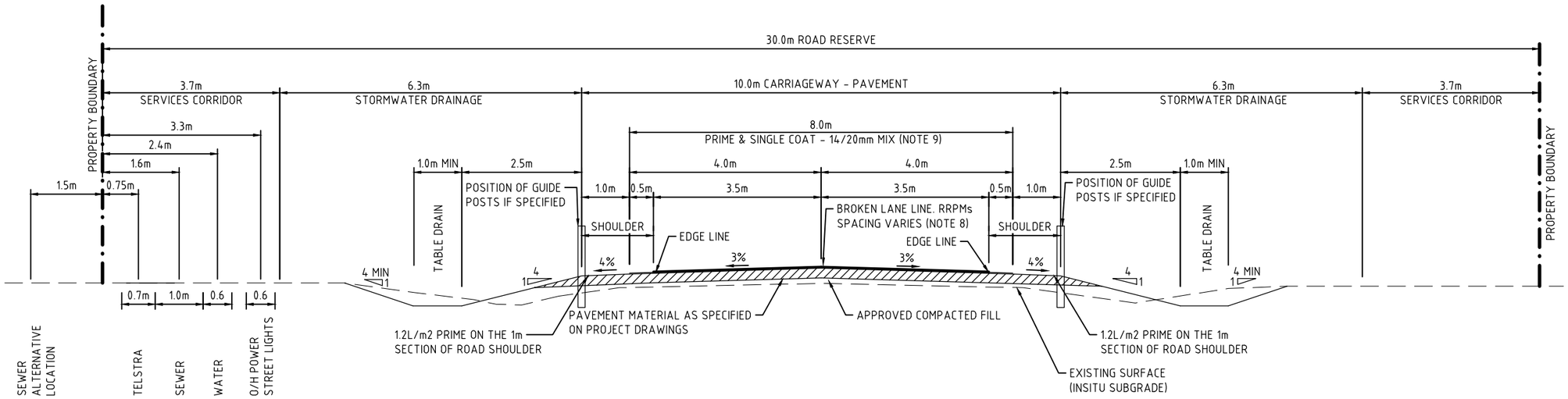
Email: ……

I understand that Litchfield Council typically requires all works to be completed in accordance with Litchfield Council's Development and Subdivision Standards prior to the Clearance of General Conditions being issued. By the submission of this document, I am requesting Council to allow a provision of a bond in lieu of outstanding works/defects considering the following details:

Description of Outstanding Works/Defects

Item	Description	Location	Reason	Amount of Bond
1				
2				
3				
Total				

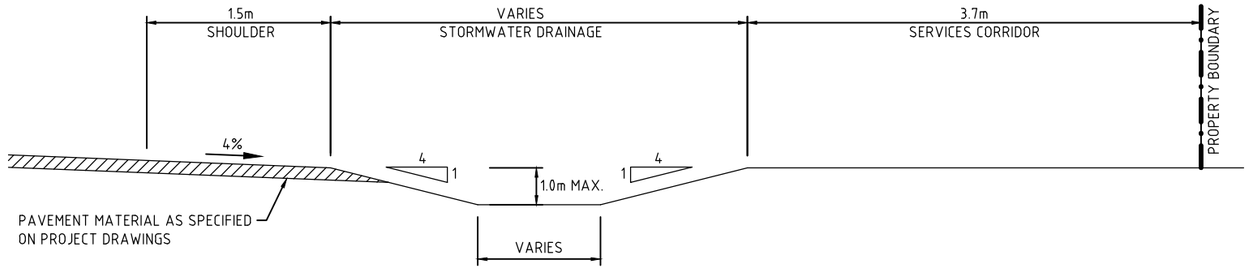
STANDARD DRAWINGS



TYPICAL CROSS SECTION
NTS

GENERAL NOTES

1. BATTER SLOPES
   SUBJECT TO SOIL STABILITY THE MAXIMUM BATTER SLOPE PERMISSIBLE IN ALL SITUATIONS (INCLUDING OPEN UNLINED DRAIN BATTERS) SHALL NOT EXCEED 1 IN 4. UNSTABLE SLOPES TO BE PROTECTED.
2. POSITION OF DRAIN (OTHER THAN TABLE DRAINS)
   TO MAXIMISE CLEARANCE TO THE EDGE OF CARRIAGEWAY, OPEN DRAINS SHALL BE POSITIONED IMMEDIATELY ADJACENT TO THE SERVICES CORRIDOR.
3. EMBANKMENT & CUTS
   EMBANKMENT AND CUT SITUATIONS BEYOND THE SCOPE OF THIS CROSS SECTION SHALL BE PERMISSIBLE AND SHALL CONFORM AS NEAR AS POSSIBLE TO THIS CROSS SECTION.
4. TABLE DRAIN/EDGE OF SHOULDER LEVEL
   TABLE DRAIN BANK LEVEL SHALL BE WHERE POSSIBLE AT THE LEVEL OF THE ADJACENT SHOULDER EDGE.
5. ROAD RESERVE WIDTHS
   ROAD RESERVE WIDTHS GREATER THAN 30.0m MAY BE REQUIRED TO ACCOMMODATE MAJOR TRUNK DRAINAGE.
6. EXTENT OF PAVEMENT MATERIAL
   THE PAVEMENT MATERIAL SHALL EXTEND THE FULL WIDTH OF THE CARRIAGEWAY.
7. GRASSING
   TOPSOIL AND GRASS TABLE DRAIN AND VERGE TO FULL ROAD RESERVE WIDTH. USE TEMPORARY IRRIGATION UNTIL GRASS IS ESTABLISHED.
8. RAISED RETROREFLECTIVE PAVEMENT MARKERS (RRPM)
   RRPM's TO BE USED SUPPLEMENT LINE MARKING. COMPLY WITH THE REQUIREMENTS OF AS1742.2
9. SEAL TO BE A SINGLE COAT WITH 50%x14mm STONE AND 50%x20mm STONE MIX



TYPICAL OPEN UNLINED DRAIN SECTION
NTS

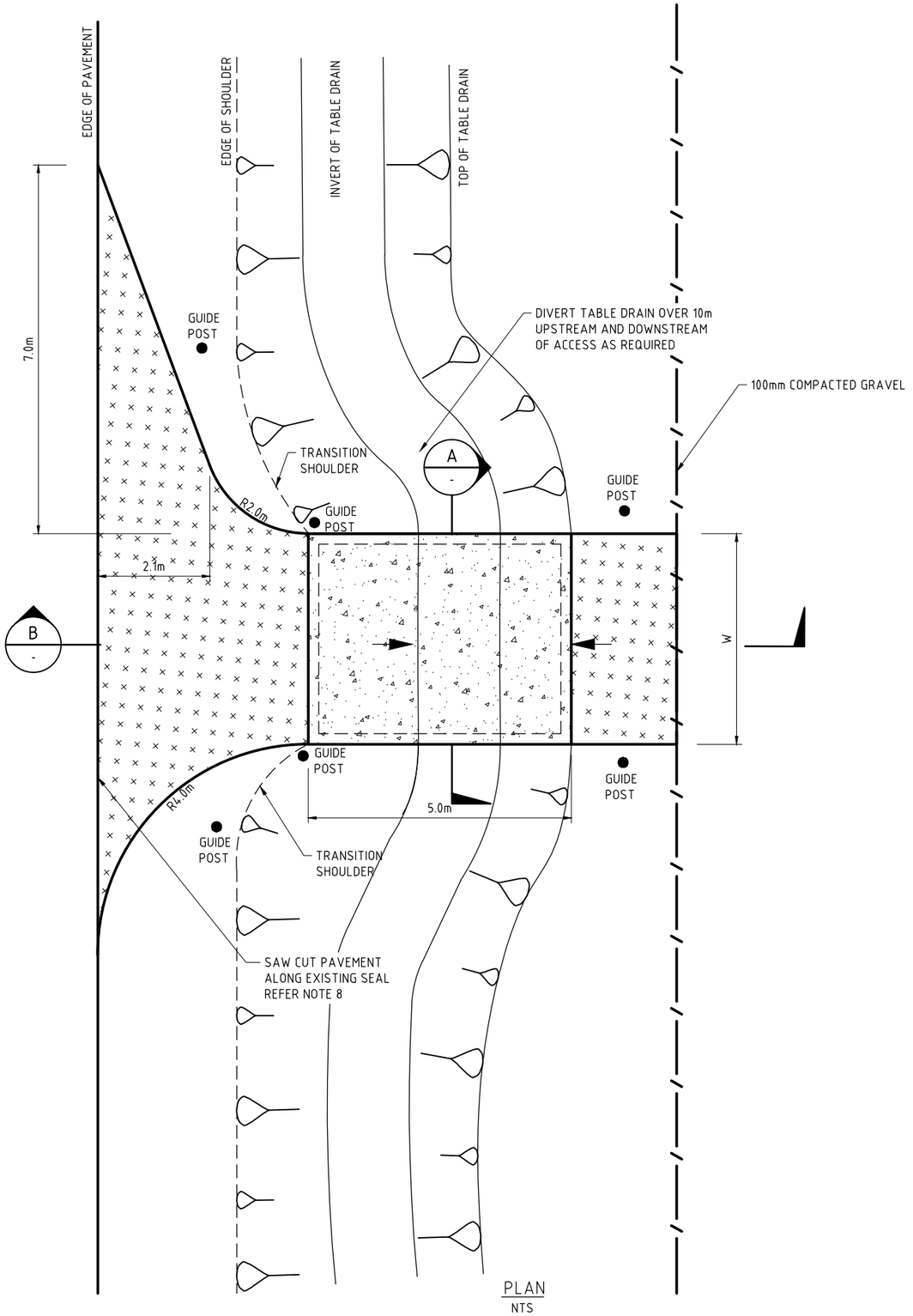
ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

LITCHFIELD COUNCIL
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

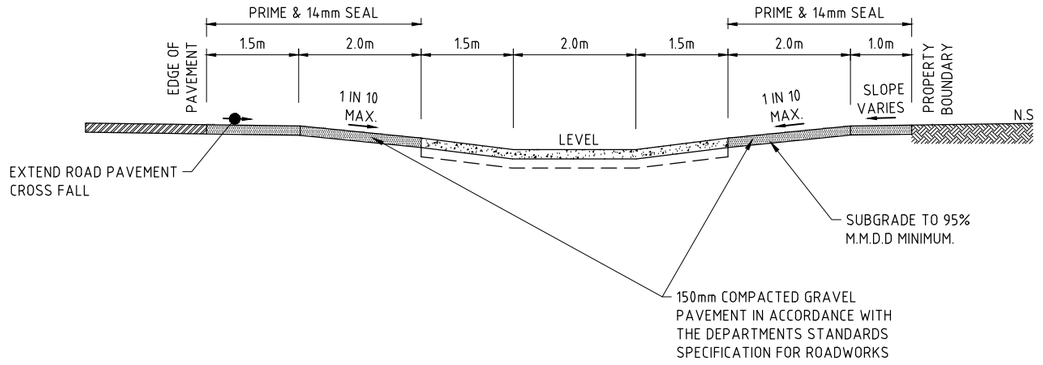
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING
RURAL ROAD RESERVE

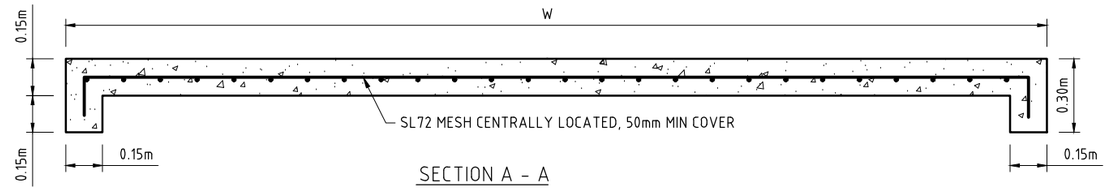
SCALE NOT TO SCALE
DRAWING No. LC-100
AMDT. 0



PLAN
NTS



SECTION B - B
1:100



SECTION A - A
1:25

NOTES:

1. ACCESS WIDTH (W) 4.0m FOR SINGLE ACCESS AND 8.0m FOR DOUBLE ACCESS.
2. ESTABLISH INVERT ON A COMPACTED SUB-BASE AND MATCH TO TABLE DRAIN INVERT LEVELS.
3. CONCRETE SHALL BE CLASS 25MPA MIN.
4. TYPICAL MINIMUM TABLE DRAIN GRADE 0.5%.
5. UPSTREAM AND DOWNSTREAM PROTECTION WORKS MAY BE REQUIRED: EACH SITE SHOULD BE ASSESSED APPROPRIATELY.
6. PROPERTY ACCESSES ON SEALED ROAD NETWORKS ARE REQUIRED TO BE SEALED. SEAL TO EXTEND TO ROAD RESERVE BOUNDARY.
7. PROPERTY ACCESSES FOR RURAL INDUSTRIAL/COMMERCIAL SITES WILL BE REQUIRED TO BE INDEPENDENTLY DESIGNED TO CATER FOR :
   A. THE MAXIMUM VEHICLE CONFIGURATION TO USE THE SITE.
   B. THE APPROPRIATE PAVEMENT THICKNESSES AND COMPOSITION.
8. IN THE EVENT THE ACCESS IS LOCATED OFF AN EXISTING SEALED ROAD THEN:
   A. PROVIDE A SAW CUT INTO SOUND UNCONTAMINATED PAVEMENT MATERIAL.
   B. LAP (i) SEAL COAT 200mm OVER SAW CUT (SINGLE COAT SEAL)
      (ii) SEAL TOP COAT 200mm OVER SAW CUT (TWO COAT SEAL)

   ENSURING THE JOIN IS A SMOOTH TRANSITION OVER THE EXISTING SEAL WITHOUT FORMING INVERTS OR CRESTS.

1 0 2 4m
SCALE 1:100

250 0 500 1000mm
SCALE 1:25

NOTE: THIS DRAWING IS ADAPTED FROM CS1206-7

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

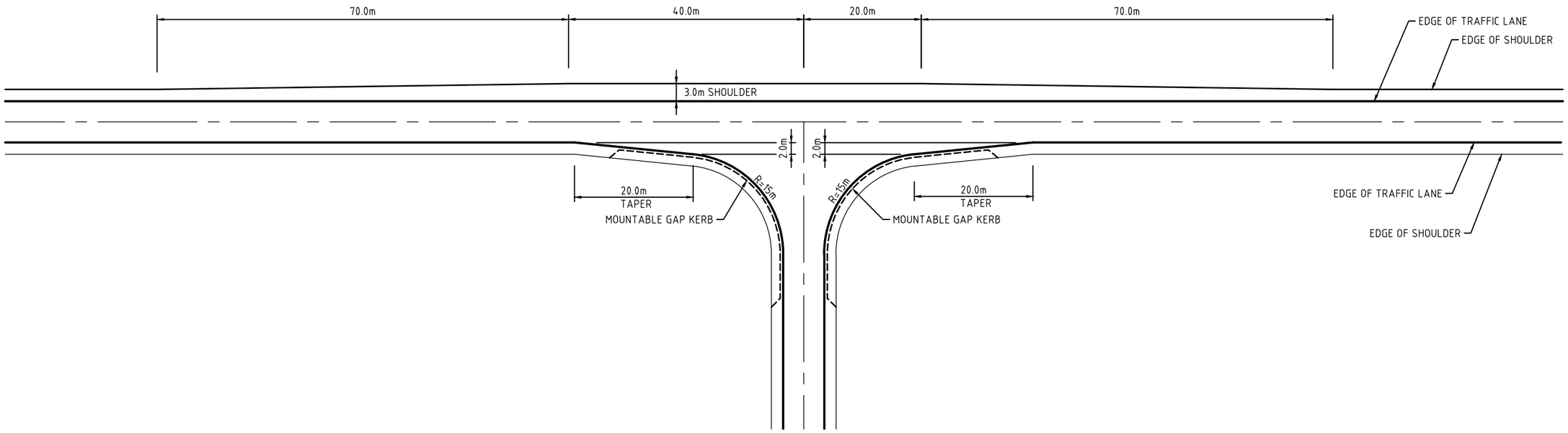
LITCHFIELD COUNCIL
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

RURAL RESIDENTIAL PROPERTY ACCESS WITH CONCRETE INVERT

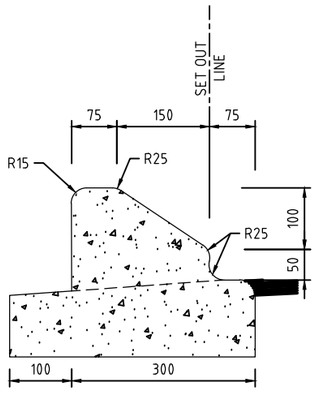
SCALE AS SHOWN
DRAWING No. LC-101
AMDT. 0



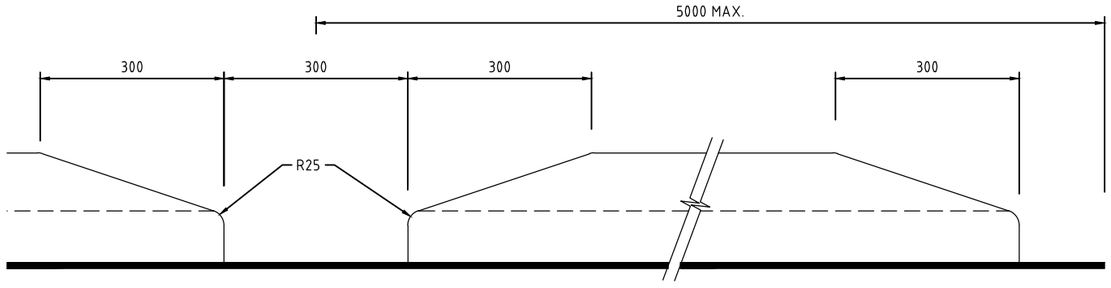
GAP KERB LAYOUT
NTS

GENERAL NOTES:

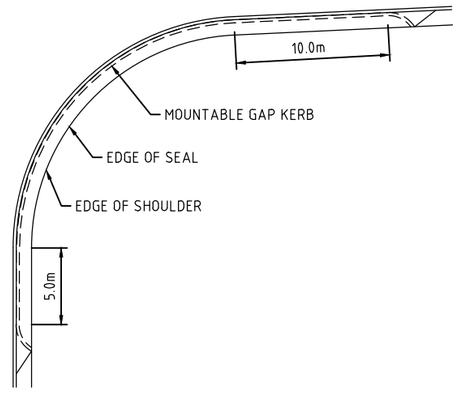
1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.
3. SINGLE SEAL (14/10MIX) ON INTERSECTIONS TO COVER THE FULL CARRIAGEWAY TO END OF TAPERS.



GAP KERB DETAILS
NTS



GAP KERB ELEVATION
NTS



GAP KERB LAYOUT
NTS

0	DRAFT	APR'17	RC
ADMT	DESCRIPTION	DATE	AUTH

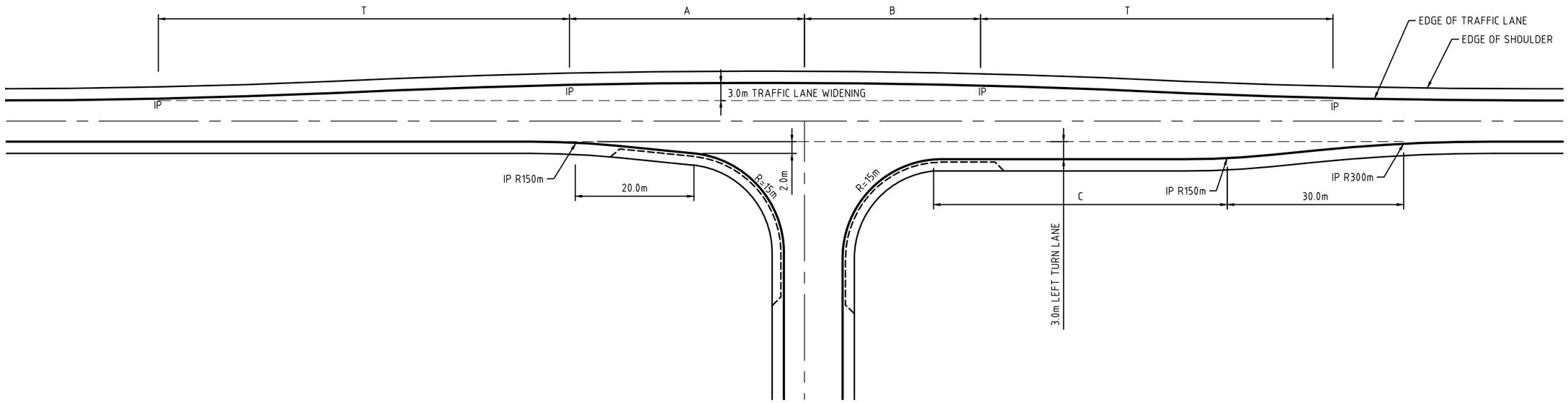
LITCHFIELD COUNCIL
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

RURAL ROAD INTERSECTION
TYPE 1

SCALE NOT TO SCALE
DRAWING No. LC-102
AMDT. 0

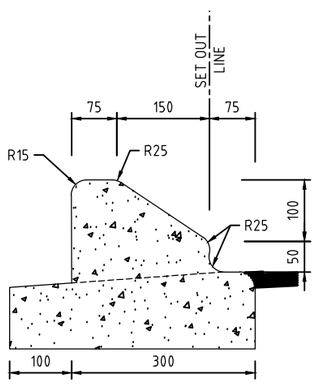


DESIGN SPEED Km/h	T	A	B	C	RADIUS AT IP's
100	100	50	40	120	*2400
90	90	45	40	90	*2100
80	80	45	40	70	*1800
70	70	40	30	50	*1400
60	60	40	30	30	*1000

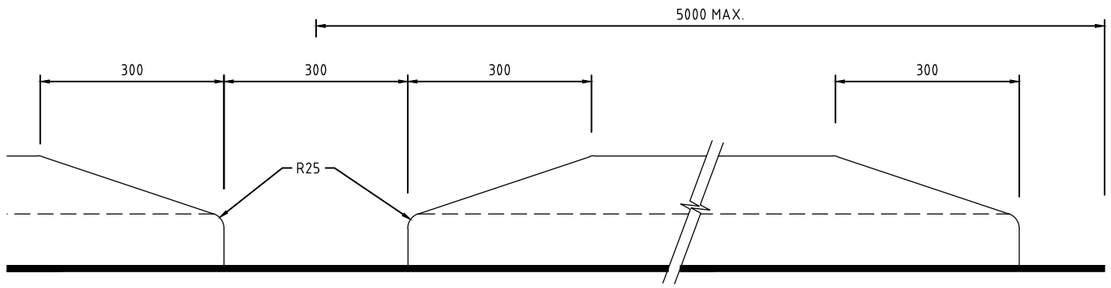
*UNLESS NOTED OTHERWISE

GENERAL NOTES:

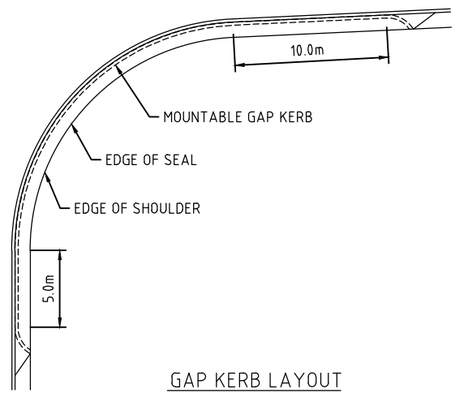
1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.
3. SINGLE SEAL (14/10MIX) ON INTERSECTIONS TO COVER THE FULL CARRIAGEWAY TO END OF TAPERS.



GAP KERB DETAILS
NTS



GAP KERB ELEVATION
NTS



GAP KERB LAYOUT
NTS

0	DRAFT	APR'17	RC
ADMT	DESCRIPTION	DATE	AUTH

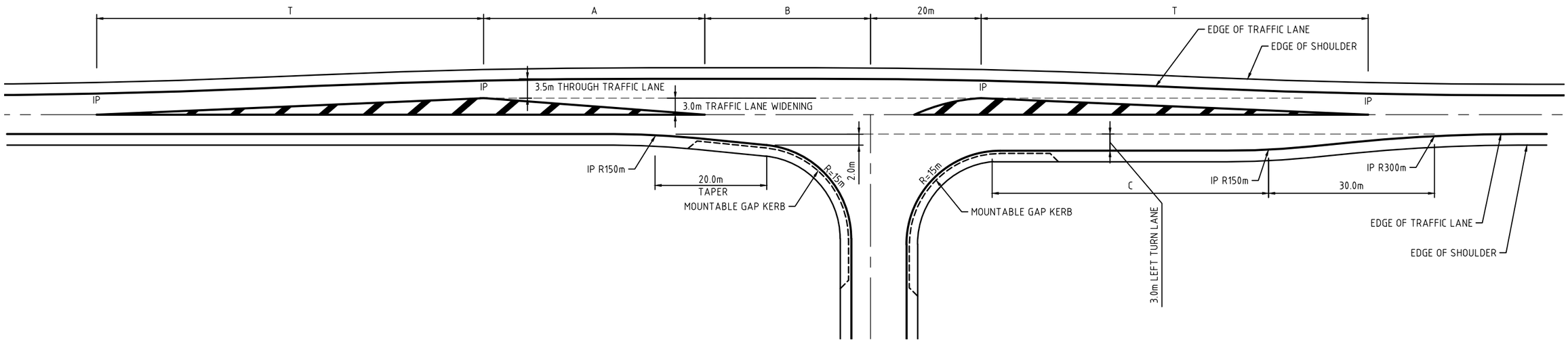
LITCHFIELD COUNCIL
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

RURAL ROAD INTERSECTION
TYPE 2

SCALE NOT TO SACLE
DRAWING No. LC-103
AMDT. 0

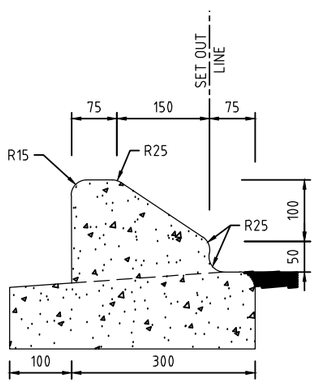


DESIGN SPEED Km/h	T	A	B	C	RADIUS AT IP's
100	100	50	40	120	***2400**
90	90	45	40	90	***2100**
80	80	45	40	70	***1800**
70	70	40	30	50	***1400**
60	60	40	30	30	***1000**

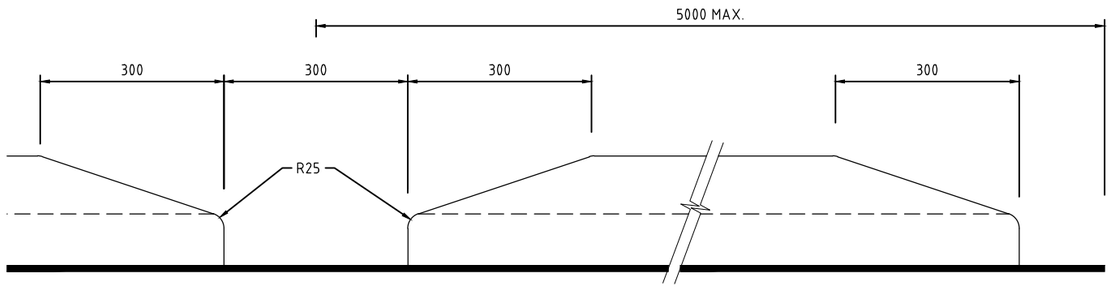
*UNLESS NOTED OTHERWISE

GENERAL NOTES:

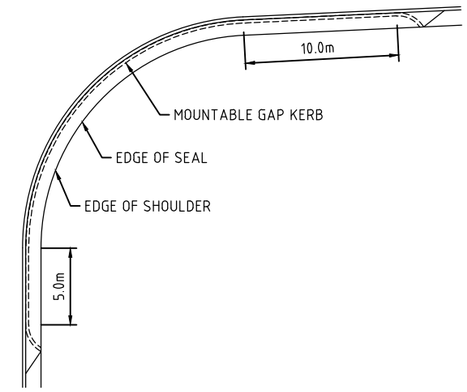
1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.
3. SINGLE SEAL (14/10MIX) ON INTERSECTIONS TO COVER THE FULL CARRIAGEWAY TO END OF TAPERS.



GAP KERB DETAILS
NTS



GAP KERB ELEVATION
NTS



GAP KERB LAYOUT
NTS

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

LITCHFIELD COUNCIL

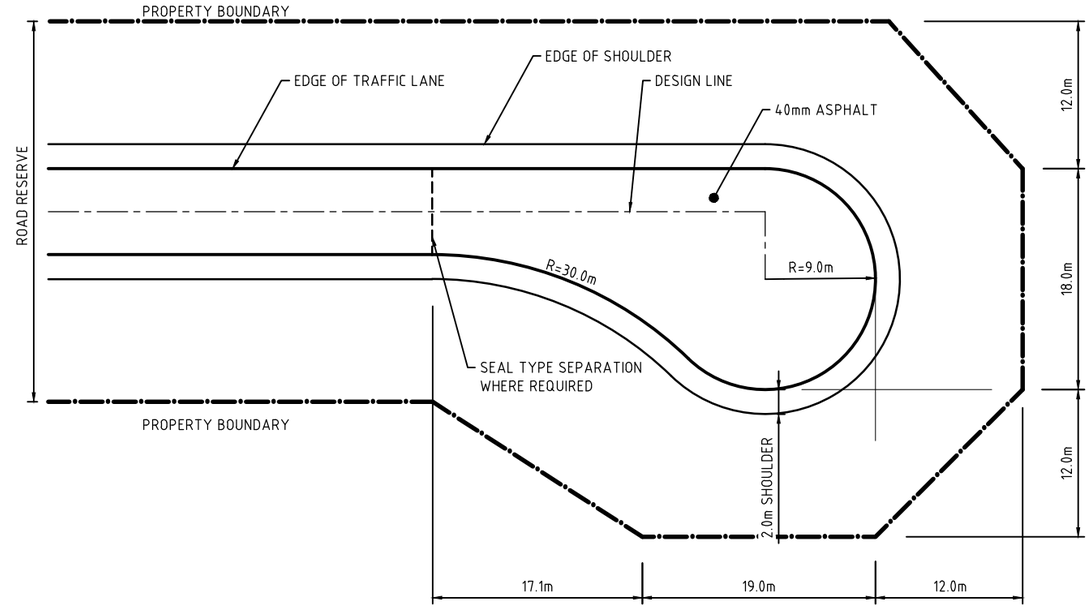
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

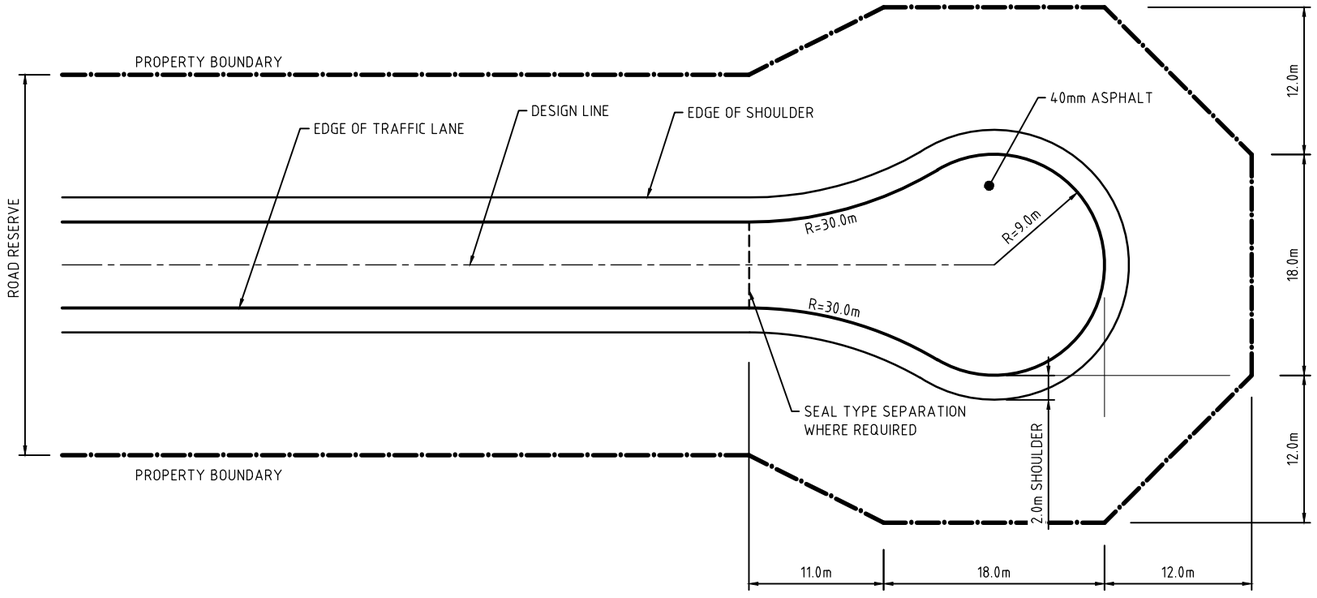
STANDARD DRAWING

RURAL ROAD INTERSECTION
TYPE 3

SCALE NOT TO SACLE
DRAWING No. LC-104
AMDT. 0



PREFERED TREATMENT
NTS



ALTERNATIVE TREATMENT
NTS

GENERAL NOTES:

1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH CUL-DE-SAC MAY HAVE SPECIAL DRAINAGE REQUIREMENTS WHICH WILL DETERMINE THE PROPOSED PROPERTY BOUNDARY.
3. ROAD RESERVE WIDTHS GREATER THAN 30 METRES MAY BE REQUIRED TO ACCOMMODATE MAJOR TRUNK DRAINAGE.

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

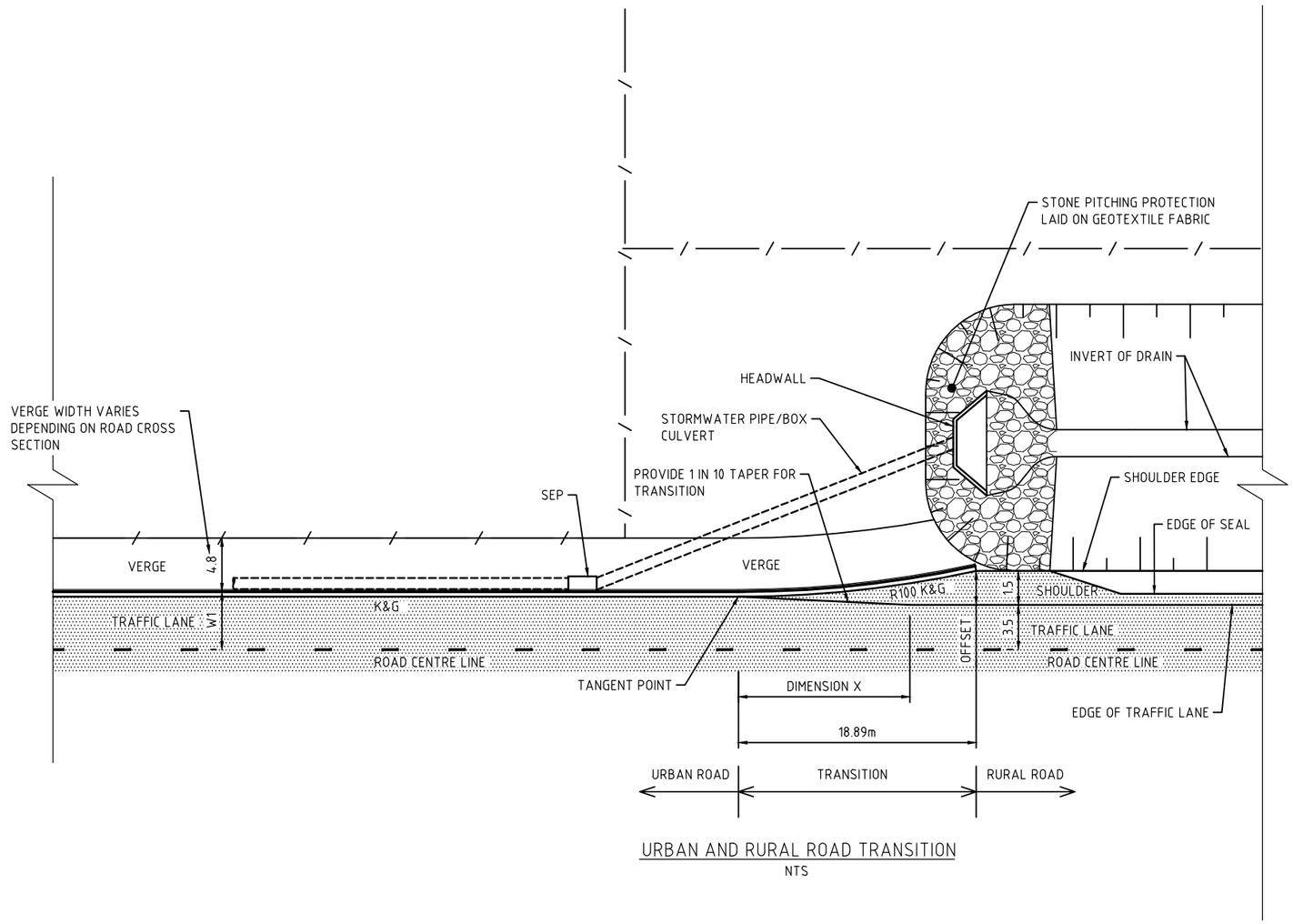
LITCHFIELD COUNCIL
PO Box 446,Humpty Doo NT 0836
PH 08 8983 0600 FAX: 08 8983 1165

DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

RURAL ROAD CUL-DE-SAC
MINIMUM TREATMENT - 9.0m RADIUS

SCALE NOT TO SCALE
DRAWING No. LC-105
AMDT. 0



URBAN AND RURAL ROAD TRANSITION
NTS

URBAN ROAD TYPE	HALF WIDTH W1 (m)	TAPER DIMENSION 'X'
TYPE 1	4.0	5.0
TYPE 2	5.0	15.0
TYPE 3	5.2	17.0

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

LITCHFIELD COUNCIL
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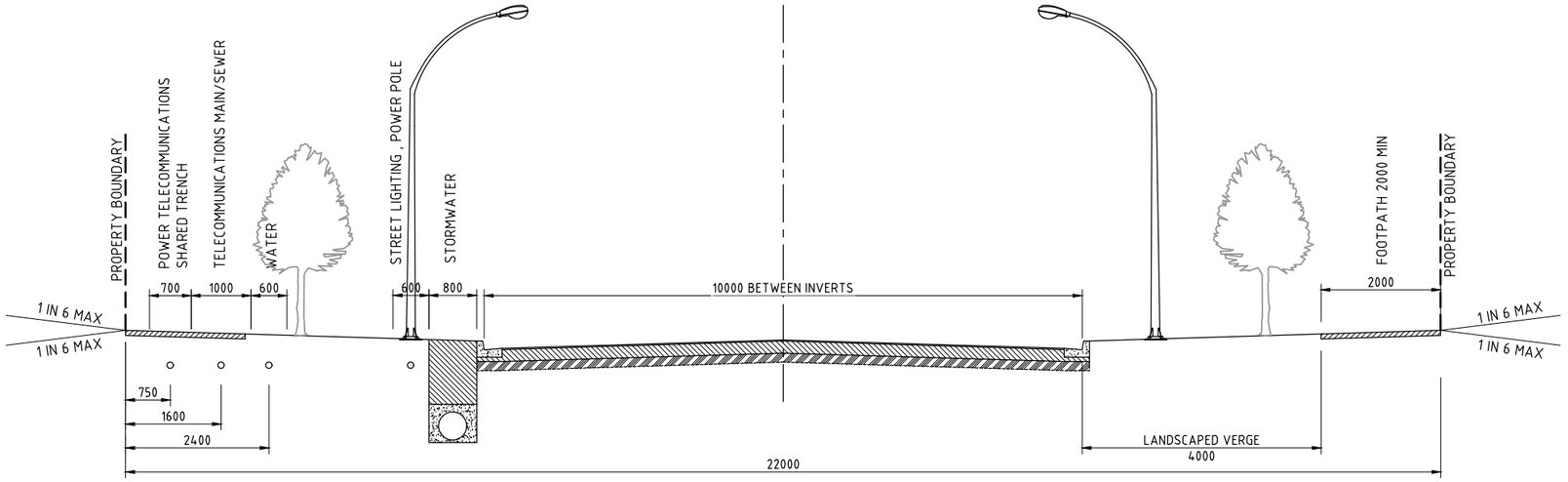
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

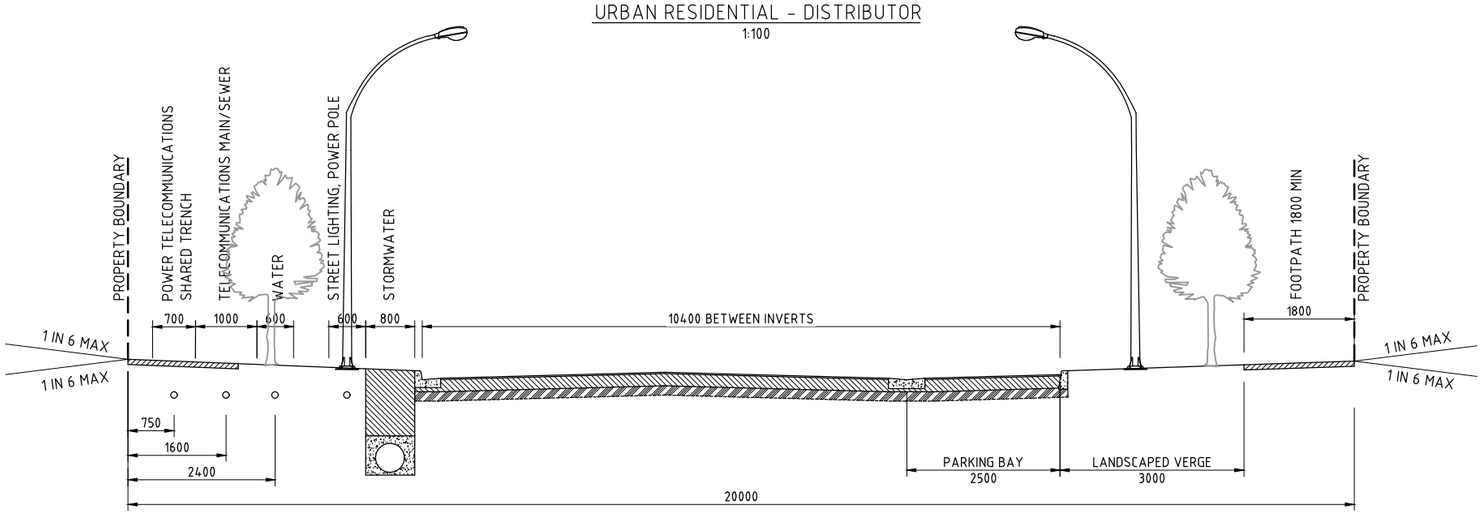
STANDARD DRAWING
URBAN TO RURAL ROAD TRANSITION

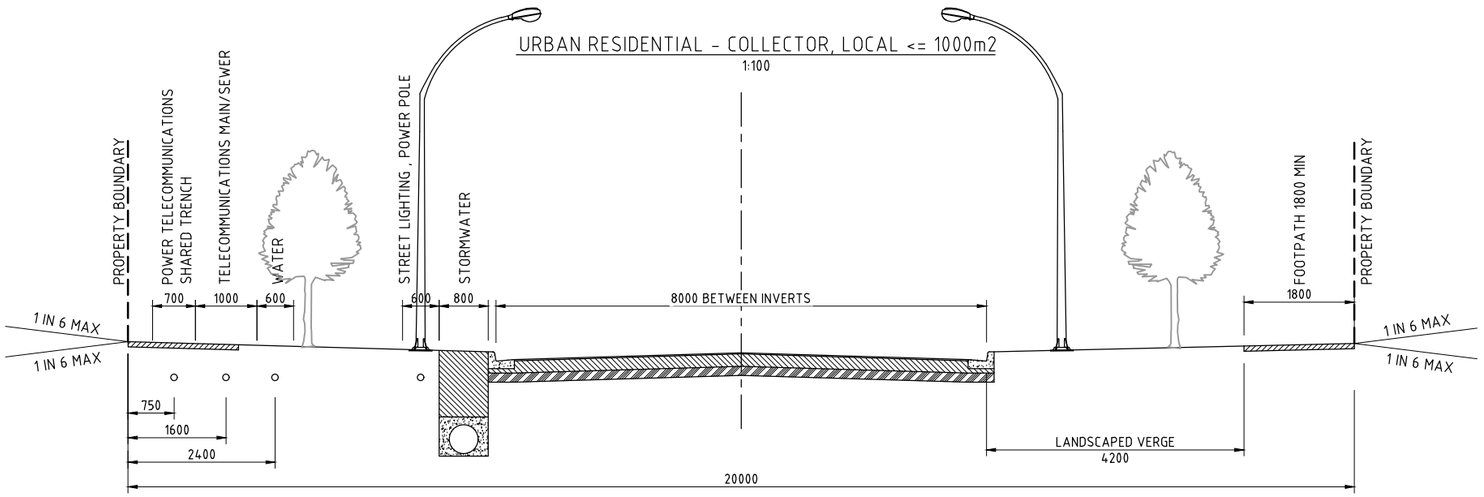
SCALE NOT TO SACLE
DRAWING No. LC-106
AMDT. 0



URBAN RESIDENTIAL - DISTRIBUTOR

1:100





URBAN RESIDENTIAL - COLLECTOR LOCAL > 1000m2 - 4000m2

1:100

ZONE		ROAD HIERARCHY	ROAD RESERVE WIDTH (m)	CARRIAGEWAY WIDTH (m)	LANDSCAPED VERGE WIDTH[1] (m)	FOOTPATH WIDTH[1] (m)
URBAN AREA	RESIDENTIAL	DISTRIBUTOR	22.00	10.00	4.00	2.00
		COLLECTOR, LOCAL <=1000m^2	20.00	10.40	3.00	1.80
		COLLECTOR, LOCAL >1000m^2 - 4000m^2	20.00	8.00	4.20	1.80
	INDUSTRIAL/ COMMERCIAL	DISTRIBUTOR	22.00	10.00	4.00	2.00
		COLLECTOR, LOCAL	22.00	10.40	4.00	1.80

NOTE:

1. REQUIRED ON BOTH SIDES OF THE ROAD.
2. INTENTION IS TO PROVIDE AN ON-STREET CAR PARKING LANE 2.5m IN WIDTH.

1 0 2 4m

SCALE 1:100

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

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DESIGNED LC

DRAWN AURECON

SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

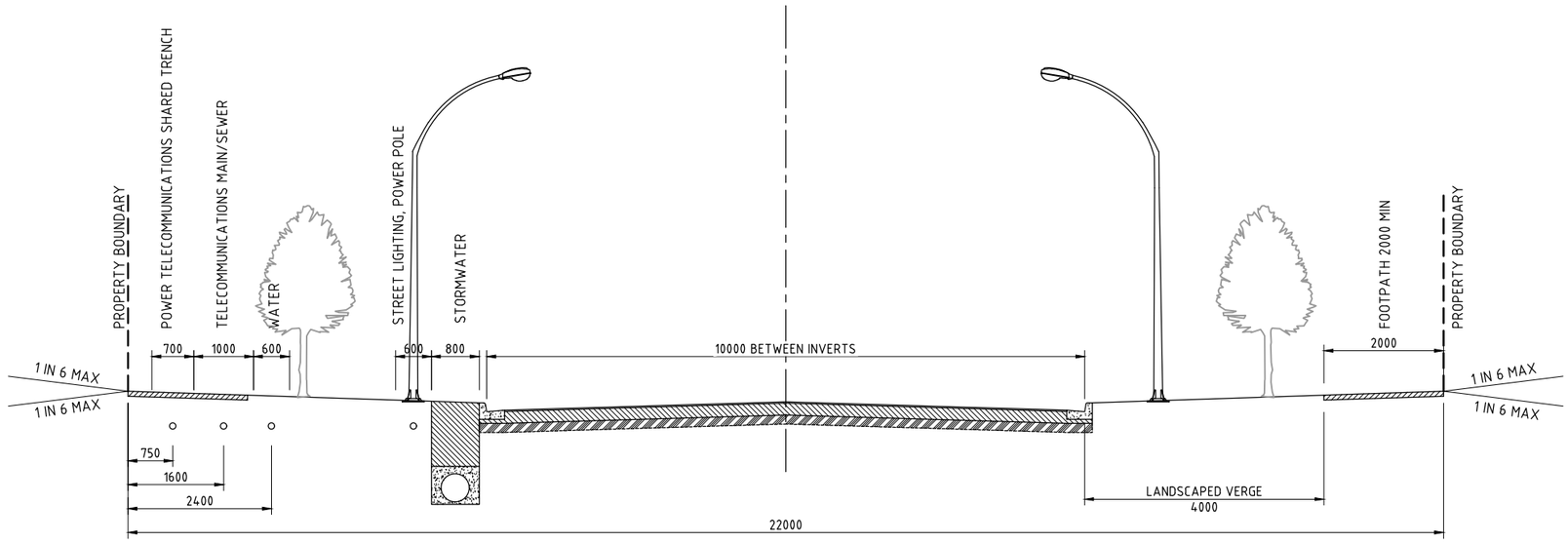
URBAN ROAD RESERVE

SHEET 1

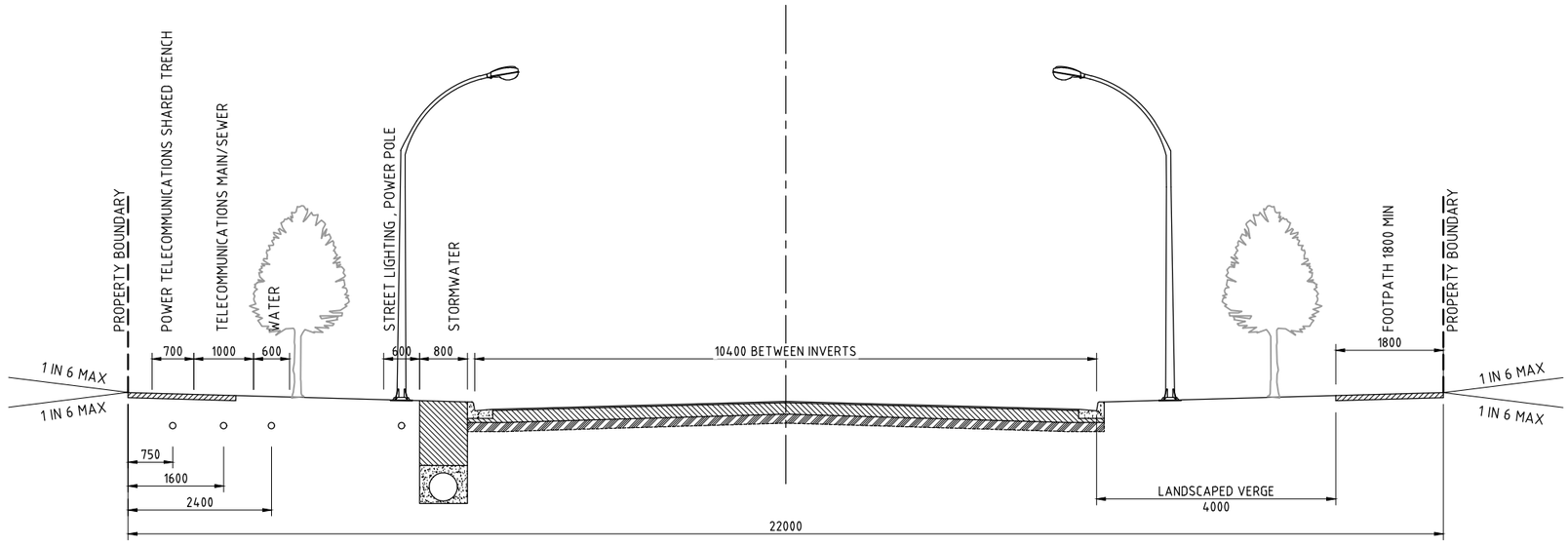
SCALE 1:100

DRAWING No. LC-200

AMDT. 0



URBAN INDUSTRIAL/COMMERCIAL - DISTRIBUTOR
1:100



URBAN INDUSTRIAL/COMMERCIAL - COLLECTOR, LOCAL
1:100

1 0 2 4m
SCALE 1:100

0	DRAFT	APR'17	RC
ADMT	DESCRIPTION	DATE	AUTH

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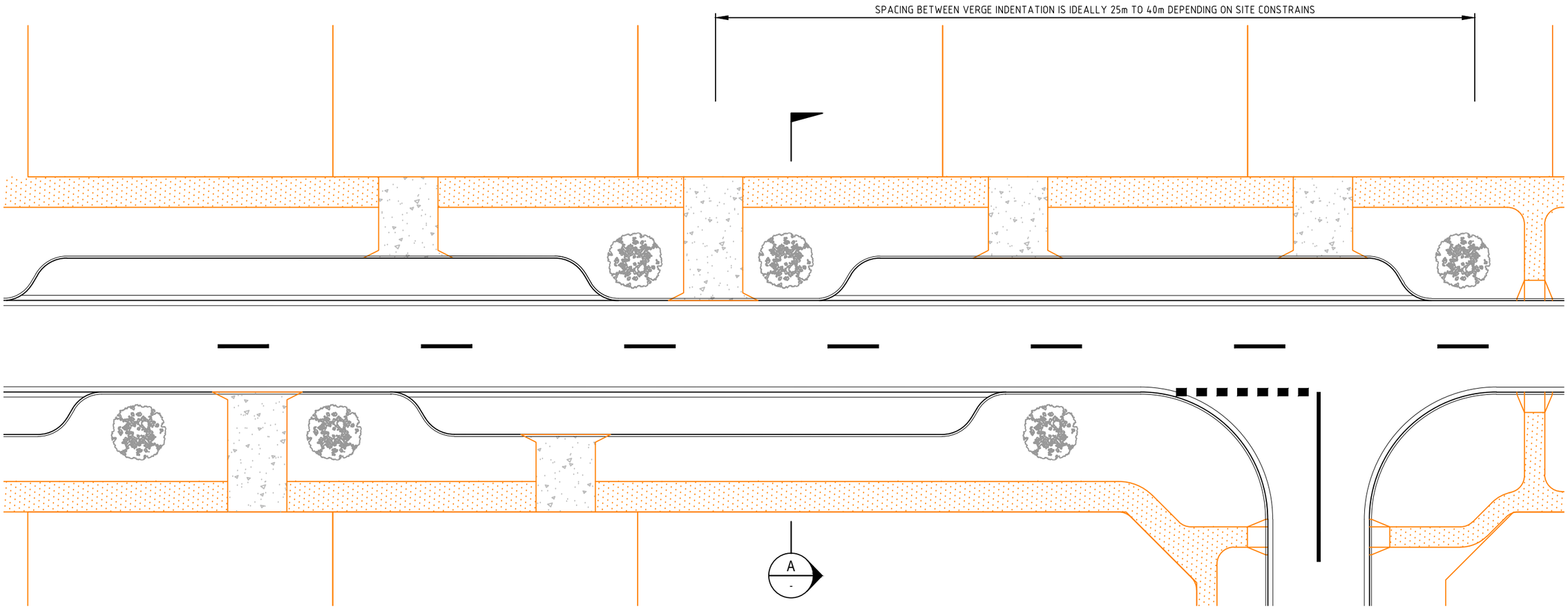
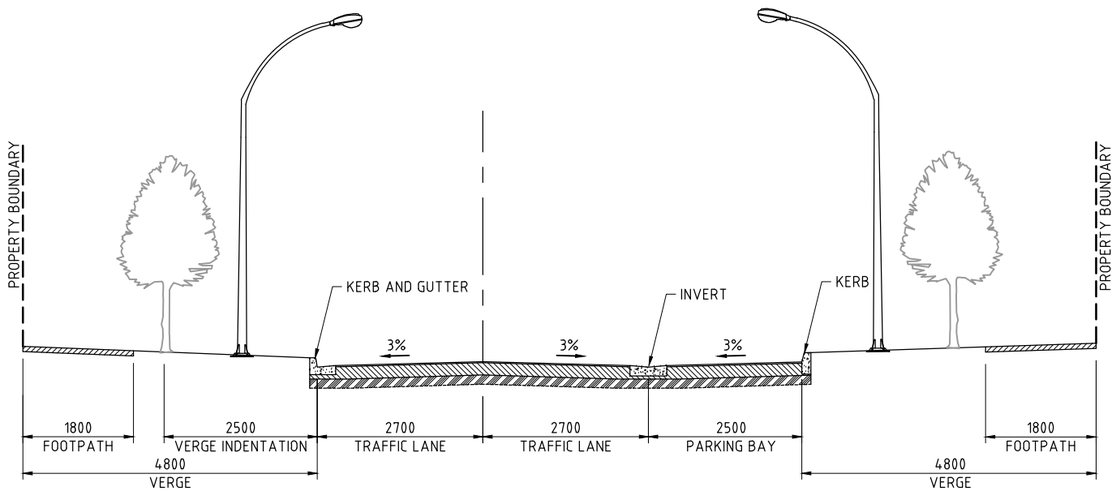
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING
URBAN ROAD RESERVE
SHEET 2

SCALE 1:100
DRAWING No. LC-201
AMDT. 0





SECTION A
TYPICAL SECTION ON SINGLE DWELLING LOTS <= 1000m2
1:100

1 0 2 4m
SCALE 1:100

2.5 0 5 10m
SCALE 1:250

0	DRAFT	APR'17	RC
ADMT	DESCRIPTION	DATE	AUTH

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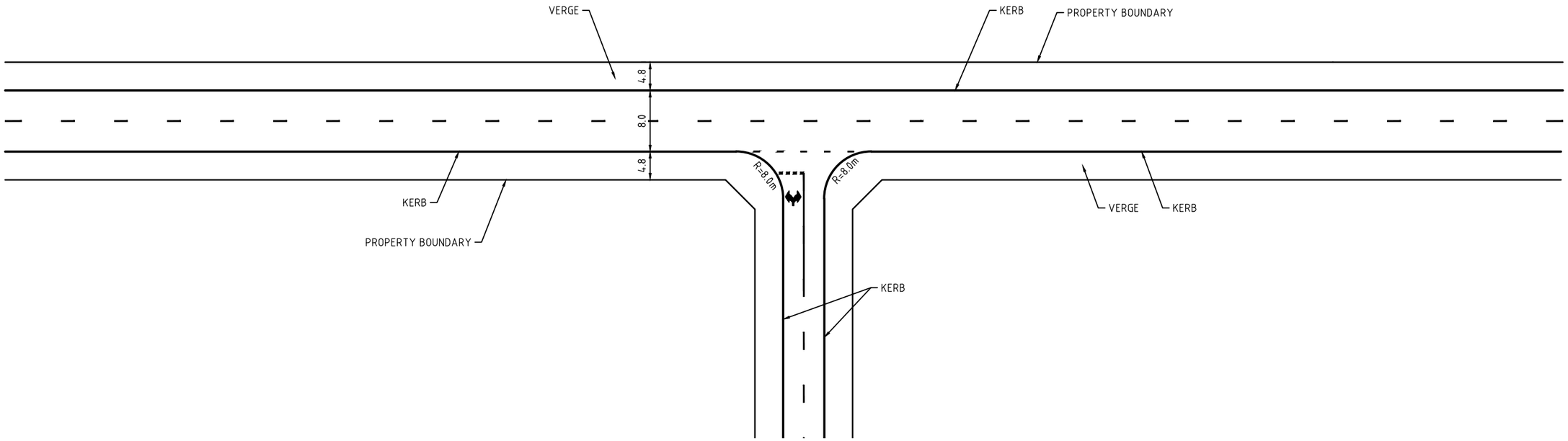
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

PARKING ARRANGEMENT - URBAN RESIDENTIAL
COLLECTOR, LOCAL <= 1000m2

SCALE AS SHOWN
DRAWING No. LC-202
AMDT. 0



BASIC LEFT TURN (BAL)
ON THE MINOR ROAD
NTS

GENERAL NOTES:

1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.

MINIMUM RADII FOR KERB RETURNS AT INTERSECTIONS				
	LOCAL	COLLECTOR	ARTERIAL	INDUSTRIAL
LOCAL	8	8	8	8
COLLECTOR	8	12.5	AS ADVISED	15
ARTERIAL	8	AS ADVISED	AS ADVISED	15
INDUSTRIAL	8	15	AS ADVISED	15

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

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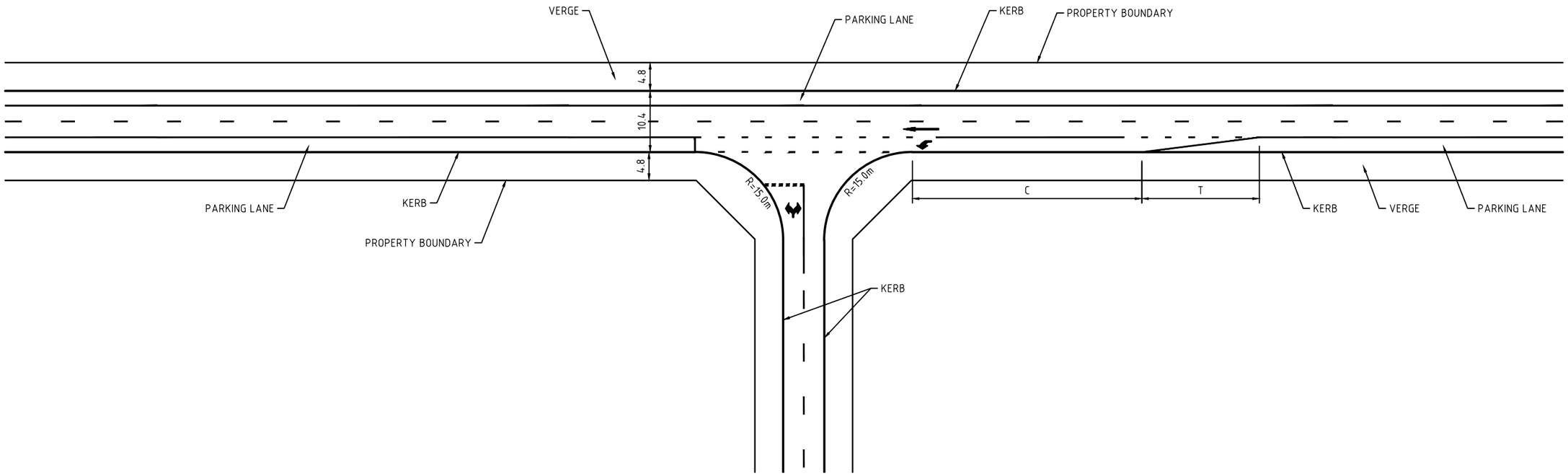
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING
URBAN ROAD INTERSECTION
TYPE 1

SCALE NOT TO SACLE
DRAWING No. LC-203
AMDT. 0



AUXILLARY LEFT TURN (AUL)
ON THE MAJOR ROAD
NTS

GENERAL NOTES:

1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

LITCHFIELD COUNCIL
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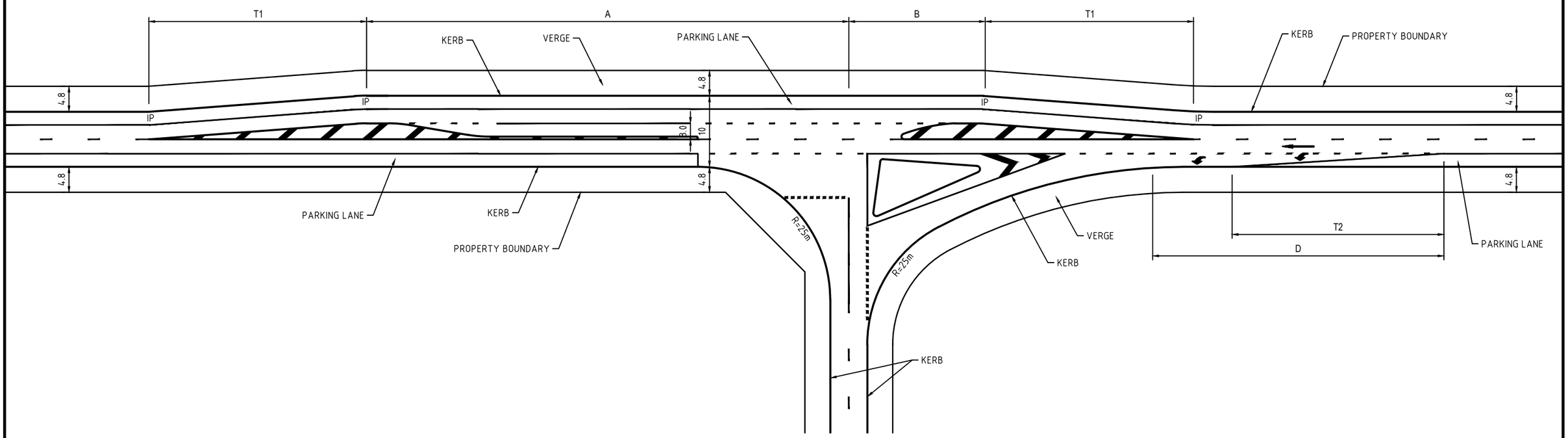
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING
URBAN ROAD INTERSECTION
TYPE 2

SCALE NOT TO SACLE
DRAWING No. LC-204
AMDT. 0



CHANNELISED LEFT TURN
ON THE MAJOR ROAD
NTS

GENERAL NOTES:

1. DIMENSIONS SHOWN ARE TO BE REGARDED AS MINIMUM DESIRABLE TREATMENT.
2. EACH INTERSECTION MAY HAVE SPECIAL REQUIREMENTS NECESSITATING DEVIATION FROM THESE STANDARDS.

DESIGN SPEED Km/h	T1	A	B	D	T2	RADIUS AT IP's
90	90	45	40	55	40	***2100**
80	80	45	40	45	30	***1800**
70	70	40	30	35	30	***1400**
60	60	40	30	25	20	***1000**
50	50	40	30	20	20	***1000**

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

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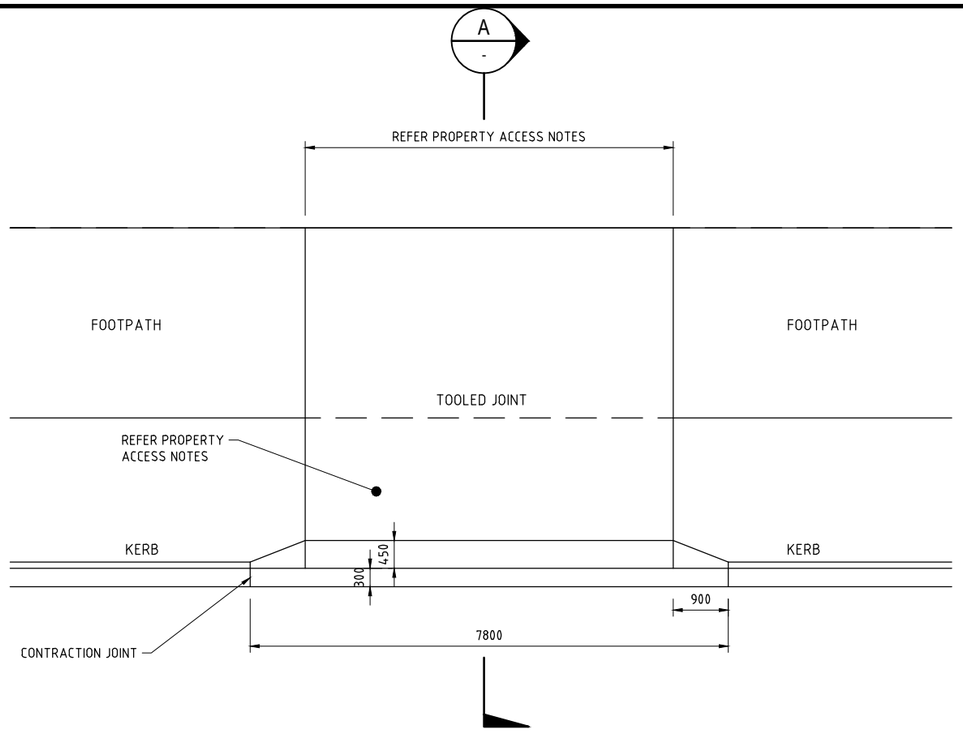
DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING
RURAL ROAD INTERSECTION
TYPE 3

SCALE
NOT TO SCALE

DRAWING No. LC-205

AMDT. 0



URBAN RESIDENTAL, INDUSTRIAL/COMMERCIAL PROPERTY ACCESS

1:100

PROPERTY ACCESS NOTES:

ZONING	WIDTH	DRIVEWAY MATERIAL
SINGLE DWELLING	3.5m	100mm CONCRETE, SL82MESH
DUPLEX	6.0m	100mm CONCRETE, SL82MESH
MEDIUM/HIGH DENSITY RESIDENTIAL	6.0m	150mm CONCRETE, SL82MESH
COMMERCIAL/ INDUSTRIAL	6.0m	200mm CONCRETE, SL82MESH

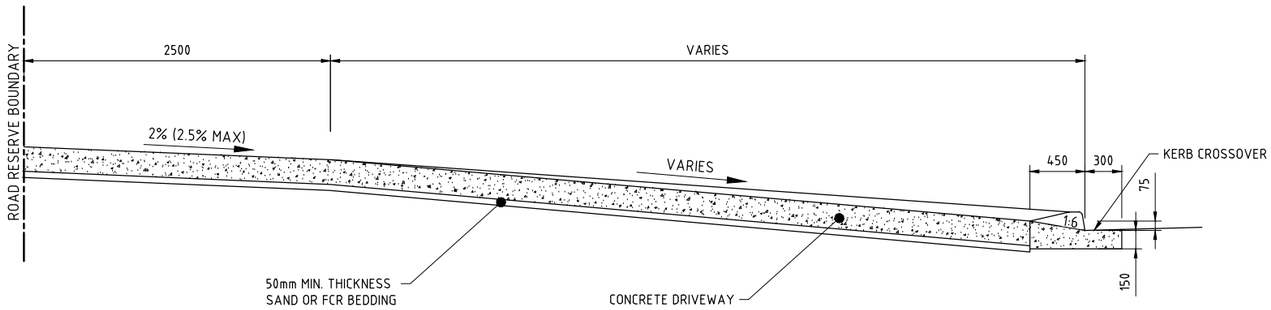
1. SUBGRADE TO BE COMPACTED TO 95% M.M.D.D.
2. FINISH WITH STEEL TROWEL FOLLOWED BY LIGHT BRUSHING WITH MOIST HAIR BROOM.
3. MOIST CURE FOR 48 HOURS, DO NOT USE DRIVEWAY DURING THIS PERIOD.
4. ACCESS FOR LARGER VEHICLES WILL REQUIRE INDEPENDENT DESIGN AND FURTHER APPROVAL FROM COUNCIL.

JOINTING NOTES:

1. CONSTRUCTION JOINT TO BE AT 4.00 METER CENTRES MAX. ROUGHEN AND CLEAN FACE OF HARD CONCRETE. REMOVE FOREIGN MATERIAL AND LAITENCE. COAT WITH MORTAR (2 SAND : 1 CEMENT) IMMEDIATELY BEFORE PLACEMENT OF FRESH CONCRETE.
2. EXPANSION JOINTS TO BE AT 12.00 CENTRES MAX. (EVERY THIRD CONSTRUCTION JOINT), AND AT ALL JUNCTIONS WITH EXISTING STRUCTURES. USE 12mm BIYCELL PREFORMED JOINT FILLER (OR SIMILAR) TO FULL DEPTH OF CONCRETE.
3. CONTROL JOINTS - DIVIDE PAVEMENT INTO RECTANGLES WITH 30mm DEEP JOINTING TOOL. JOINTS SHOULD BE SQUARE WITH CONCRETE EDGE AND EVELY SPACED ACROSS PATHS/DRIVEWAYS. CUT EVERY SECOND MESH BAR AT JOINT.

FOOTPATH NOTES:

1. REFER FOOTPATH WIDTHS IN URBAN ROAD RESERVE
2. 100mm THICK, N25 CONCRETE, ONE LAYER SL82 MESH CENTRAL.
3. LAID ON 50mm SAND OR FCR BEDDING.
4. FINISH WITH STEEL TROWEL FOLLOWED BY LIGHT BRUSHING WITH MOIST HAIR BROOM.
5. SUBGRADE TO BE COMPACTED TO 95% M.M.D.D.
6. CROSSFALL TO BE 2.5% MAX (1 IN 40).
7. LOCATE FOOTPATH EDGE 0.5m FROM PROPERTY BOUNDARY LINE.



SECTION A-A

150

1 0 2 4m
SCALE 1:100

500 0 1000 2000mm
SCALE 1:50

250 0 500 1000mm
SCALE 1:25

0	DRAFT	APR'17	RC
ADMT	DESCRIPTION	DATE	AUTH

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DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

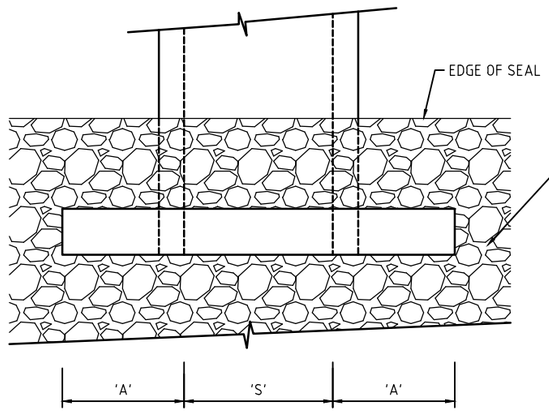
URBAN PROPERTY ACCESS AND CONCRETE FOOTPATH DETAIL

SCALE AS SHOWN

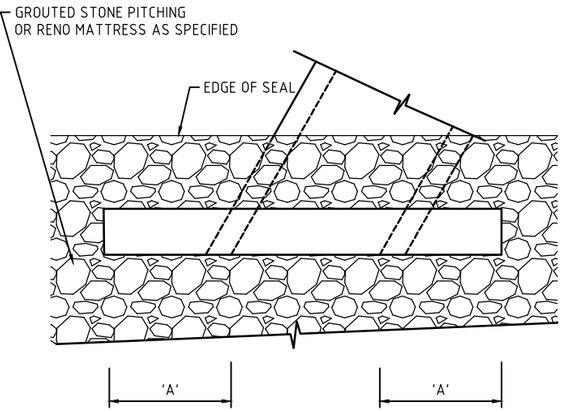
DRAWING No. LC-206

AMDT. 0

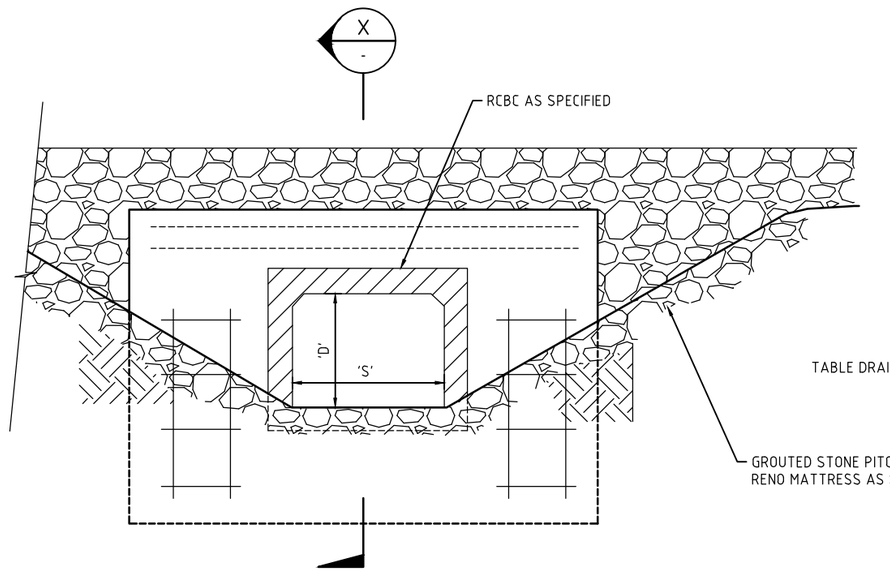
CONCRETE QUANTITIES PER ENDWALL						
BOX CULVERT SIZE 'S' x 'D'	'A'	'B'	'H'	QUANTITY OF CONCRETE PER ENDWALL (m3)		QTY.OF CONC.FLOOR PER METRE LENGTH
				SINGLE BOX	ADDITIONAL BOXS	
600x450	690	115	928	0.487	0.126	0.093
750x450	710	115	533	0.529	0.126	0.112
750x600	940	115	610	0.721	0.146	0.112
900x450	710	115	771	0.556	0.146	0.129
900x600	940	115	850	0.748	0.146	0.129
1200x450	730	130	1007	0.633	0.186	0.187
1200x600	960	130	928	0.835	0.186	0.187



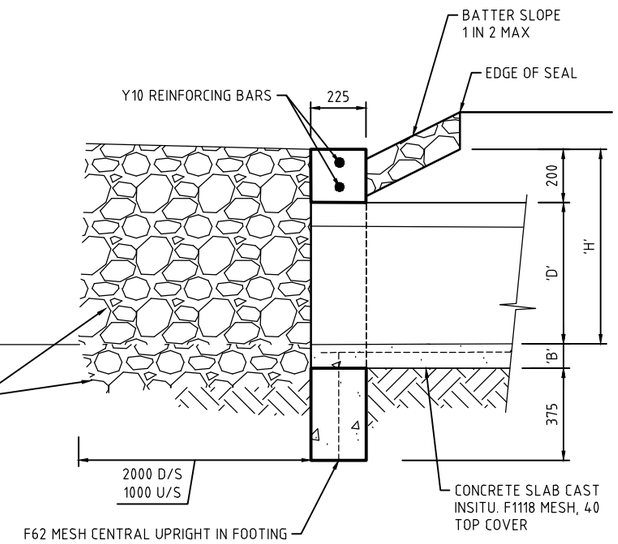
PLAN
NTS



PLAN - SKEWED CULVERT
NTS



ELEVATION
NTS



SECTION X-X
NTS

GENERAL NOTES:

1. R.C.B.C SIZE AND EXTENT OF STONE PITCHING SHALL BE APPROVED BY COUNCIL PRIOR TO COMMENCEMENT OF WORKS .
2. FOR MULTIPLE BOXES THE SPACING BETWEEN BOXES SHALL BE 25mm MINIMUM AND MORTAR FILLED .
3. Y10 REINFORCING BARS SHALL BE PLACED AT 100 CENTRES, 60 TOP COVER.
4. F1118 MESH LONGITUDINAL BARS IN CULVERT SLABS SHALL BE LAID IN DIRECTION OF TRAFFIC.
5. CONCRETE SHALL BE CLASS N15.
6. CONCRETE FLOOR SLAB TO EXTEND 25mm PAST R.C.B.C OUTER WALLS.
7. CONCRETE QUANTITIES ARE BASED ON ENDWALLS BEING PERPENDICULAR TO R.C.B.C.
8. STONE PITCHING PROTECTION TO BE EXTENDED TO ALL BATTERS GREATER THAN 1:4 ADJACENT TO THE ENDWALLS.
9. ON DRIVEWAYS, STONE PITCHING SHALL MATCH WITH THE BITUMINOUS SURFACE OF THE ACCESS. NO GAP BETWEEN THE SURFACE OF THE DRIVEWAY AND HEADWALL PROTECTION WILL BE ACCEPTED.
10. COUNCIL ONLY ACCEPT A MINIMUM OF 450mm HEIGHT CULVERT.

ADMT	DESCRIPTION	DATE	AUTH
0	DRAFT	APR'17	RC

LITCHFIELD COUNCIL
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DESIGNED LC
DRAWN AURECON
SHIRE ENGINEER ..... DATE .....

STANDARD DRAWING

CULVERT DETAILS AND ENDWALLS
325mm x 225mm TO 1200mm x 600mm

SCALE NOT TO SACLE
DRAWING No. LC-300
AMDT. 0