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A - GENERAL PLANNING REQUIREMENTS

1. INTRODUCTION

These Litchfield Council Development Guidelines (Guidelines) have been prepared to assist developers and others stakeholders (Designers, planners, contractors, etc.) in establishing the minimum standards acceptable to Council for the Design, Construction and Maintenance when subdividing or developing land within Litchfield Municipality.

These guidelines are presented in 3 sections to provide an easy and quick access to a particular topic of consultation.

ESTABLISH

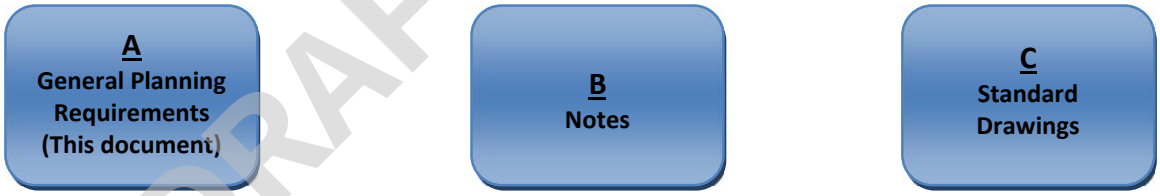
The Guidelines also aimed to:

- Standardise submissions as much as possible; in order to expedite approvals.
- Provide Developers / Consultants a quick access to the requirements that need to be considered during a Subdivision / Development.
- Provide the necessary information with regards of Council requirements prior to the issue of the Development Permit.
- Inform Developers / Consultants Council's administrative requirements further issued the Development Permit by DCA.
- Inform interested parties to comprehend the stages of Completion of works, outstanding works, and Defects Liability Period.
- Ensure that appropriate engineering practices have been applied at all stages of the new infrastructure, to ensure the safety of residents and to minimize maintenance / upgrade costs.
- Provide an upfront, clear and fair scenario for all Developers looking to carry out a project within the Municipality.

These Guidelines deal mainly with the requirements for large developments of multiple allotment properties and less with single lot developments.
Nothing within the Guidelines removes responsibility from any parties for their actions within the process.

The Guidelines are "living" documents and will be subject to changes / revisions as necessary, therefore Developers should utilise the current version of the relevant publications at any time to ensure that they are referring to the most current editions(s).

2. STRUCTURE OF THE GUIDELINES



PART A
This document aims to provide a practical guidance to assist Developers / Consultants about administrative matters that governs a development submission, design, construction, and final clearance.

PART B
The intention of this part is to draw the attention of interested parties to the conditions that they need to be aware during the Design and Construction of a Development.

Should any party requires additional information; the reader can obtain further details in Part C – Standard Drawings

PART C
Standard Set of Drawings

3. DISCLAIMER

Developer shall inform themselves fully, of all circumstances and conditions relating the information provided in these guidelines and read them in conjunction with relevant legislation.
Developer who has any doubts as to the meaning of any part of the guidelines shall seek clarification from the Planning Engineer of Litchfield Council.
No explanation or amendment to these guidelines shall be recognised unless in the form of a written addendum issued by the Director of Planning and works.
Council reserves the right to adjust a particular topic of the Guidelines where it deems to be reasonable.
Although care has been taken in preparing the information contained in the Guidelines, Council does not accept any loss or damage and accepts no legal liability whatsoever, that may result from the use of the Guidelines as does not guarantee, the accuracy, reliability, currency or completeness of any material contained on this document.

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B - SUBMISSION CONSIDERATIONS

4. GENERAL PLANNING REQUIREMENT

The Northern Territory Planning Act appoints the Development Consent Authority (DCA) as the body responsible for approving subdivision and development in the Territory.
The Northern Territory Government (NTG) and the relevant Minister are responsible for administering the Northern Territory Planning Act and NT Planning Scheme.

An application must be lodged with the Development Assessment Services (DAS) of the Department of Lands and Planning for any development that requires a Development Permit,

It is essential that applicants discuss their submission proposals at an early stage with:
• Development Assessment Services (DAS)
• Council
• Other Authorities (e.g. Power Water Corporation, Health Department)

As every development is unique, design criteria and standards are considered on their merits. This should be discussed with Council prior to and during planning submission.

Preliminary design work includes, but is not limited to:

- Road Layout and Design, Including Accesses,
- Stormwater Drainage,
- Pathways,
- Lighting,
- Waste Requirements,
- Landscaping
- External and Other Works Associated With or Affected by the Proposed Development.

Works are to be carried out in accordance with the approved drawings and specifications, relevant legislation, the requirements of the Development Permit and these Guidelines.

Final approval and acceptance will only be given when all works have been executed to the true intent and meaning of the approved drawings and specifications.

Council do not supervise or project manage developments. However, Council will carry out random inspections from time to time and join inspections as scheduled and requested. Inspections by the Planning Engineer shall in no way diminish the responsibility of the Developer to adequately supervise the works.

5. PLANNING PROCESS AND LITCHFIELD COUNCIL'S ROLE

5.1 Project Development - The Department Of Lands, Planning And The Environment

The Planning Act under Section 49 and 51 prescribes the matters under which the Development Consent Authority assesses an application. The application should address these matters, taking into consideration the NT Planning Scheme, Land Use Objectives, these Guidelines, and any other relevant legislation (e.g. Waste Management and Pollution Control Act).
In order to undertake a subdivision, consolidation or redevelopment, and application must be lodged with the Development Assessment Services (DAS) of the epartment of Lands and Planning. Therefore, it is essential for applicants to discuss their submissions proposals at an early stage with:

- Development Assessment Services (DAS)
- Council
- Others Authorities (i.e. Power Water Corporation)

Council reviews the plans and makes comments, after a development application has been lodged with DAS.

5.2 Early Engagement

It is recommended to all applicants, the engagement of the Development Assessment Service (DAS) and Council at the early stage of the submission to discuss their proposals. The Applications addressing DAS and Council's requirements minimize issues that may arise, after a Development Application have been submitted / issued.

5.3 Assessment Process

The Development Assessment Services (DAS) invites the relevant authorities and others stakeholders to submit comments relating to the application (e.g. Council, Telstra, Power and Water, Department of Land Resource Management, etc.). The Development Assessment Services assesses the merits of the application and comments received from these parties and provide recommendations to the Development Consent Authority (DCA). The DCA, Litchfield Division, meets at Whitewood Hall Howard Springs on a monthly basis to consider planning applications. A Developer or the Developer's representative can undertake verbal presentations and may have to answer some enquiries from public and authorities during this meeting.

Following to this meeting, DCA can:

- Issue a Notice of Refusal. Therefore, applicants has 30 days to lodge an appeal.
- Defer a decision, requiring additional information for further consideration.
- Issue a Notice of Consent - which indicates that DCA intends to issue a permit within thirty days. This gives objectors thirty days to lodge an objection with the Registrar of Lands, Planning, and Mining Tribunal. Once the thirty days has expired, and no appeal has been lodged, DCA issues a development permit, generally with a list of conditions some of which need to be met prior to the commencement of works.

5.4 Developer's Technical Representative

A qualified engineer "Technical Representative", must be appointed by the developer (at the developer's cost), to be the pivotal contact point with the Council for the whole of the project.

The Developer's Technical Representative will be responsible but not limited to:

- Submit engineering drawings and specifications in accordance with the Litchfield Council Engineering Standards for approval.
- Liaise and obtain consents and approvals from relevant authorities.
- Monitor all stages of design, construction, including clearing, excavation, drainage, pavement sealing, and Maintenance.
- Provide conformance test results as required by Council.
- Prepare and certify "As Constructed" plans and list of assets to be vested with the Council.

The Technical Representative must have both experience and proven background in subdivision development/construction work acceptable to Council (e.g. a licensed surveyor or qualified engineer). The Technical Representative must be available within 24 hours notice to be on site as required over the duration of the development work.

5.5 Responsibilities Of Designer / Construction Engineer

Unless approved otherwise by the Council,

- All Rural and Urban subdivisions, roads and drainage works designs shall be undertaken by a qualify Civil Engineer, experienced in the field.
- A qualified engineer, experienced in the field, shall supervise all rural subdivision roads and drainage works constructions.

5.6 Initial Submission And Review Of Documents

Prior to commencement of construction, a Development Application Form A along with all of the required design documentation is to be submitted for assessment and approval. Drawings will not be accepted for assessment unless signed as checked and/or approved for that particular issue by the appropriately qualified person for that discipline.

The submission is to contain all documentation, requested in FORM A of these Guidelines.

Documentation

- Proof of appointment of suitably qualified Consultant(s) to act for the Developer;
- Copy of any relevant agreements and supporting documentation if development is to be carried out on Crown Land
- Copy of Development Permit(s)
- Copy of permission to carry out works on other's land if necessary;
- Copies of approvals for Other Authority's designs
- Design Report;
- Variation to Guidelines report
- Declaration of Works (Please refer to Form B of these Guidelines);
- Certifications for any Structural works;
- Any other relevant documentation deemed necessary by the Planning Engineer.

Design Report

The design report is intended to act as an overview of the development/subdivision and includes a summary of all relevant information and design aspects, such as;

- Overview of the development/subdivision
- Copy of Proposed Subdivision plan;
- Stormwater Management Report Including drainage calculations
- Pavement design calculations and considerations
- Sediment and Erosion Control Plan;
- Summary of all relevant reports (geotechnical, erosion control etc)
- Geotechnical and Soil Types Report
- Geological and geo-hydrological Report;
- Environment Management Plan; (either including or a separate Heritage Site Plan and any reports pertaining to Aboriginal use of area)
- Standards used for the design (Austroads, Australian Standards etc)
- Summary of design as presented in the plans
- All details of design outside of the Guidelines
- Any other relevant information not provided elsewhere

Plans

- Copy of all signed and checked Civil Design drawings made up by, but not limited to the following:
  - Locality Plan
  - Stages plan (if required)
  - Typical road cross sections and general notes
  - Earthworks plan
  - Services plan including power, water, sewage, gas, communications, drainage
  - Road works layout,
  - Footpath and shared paths layout plan, including on-road bicycle paths
  - Road longitudinal sections and cross sections
  - Intersection, roundabouts, traffic calming and cul de sac details
  - Drainage and sub soil drainage layout, longitudinal sections, pit schedule
  - Traffic control devices, including line marking and signage;
  - Landscape plans including verge treatments and furniture;
  - Irrigation plans
  - Structural Drawings if required, i.e., retaining walls, fences, footings
  - Lighting categories and plans
  - Sediment and Erosion Control plan
  - Any other relevant drawings.

5.7 Key Authorities

Engineering services in the Northern Territory are the responsibility of various Authorities, but not necessarily restricted to the following as listed below:

- Local Government (Council) for all road works and associated earthworks, drainage works, verges, pathways, street lighting, streetscape and landscaping of Council owned public places;
- The Northern Territory Government Departments:
  - Construction and Infrastructure – for all road works and associated earthworks, drainage works, pathways, street lighting and street scaping for all roads gazetted as being controlled by the Department
  - Lands and Planning – for all development proposed on Crown Land,
- Department of Land Resource Management – for environmental matters and stormwater pollution, matters concerning water quality, clearing and erosion and sediment control.
- Power Water Corporation (PWC) – for all electricity reticulation, water supply and sewerage reticulation;
- Telstra or other communication providers;
- Northern Territory Police, Fire and Emergency Services (NTPFES) for fire fighting requirements
- Others for
  - CCTV and other security infrastructure
  - Environmental and other monitoring infrastructure

Clearances and/or approvals for construction will be required by Council from all relevant Authorities prior to works being accepted for ON Maintenance and may be required prior to approval for construction.

6. SINGLE LOT DEVELOPMENTS

The documentation required for single lot developments will be at the Planning Engineer's discretion and will depend on the extent of works. Any of the previously listed documents and plans may be required. As a minimum, the following must be submitted;

- Development Permit
- Stormwater Drainage Plan, including basic calculations
- Driveway/Access Plan
- Waste Plan, including bin enclosure and indication of waste truck manoeuvrability
- Landscaping

7. REVIEW OF DOCUMENTS AND APPROVAL

Once the submission has been accepted, the Planning Engineer will check the plans and specifications against Councils Guidelines submitting comments back to the Consultant.
Amended plans that are signed as checked and approved by the consultant are then to be resubmitted by the consultant for approval.
Once the plans and specifications meet all Council requirements, they will be stamped and signed by the Planning Engineer.
It is important to note that any approval granted does not construe that Council accepts responsability for the technical adequacy of the design. This responsabiity remains absolute with the "Design" Engineering Consultant".

8. FEES AND CHARGES

The Developer is required to pay to Council an amount to cover reasonable costs incurred in Council administering, assessing and inspecting design and construction of the works. These fees are part of Council Municipal Plan and are review and approved by Council every year.

9. CHANGES TO THE EXISTING INFRASTRUCTURE

Where an alteration is required as a direct result of the project, the developer will be responsible for all costs associated with the alteration including design, consultation, and physical works.

Where at the discretion of the Manager, an opportunity arises to alter existing infrastructure but not as a result of the development itself, then Council will fund such works.

10. CONNECTION OF NEW WORKS TO EXISTING

The Developer shall carry out connection of the new works to the existing Council's Infrastructure. The Developer's Technical Representative shall submit a Permit to Work Within a Road Reserve for Council approval prior to execute these works (Please refer to Section Permit to Work Within Roads or Road Reserve on this document).

11. RELEVANT LEGISLATION

In the process of preparation of the planning application, the Developer / Consultant should become aware of the relevant legislation, standards, and acceptable guidelines applicable to the project.

12. DEVELOPER TO INFORM THEMSELF

Developer shall inform themselves fully, of all circumstances and conditions relating the information provided in these guidelines.

Developer who has any doubts as to the meaning of any part of the guidelines shall seek clarification from the Planning Engineer.

13. STANDARDS AND AUSTROADS PUBLICATIONS

Reference to all Australian Standards (AS), Australian and New Zealand Standards (AS/NZ), Standard Drawings, guidelines, Austroads, ARRB publications and any other publication contained in this documents must be the latest version or amendment to those standards and publications unless otherwise specified.

14. ENGINEERING DRAWINGS, SPECIFICATIONS, SURVEY AND REPORTS

The developer or technical representative must provide a complete set of legible detailed engineering drawings with supporting specifications and reports in either hard copy (drawings to be A3) or, in PDF format.

The drawings, specifications, and reports must include the following where applicable.

15. GENERAL DRAWING REQUIREMENTS

a) The drawings must show sufficient detail to allow Council to accurately ascertain the feasibility of the design in all areas and to allow contractors to confidently construct the project.
b) Specifications must provide sufficient details to both support the engineering drawings and demonstrate that the design and construction criteria comply with the guidelines.
c) Where land is developed in stages, each stage must include a plan showing how the particular stage relates to the project as a whole. At least one plan of the area encompassed by the works, which may be a road or service plan, must clearly define the boundaries or limits of the subdivision.
d) All network utility services, including easements must be located at offsets shown on the Standard Drawings, except where an alternative location has been approved by the Planning Engineer.

Note that although Council does not control reticulated services (sewer, water supply, gas, power, and telecommunications) it does require this information to be shown on plans to prevent conflict with Council controlled services.

16. DRAFTING STANDARDS

Drafting standards must comply with the provisions of Australian Standard 'Technical Drawing General Principles' AS 1100101-1992 or superior.

Details of roads, stormwater, and miscellaneous infrastructure to be handed over to Council must be shown on separate drawings. Sewer and Water Supply can be incorporated onto the same plan. All remaining reticulated services can be shown on the same plan.

The following scales must be used:

• Plans	• 1 in 500 • 1 in 200
• Cross Sections	• 1 in 100 horizontal • 1 in 50 vertical
• Long Sections	• 1 in 500 horizontal • 1 in 50 vertical
• Cross Sections	• 1 in 100 • 1 in 50
• Details	• as required

17. DRAWINGS INFORMATION

The drawings should show, but not limited, to the following information:

- Roadwork
- Drainage
- Water supply
- Sewerage treatment plan
- Layout and details of Gas reticulation mains and ancillary work
- Layout and details of power cables, ancillary work
- Street lighting
- Telecommunications network
- Unconstrained land: Where the land may be subject to water logging or flooding, the plans need to show a building envelope for each lot with 1ha of unconstrained land and access to that land from a public road is similarly unconstrained. Documentation to justify the location of the building envelope must be provided.
- Any associated structures, pumps, special manholes, penstocks, retaining walls, bridges etc,

18. SURVEY INFORMATION FOR DESIGN

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

Units of measurement

The following units shall be adopted:

- Linear measurements shall be in mm
- Vertical measurements shall be in mm
- Azimuth shall be on the local plane rectangular grid system

19. SURVEY CONTROL NETWORK

Vertical and Horizontal Control

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

Horizontal Control

The horizontal control 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 25 m intervals on straights, and 12.5 m 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 100 metre intervals, at ant tangent points and at secant points.

Boundaries of the subdivision shall be clearly pegged to avoid disputes between landowners.

Notes
Where any unacceptable discrepancies in control marks due to land settlement, disturbance, or other factors are apparent, a discrepancy report will be prepared by the Developer and referred to the Director.
For each Project Design, the Developer / Designer must provide a sufficient number of benchmarks – surveyed in 3 coordinates: Easting, Northing and Height (AHD) - to enable the works to be set out accurately in accordance with the Drawings.

Level Control

Permanent Bench Marks to Australian Height Datum shall be established within the proposed or existing road reserves at spacing not greater than one kilometre or as required by the Planning Engineer.

e) Longitudinal Section: Levels shall be taken at all pegged chainages and at other salient points such as changes in grade, drains, etc.
f) Cross Sections: Cross sections shall be taken at all pegged chainages and at end of existing pavements. Levels shall be taken at centre line of road, at property boundaries, 10m inside property boundaries and at other salient point as mentioned above.

20. GEOTECHNICAL INVESTIGATION

Adequate site investigation shall be undertaken to determine the suitability of the subgrade to support the pavement design and to drain freely. The level of investigation should include the classification of the in situ soils and the particular soil characteristics.

Evaluation of the actual support provided to the pavement structure by the subgrade can be complicated by the strength variations that often occur with depth. It is essential that the potential effects of any weak layer below the design subgrade level be considered in the pavement design process, particularly for low–strength materials occurring to depth of about 1m.

If a layer of material of in-situ higher CBR material is selected and removed from the natural surface and stockpiled it shall be referred to as a "Sub-base".

The "Design CBR" used to design the pavement shall be based on the weaker underlying layer that exists up to 1m depth below the sub-grade surface level.

This information to accompany the design drawings being lodged for approval and it will be considered as the basis for the road design, drainage, and associated works such as protection works and landscape.

21. ENVIRONMENTAL MANAGEMENT

Under the Environmental Assessment Act (EAA) the Developer is responsible to take into account the harm effects that the Development may cause to the Environment. An Environmental Management Plan should be considered to be lodged joining the Engineering Plans. In particular, this plan should, but not limited to, control the effects of dust, stormwater runoff, vegetation removal, soil erosion and sediment control, material extraction, material stockpiles and noise.

C - CONSTRUCTION

22. COMMENCEMENT OF THE WORKS

21.1 Approval Of Engineering Drawings And Specifications

No construction works (including earthworks), must proceed until drawings and specifications have been approved. The Planning Engineer, following the satisfactory correction or amendment of any required detail, will provide the approval of the Engineering drawings and specifications in writing. The Assessment of drawings and specifications will be completed within twenty working days of initial receipt providing that the application contain the necessary information required by Council.

All approvals will expire if construction work has not commenced within one year of the date of the Planning Engineer's approval. Developer must seek written approval from the Director to extend this date. Nevertheless, the Director may request amendments to the approved drawings according to the current circumstances.

21.2 Variations To Approved Engineered Drawings And Specifications

Any alterations to the works in progress resulting in a variation from the approved drawings and specifications must be notified to the Planning Engineer in writing prior to the commencement of the works. Such works must not be commenced without approval from the Planning Engineer.

21.3 Inspections – Hold Points

Inspections shall form part of the approval of the plans.
Council may inspect any or all of the subdivision works or proposed site works.
The Council may enter upon the site of the works at any time before, during or after construction, without notice, for the purposes of such inspections.
Council shall be notified in writing 48 hours in advance of the commencement of the relevant stages specified in **FORM C – HOLD POINTS.**

23. NAMING OF ROADS

Application is to be made to NTG Place names Committee and resolved prior to completion of the Development.

24. WORKS WITHIN ROADS OR ROAD RESERVES

- Permit To Work Within A Road Reserve

  Where works are to be carried out within (or affecting) an existing road reserve or land owned or under the control of Council, a works permit to construct is to be obtained.
  If the Planning Engineer assesses a risk of damage to Council property or a liability has been identified, the Planning Engineer may request an appropriate security bond to be lodged prior to the permit being issued and the works commenced.

- Traffic Management Plan

  An approved Traffic Management Plan is required in accordance with Australian Standard AS 1742.3 prior to the commencement of any works in an existing road or road reserve. The plan must be prepared by a person registered in the NT with a Work Zone Traffic Management Plan Design Certificate (WZ1).

  The Developer / Permit Holders are solely responsible for all sub-contractors, plant, machinery, visitors and all movement of traffic and pedestrians within and surrounding the immediate development site. This responsibility exists twenty-four (24) hours per day, seven (7) days a week for the entire duration of works, including reinstatement works.

  The Traffic Management Plan should address at least the following:

  - Access point(s) and proposed route for construction works.

- Details of vehicle and equipment trafficking Councils roads and accessing the site from surrounding and connecting roads,
- Haulage routs,
- All personnel implementing Traffic Control shall have Work Zone licences, or a copy of their Statement of Attainment, on site and readily available for inspection.
- It is the Developers responsibility to notify all affected residents, owners, and service providers of works and disruptions

Dilapidation reports may also be required at the discretion of the Director.

25. INSURANCE

The developer must ensure that the following insurance cover is obtained prior to the commencement of any works within existing road reserves and that the cover remains current until the defects liability period has expired.

Public Liability	$20,000,000
Professional Indemnity	$1,000,000
Motor Vehicle/Plant Insurance	For all vehicles and for plant over $50,000
Contract Works Insurance	80% of the value of the works

Evidence must be provided to the Planning Engineer that insurance cover outlined above has been obtained and will form part of the approval consent process.

26. ON MAINTENANCE REQUEST FURTHER COMPLETION OF WORKS

When all works have been completed in accordance with the approved drawings, specifications and permit conditions, the Developer must request an inspection for practical completion and to have the works placed "ON Maintenance".

The following information, payments and documentation is to be submitted for acceptance:

- Completed ON Maintenance checklist (FORM E);
- Development Inspection Fee;
- Maintenance bond
- Lodgement of all outstanding works bonds(if required),
- Asset information (civil, structural, landscape, environment)
- As constructed and other documentation (civil, structural, landscape, environment)
  - Appropriately certified as constructed drawings compatible with the latest version of AutoCAD
  - The drawings are to be clearly marked "AS CONSTRUCTED".
- Certification of works
  - Statement of compliance
  - Non compliance report(s)
  - Inspection and testing and re-testing results and reports;
  - Other documentation such as:
    - ✓ Structural certification
    - ✓ Certifications by other disciplines and trades.
- Materials testing & compaction and other test results (civil, structural, landscape, environment):
- Clearances from other authorities and private owners;
- Proposed cadastral survey plan showing all easements;
  - The Planning Engineer will sign off the survey plans on aspects of easements and any other matter that affects the plan.

Any other documentation deemed necessary by the Planning Engineer.

The Planning Engineer shall issue to the Consultant an ON Maintenance certificate further to the assessment based on the above information.

27. ON MAINTENANCE INSPECTION

The ON Maintenance inspection is to be arranged following the practical completion of all construction works. The ON Maintenance Site Inspection Checklist (FORM E) will be used as a basis for the inspection. Following the inspection, the Planning Engineer will confirm with the Consultant/Developer/Contractor any items not in accordance with the requirements of the drawings and specification and the conditions set out in the permit.

The non-complying items (defects) shall be divided into:

- Items requiring completion or rectification prior to clearance being issued.
  - A further inspection of these works when completed or rectified shall be an extension of the practical completion / conditions clearance inspection.
  - These works are to be completed prior to works being placed On Maintenance or the conditions cleared;
- Other items to be completed, repaired or altered by an agreed date during the maintenance period.
  - These works may require a security bond(s) to be lodged;
- Any other outstanding matters requiring attention

28. VIDEO CAMERA INSPECTION RECORDS FOR DRAINAGE PIPELINES

Video camera inspections (CCTV) may be required for selected stormwater drainage pipelines and will be undertaken by Council. The cost of inspecting the stormwater pipes in the subdivision will be borne by Council. However, in the event that there are defects within the system the Developer will be required to pay for all additional inspection and testing costs.

The Planning Engineer will determine whether a CCTV inspection is required, it will depend on the results of onsite inspections and the certified construction report. Council will arrange with the Developer a suitable time for the inspection and the Developer must ensure the pipes are clean and accessible for the inspection.

29. MAINTENANCE BOND

A Maintenance Bond calculated at a percentage (specified in Council Municipal Plan - Fees and Charges) of the certified cost of the works is to be lodged prior the Works being placed On Maintenance.

The Maintenance Bond is to be held for the duration of the Maintenance Period and may be drawn upon by Council to carry out defect rectification, in the event that the Developer takes no appropriate action.

The amount of bond shall be released at the termination of the On Maintenance period, subject to the satisfactory completion of the defects rectification required by the Council.

30. BONDING – OUTSTANDING WORKS

The **Bond for Outstanding Works** is a security against the completion or and rectification works that need to be undertaken to conform to the approved drawings and these guidelines.

Council requires the works to be completed prior to Practical Completion rather than bonded. However, bonding may be accepted in lieu of outstanding works in some cases, strictly under the discretion of the Director.

Should outstanding works / defects exist, the Developer must submit to Council an application using Form G "Bond for Outstanding Works / Defects" if a Letter of Clearance for the project is seek. The Bond must be in Cash or Unconditional Guarantees from a financial institution acceptable to Council.

The name of the Developer appearing on the bond shall be the same as appears on the Planning Application and Development Permit.

The bond will be of an amount mutually agreed by both parties. However, in the event of inability of both parties to reach an agreement, the Director has the discretion to engage a quantity surveyor to estimate the value of the outstanding works. Consequently, the cost of this course of action will be further added to the bond.

Bond for outstanding works Applications
If a bond for outstanding works is sought, the Developer shall lodge and application to the Director requesting that the outstanding works to be bonded. Applications shall be in writing using the FORM G – Bond Application Form.

31. MAINTENANCE AND DEFECTS PERIODS

At any time during the maintenance period, Council will undertake random inspections to determine the satisfactory maintenance of the works.

- If, in the opinion of Council, and after due process, the works are not appropriately maintained, Council may call up the maintenance and any other applicable Bonds and undertake rectification works.
- Council's time in these matters will be charged to the Developer.

The minimum maintenance and defects period is 24 Months since the On Maintenance Acceptance. Additional defect periods will be required in the event that major rectification works are required during the maintenance period or at the discretion of the Director. The maintenance and defects periods will be extended as required to ensure all requirements of the Development have been completed to Councils satisfaction.

32. OTHER FINANCIAL CONTRIBUTIONS AND INFRASTRUCTURE DEVELOPMENT LEVIES

The developer must pay to Council all fees and charges – Subdivision and Development Fees as resolved by Council and applicable for the financial year in which the project proceeds. These fees include:

Infrastructure Developer Levy (IDL) - Council requires the Developer to meet the IDL payment prior to provide clearance to DCA. This levy is part of the Development Contribution Plan prepared by Council to ensure that Developers share the costs of providing infrastructure to meet future demand generated by the developments.

(a) The rate will be the current amount at the time of the request for clearance, and it applies to each new lot created based on the locality, as defined, in the Litchfield Council 'Developer Contributions Plan for Roads and Drainage'.

(b) Other payments – Council may required other payments to cover specific situations according to the nature of the project (e.g. the engagement of an specialist consultant to act in behalf of Council)

33. ASSET DOCUMENTATION

To meet legislated financial reporting, operational and maintenance needs Council maintains a Corporate Asset Register. Therefore, when assets are about to be placed 'On Maintenance" all relevant information about the asset must be provided, and in a suitable format, to Council. If defects are identified at the 'On Maintenance' inspection then the information of any changes must be provided as they occur.

Council recommends that at the design phase of the Development:

- The Developer should contact NTLIS - (NTG) to obtain spatial data of the parcel(s) of land (including Road Reserves) that are part of the development. This data can be supplied as a Drafting file for the Developer. (There is a minimum charge from NTG to supply this data - approx $100).
- The file would be requested as Easting, Northing File in Zone 52 (GDA94).
- The drafting file should be used by the Developer to geographically locate the future infrastructure as part of Development.
- All buildings, roads, road furniture, etc. - should be drafted as construction plans and then built as per the construction plans. Any changes to Asset on the ground would need to be captured by the drafting team back onto the as constructed plans.

By contacting NTLIS at the beginning of the Development phase and getting the Parcel information in a geographically correct location, all features drafted would be in the geographic correct location.

Once the project is completed, the Developer should supply the final drafting plans with all asset information through to Council. This information can be loaded directly into the Councils system to record the correct location and details of the assets created. Therefore, neither Council nor the Developer would need to engage a third party to capture the data once the Development has been completed.

Asset Information Required

Developer is to provide details and attributes of the assets using an excel spread sheet to Council as part of any development. Following are assets that the Developer must declare to Council indicating Geographical position and attributes (e.g. size, length, etc.)

Road assets group

- Road pavement and surface
- Kerb and Guttering
- Traffic Control
- Street Furniture
- Landscaping
- Off Street Car parks

Stormwater assets group

- Pipes
- Pits and Gross Pollutant Traps
- Open Drains
- Culverts
- Subsoil drains

Parklands assets group

- Landscaping
- Trees
- Irrigation system
- Furniture
- Equipment
- Structures
- Services

The Pathways group

- Walkways
- Shared paths and bicycle paths
- Driveways
- Footpaths

Lighting

- Comprises all elements of the lighting network metered and owned by Council

Property Group

- Land (owned by Council)
- Buildings and other structures
- Specific Asset Data Requirements (where applicable)

Detailed asset information required includes but is not limited to the following items:

- Asset Description
- Asset Location – suburb; segment; street; park
- Asset Dimensions – specific to asset type; segment etc,
- Asset Type – eg. Road; building, park; tree, pathway; stormwater network, plant, equipment, etc.
- Date / Year of manufacture or construction
- Creation Costs – cost of purchase or construction

Appendix D: Example of Asset Declaration: Subdivision at Coolalinga, provide an example of an assets declaration.

D - OFF MAINTENANCE – CLEARANCE

34. OFF MAINTENANCE (CLEARANCE)

On completion of the project, the developer must obtain confirmation from Council that all works have been constructed to the true intent and meaning of the approved drawings, specifications and the conditions on the Development Permit in accordance with Section 62(1)(b) of the *Planning Act* 2009.

33.1 Acceptance of Works OFF Maintenance

A written request is to be submitted to Council at least 30 days prior to the end of the maintenance period for acceptance of the works OFF Maintenance and for the release of the maintenance bonds. This submission must include the "Off Maintenance" Site Inspection Check List (FORM F) signed by an experienced registered civil engineer.

The Developer / Consultant is responsible for ensuring that the works are finalised and in such condition that they can be accepted to be OFF Maintenance and taken over by Council for future care and maintenance.

OFF Maintenance will not be issued unless all outstanding defects and omissions are completed to the satisfaction of the Planning Engineer and/or and appropriate Inspection has been carried out by both Developer and Council.

33.2 OFF Maintenance Certificate

When all outstanding defects and omissions are completed to the satisfaction of Council, the Planning Engineer will issue to the Developer an OFF Maintenance certificate. The certificate will confirm that the whole of the works are satisfactory to Council and that the Council will place the works OFF Maintenance;

The certificate will have no effect until both the Planning Engineer and the Developer have executed the document.

The original of the OFF Maintenance certificate will then be issued to the Developer. Any Maintenance and other bonds being held will then be returned to the Developer.

35. ARBITRATION

In the event of a dispute between the developer and Council over any engineering activity associated with the project, a meeting between both parties must occur no later than 10 working days to resolve the conflict. The contents of the guidelines must take precedence in all decisions. Where the guidelines do not provide a solution to the dispute, Council must decide the outcome of the dispute.

36. PRECEDENCE

Where conflict arises between documents associated with the project, the guidelines must take precedence unless agreement can be reached between both parties.

APPENDICES

Appendix A: Definition and interpretation

Access	The point of access to a property within the road reserve, ceasing at the property boundary.
Approved	The approval given by the Director of Planning and Works
Clearance to DCA	Council clearance to DCA of Council conditions included in the Development Permit and if applicable, to the payment of a contribution required under Part 5 of the Planning Act.
Council	The Litchfield Council
Construction Cost	The cost to construct the Project / Development works on question. Estimated Construction Cost shall be that estimate for all envisaged works based on Current Market rates. Actual Construction Cost shall be the actual cost to construct all necessary components of work. The Developer shall provide Construction Costs in and legible Schedule format to the Director for ratification and approval.
DAS	Development Assessment Services (assessment section of the Department of Lands, Planning and the Environment)
DCA	The Development Consent Authority.
DCI	Department of Construction and Infrastructure of the Northern Territory
Developer	The person/company responsible for the land to be subdivided/developed
Development Permit	Documentation issued by Development Consent Authority. The Development Permit usually will have various conditions specified. Part 5 of the Planning Act requires a developer to demonstrate to the Development Consent Authority compliance with conditions the Council and service authorities have set so that titles can be issued.
Developer's Technical Representative	The person or persons appointed by the developer to represent the developer.
Director	The Director of Planning and Works, Litchfield Council or such persons duly authorised to act on their behalf
DLP / On Maintenance	Defects Liability Period or On Maintenance Period is a 24 months period from the date of practical completion of works by the developer where the developer will be responsible for the correction of any defects.
Driveway	The continuation of the property's access from the road reserve to inside the property boundary.
Engineering Approval	Engineering plans, specifications and reports for the project approved by the Director of Planning and Works so that construction works can proceed.
Environment	The natural and built environment and all aspects of surroundings including physical, biological and aesthetic aspects.
Geotechnical Specialist	A Geotechnical Engineer or Engineering Geologist who is a Chartered Professional Engineer (CPEng) experienced in the field of soils engineering and more particularly land slope, foundation stability and capability of soils in water logged conditions.
Guidelines	The Litchfield Council Development Guidelines for the subdivision or development of land

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	within the Municipality of Litchfield.
IDL	An Infrastructure Development Levy as defined by the Litchfield Council Development Contribution Plan.
DLRM	Department of Land Resource Management
NTEPA	Northern Territory Environmental Protection Authority
NTG	The Northern Territory Government
Officer	Duly authorized person to act on behalf of the Director.
Planning Application	A formal plan and documentation identifying the proposed development which has been lodged with the Department of Lands Planning and the Environment. The plans and documentation should contain sufficient information to allow Council to assess the merit and compliance of the proposal with the Planning Scheme and the guidelines.
Pollution Incident	An incident where there is, or is likely to be a leak, spill or escape of a substance which causes pollution.
Services	Includes water, sewerage, stormwater, power, gas, or telecommunications, whether below, on or above ground
WSUD	Water Urban Sensitive Design
1ha Unconstrained Land	The requirement of the planning scheme (Table to Clause 11.1.1) that one hectare of land and an adjacent property access and driveway not be subject to water logging or flooding.

APPENDICES

Appendix B: Example of Construction Cost Declaration.

ITEM	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
1	MISCELLANEOUS				
	Establishment (Mobilization & Demobilization)		Item		10,000
	Project Notice Board	1	No		
	Gas Pipe Concrete Protection Slab	1		3,000	3,000
2	PROVISION FOR TRAFFIC				
	Includes traffic management plan, detours, access to adjacent properties, traffic guidance, traffic control devices, warning devices, maintenance, and restoration		Item		8,000
3	CLEARING AND GRUBBING AND REHABILITATION				
	Includes removing vegetation, striping and stockpiling, top soil respreading, removing of debris of unrecoverable fencing, drainage structures, old surfaces and other obstacles. Reinstatement and cleaning up		Item		8,000
4	EARTHWORKS				
a)	Earthworks in Cut	4,090	m3	10	40,900
b)	Earthworks in Fill	4,200	m3	18	75,600
c)	Prep & Maintenance Subgrade	22,925	m2	3	68,775
d)	Turnout Table Drain		Item		4,000
5	DRAINAGE WORKS & PROTECTION WORKS				
	Extend 2x 600mm RC Pipes Class 4	3.66	m	1950	7,137
a)	Install RCBC1200 x 600 (Supplied by Council)	18.42	m	400	5,368
	Combined Concrete Headwalls (RC Pipes & RCBC)	2	No	5500	11,000
b)	Drop Structures				
	i) Type 1	14	No	2100	29,400
	ii) Type 2	10	No	2500	25,000
c)	Reinforced Concrete Floodway margin	450	m	80	36,000
d)	Lay 300mm nominal size Dumped rock with geotextile underl	900	m2	15	13,500
6	PAVEMENTS AND SHOULDERS				
a)	Type 2 Gravel for Base (150 mm compacted thickness)	20,675	m2	25	516,875
b)	Stabilizec gravel base for floodway (200mm compacted thick	2,250	m2	30	67,500
7	SPRAY SEALING				
a)	Preparation of pavement	18,125	m2	0.33	5,981
b)	Prime Coat 1.10Lt/m2	19,938	Litres	2.60	51,838
c)	14 mm Seal Coat 1.80lt/m2	32,625	Litres	2.20	71,775
d)	Second seal coat 1.1 lt/m2	3,427	Litres	2.20	7,538
e)	Supply and Application of Aggregate including precoat				0
	i) 14 mm aggregate	18,125	m2	3.50	63,438
	i) 10 mm aggregate	3,115	m2	3.50	10,903
8	ROAD FURNITURE				
a)	Road Signs - Supply and Install				
	i) G9-803	2	No	900	1,800
	ii) W5 7	2	No	400	800
	iii) R1-2	1	No	400	400
	iii) G3-5 (2 SIDED)	1	No	600	600
	iv) D4 - 4A	1	No	600	600
	v) Litchfield 'T' Intersection	3	No	600	1,800
b)	Guideposts	42	No	20	840
c)	RRPMs				
	i) Red Uni-directional	190	No	15	2,850
	ii) White Bi-directional	87	No	15	1,305
	iii) White Uni directional	5	No	15	75
	iv) Yellow Bi-directional	38	No	15	570
d)	Linemarking				
	i) Edge Line (EL)	4,392	m	2	8,784
	ii) Broken Lane Line (BL)	2,005	m	2	4,010
	iii) Continuity Line (CL)	34	m	2	68
	iv) Hold Line (HL)	5	m	2.5	13
	v) Double Barrier Line (DBL)	72	m	3	216
	vi) Single Barrier Line (SBL)	120	m	3	360
Total					

Prepared By: **Signature** **Date:**

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Appendix C: Relevant Legislation is applicable to Subdivisions / Developments.

Other Legislation may be applicable therefore, the Developer shall not be bounded merely for the list given below.

- **Northern Territory Aboriginal Sacred Sites Act 2003**
  If a proposal impacts on an aboriginal cultural heritage site an application for a certificate to undertake works has to be made to the Aboriginal Areas Protection Authority.
- **Environment Assessment Act 1982**
  Where a proposal has identified environmental impacts a Notice of Intent must be prepared and submitted to the Department of Land Resource Management.
- **(Commonwealth) Environment Protection and Biodiversity Conservation Act 1999**
  If the proposal involves land owned by the Commonwealth Government or will impact on matters of national environmental significance a referral must be submitted to the Commonwealth Minister for Sustainability, Environment, Water Population and Communities.
- **Heritage Conservation Act 1991**
  This Act relates to the protection of natural cultural heritage, aboriginal and archaeological sites of significance. A search of the NT Heritage Register will indicate whether heritage factors need to be considered in the application.
- **Soil Conservation and Land Utilization Act 1978**
  This Act seeks to prevent soil erosion and facilitate soil conservation and land reclamation. Any works constructed as part of this project will need to initiate measures that will prevent erosion and sedimentation arising from runoff.
- **Waste Management and Pollution Control Act 1998**
  This Act promotes waste minimisation and the prevention of pollution and sets standards which need to be met when carrying out works.
- **Dangerous Goods Act**
- **Environmental Assessment Act**
- **Environmental Offences and penalties Act**
- **Environmental Protection and Biodiversity Conservation Act**
- **Soil Conservation and Land Utilization Act**
- **Waste Management and Pollution Control Act**
- **Water Act**

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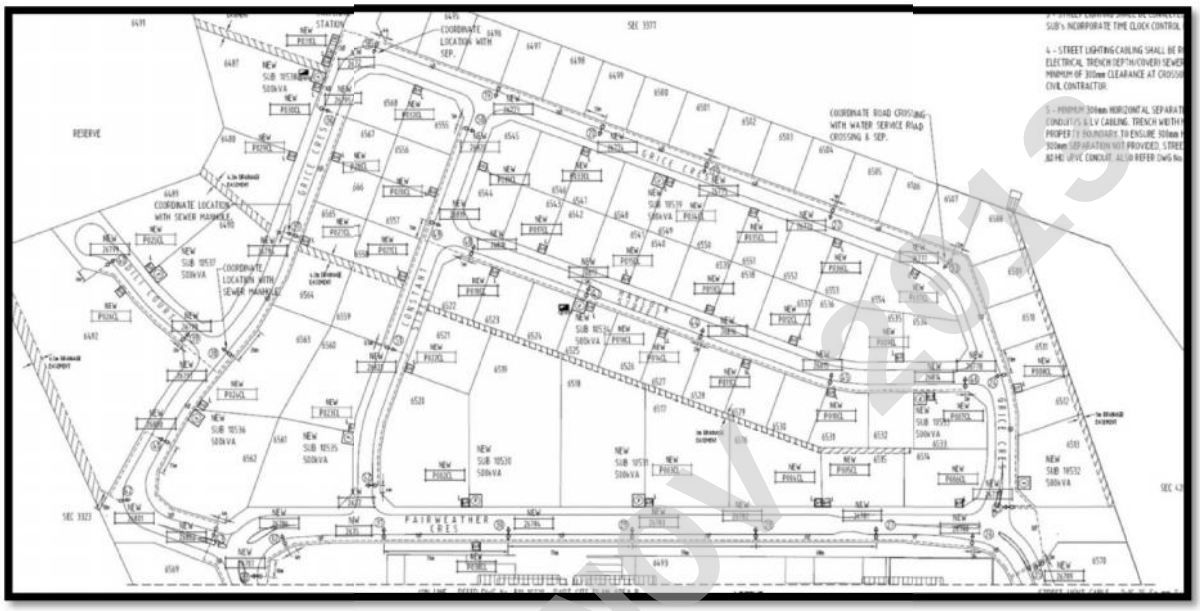
Appendix D: Example of Assets Declaration: Subdivision at Coolalinga

Plans are drafted using Parcel data supplied from the NTG.
All drafting is added to the original polygons - including proposed property, road, and road furniture information.
These layers are then sent to Council at the end of the Development.



In this case, all of the streetlights are supplied as a layer with an XLS spreadsheet of the Street Light details - and this can be loaded easily into the Councils database for use on Maintenance once the Defect period has elapsed.

POWER AND WATER TO CARRY OUT ABOVE WORKS.

STREET LIGHTING POLE/LUMINAIRE SCHEDULE

POLE No.	STREET LIGHT No.	SIZE	TYPE	OUTREACH	LUMINAIRE TYPE	REMARKS
18	26772	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
19	26773	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
20	26774	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
21	26775	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
22	26776	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
23	26777	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
24	26778	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
24	26779	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
26	26780	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
27	26781	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
28	26782	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
29	26783	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
30	26784	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
31	26785	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
32	26786	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
33	26787	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.
34	26788	9m	RIGID	1.5m	150W HPS	NEW 'INGAL/EPS' POLE/OUTREACH WITH 'REXEL' OPTISPAN 150W HPS LUMINAIRE.

APPENDIX 2 - SCHEMATICS FOR DETERMINING PERCENTAGE COVER OF VEGETATION

Schematics for vegetation cover of 1%, 5%, 10%, 20%, 40%, 60% and 80% are provided in this appendix. These schematics will be useful when assessing drainage works.

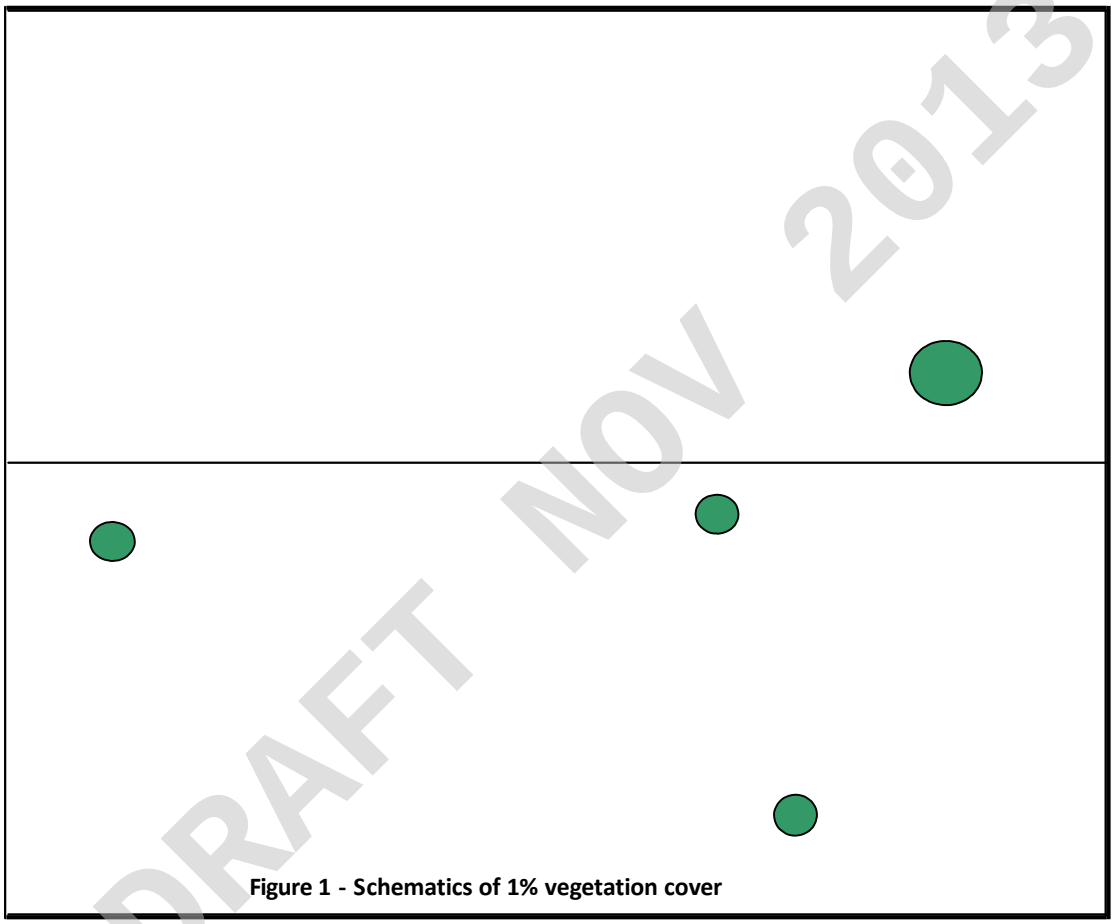


Figure 1 - Schematics of 1% vegetation cover

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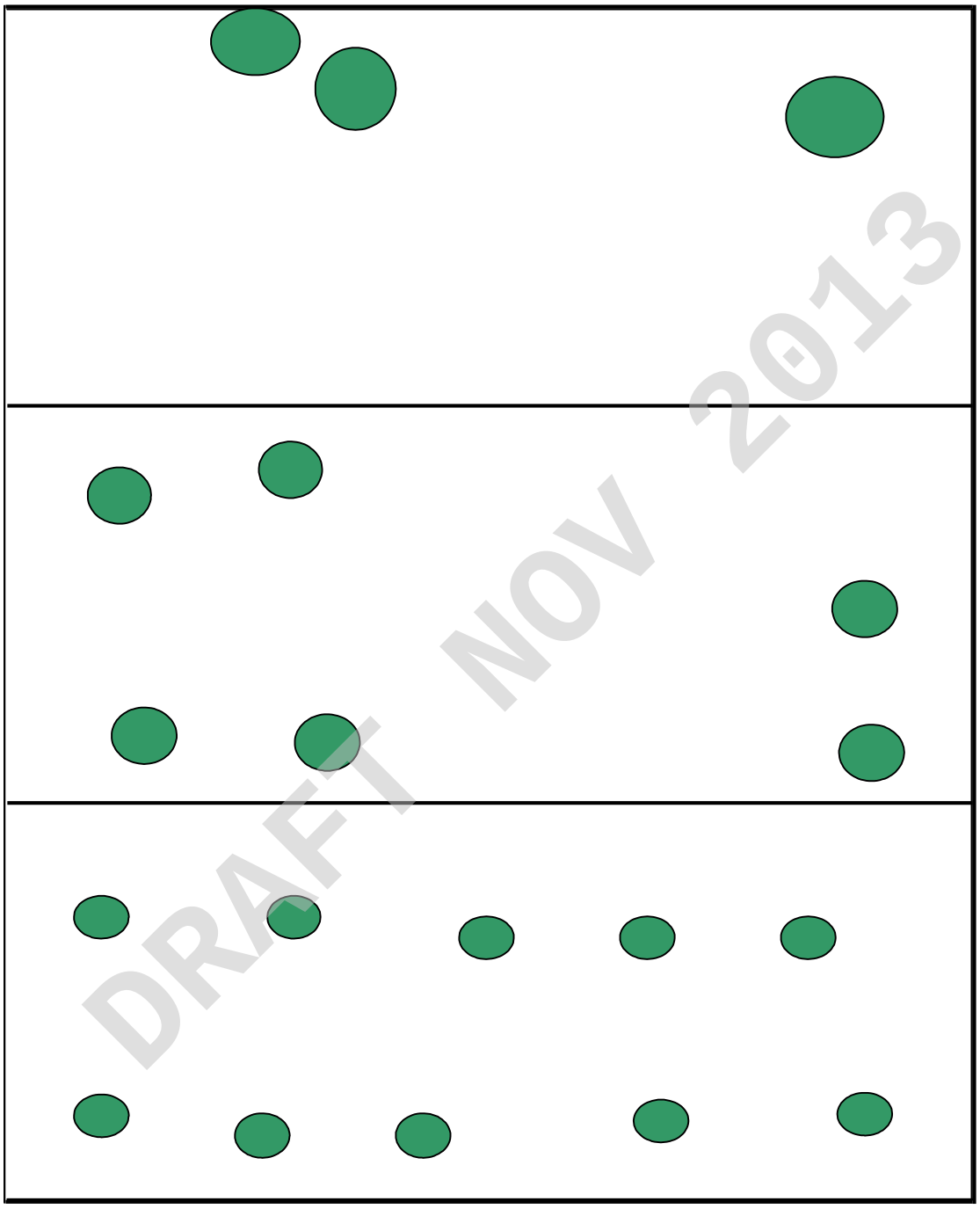

Figure 2 - Schematics of 5% vegetation cover

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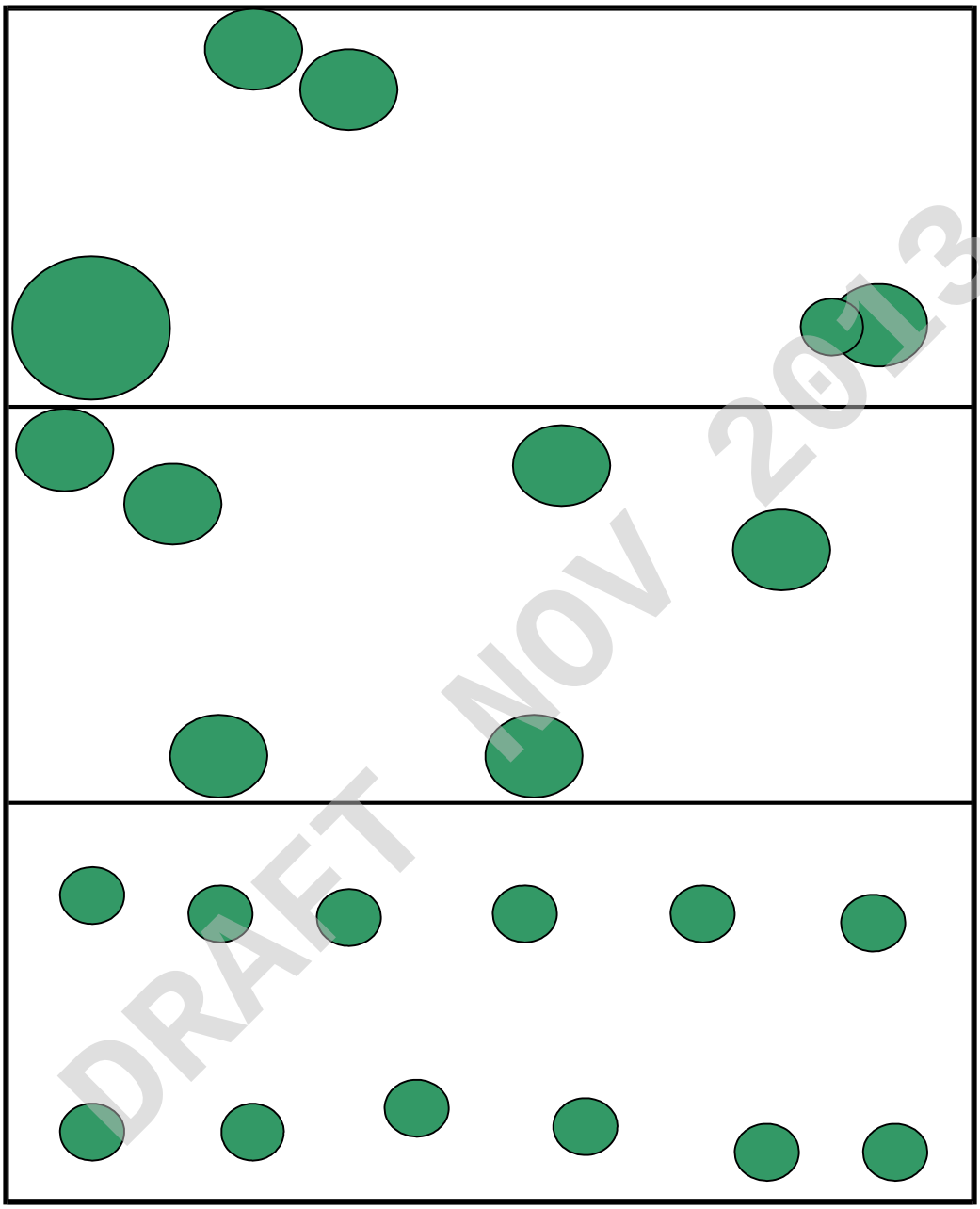

Figure 3 - Schematics of 10% vegetation cover

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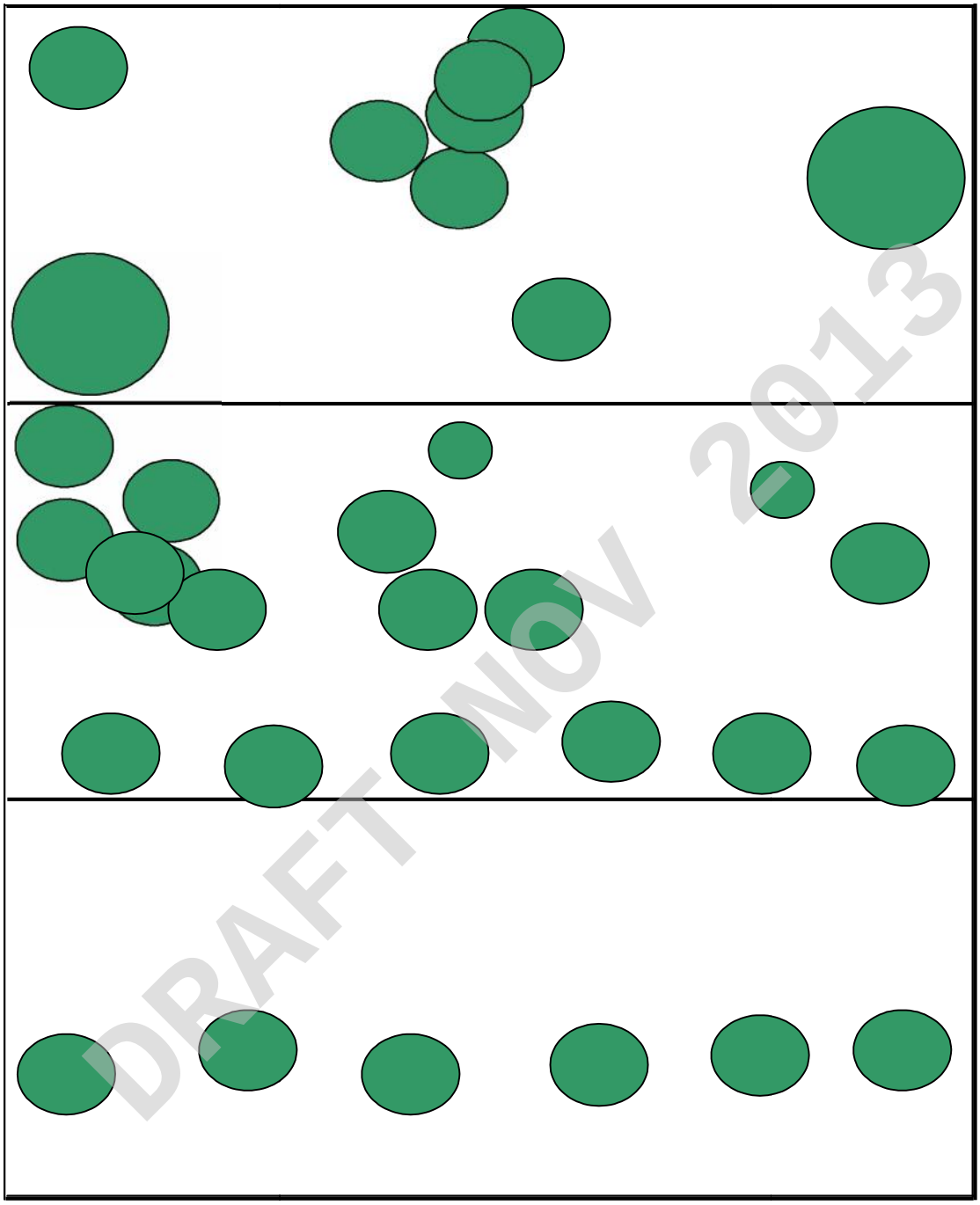

Figure 4 - Schematics of 20% vegetation cover

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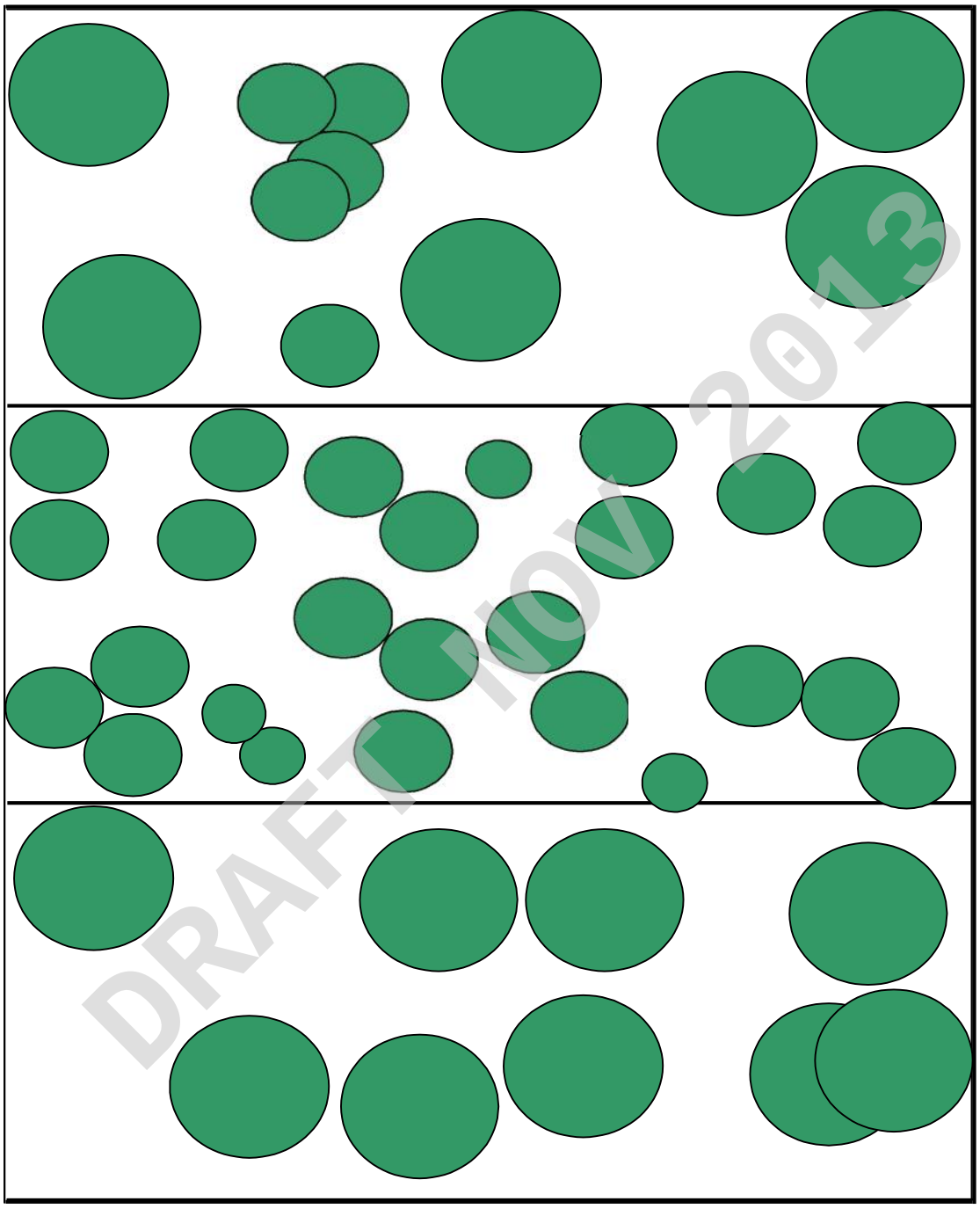

Figure 5 - Schematics of 40% vegetation cover

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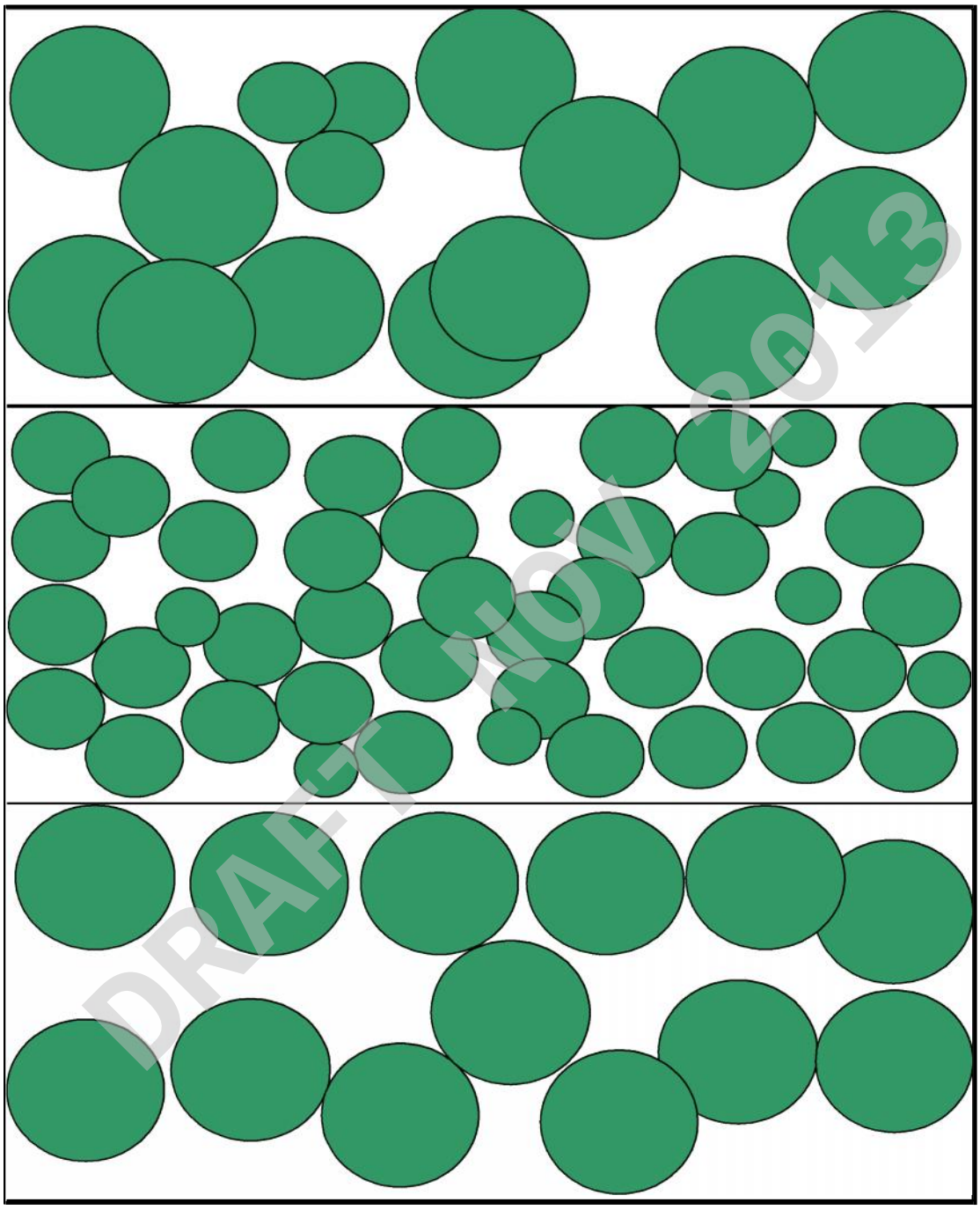

Figure 6 - Schematics of 60% vegetation cover

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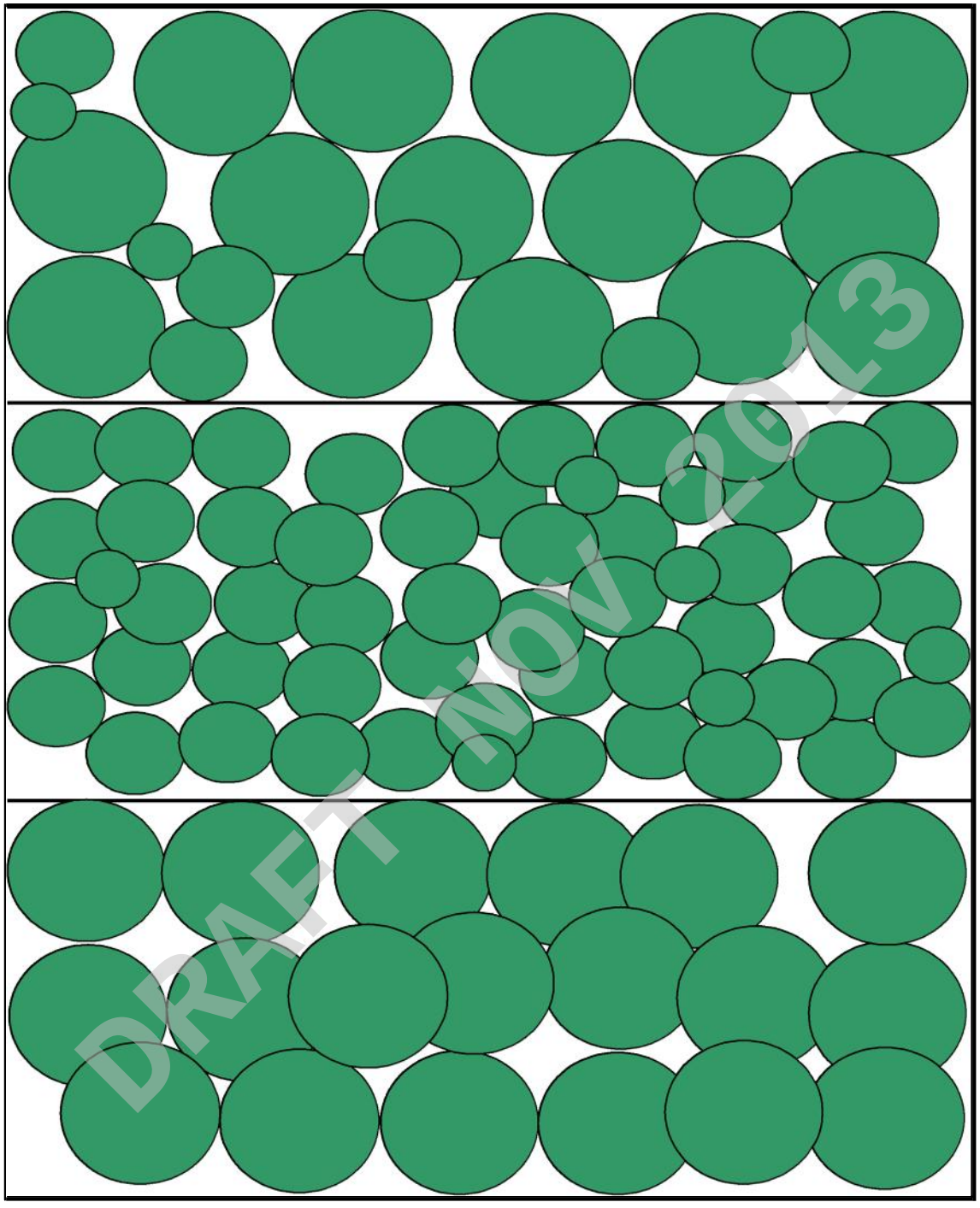

Figure 7 - Schematics of 80% vegetation cover

PLANNING – DEVELOPING GUIDELINES
GENERAL PLANNING REQUIREMENTS

Dated Released: Nov - 2013
Version: V1

B - STORMWATER DRAINAGE

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1 STORMWATER DRAINAGE

All subdivisions / developments are required to be provided with an adequate stormwater drainage system in accordance with Council's Drainage Philosophy and Design Criteria. This includes consideration for the environment, safety and future maintenance requirements.

The stormwater drainage design is to be based on a system of sealed roads, open channels, kerb and gutter, entry pits and underground drainage supplemented where applicable by a system of flood ways, preferably located in open spaces or drainage reserves isolated from residential or other critical risk areas.

Due to the limitations inherent in Darwin's climate, all stormwater drainage within any development must embrace the principles of Water Sensitive Urban Design (WSUD). Developers shall follow the Guidelines set out in the Darwin WSUD Strategy (prepared by the NT Government) in its current version.

The drainage system shall be designed to cater for two different storm events, the initial storm, and the major storm (usually Q100) in accordance with NT Planning Scheme.

- On Urban Areas, all stormwater runoff generated under the initial storm is to be collected and connected to the underground drainage system.
- Storms greater than the initial storm will be controlled within the road reserve as described in Clauses **4** and **12** of this document.
- If necessary, all of the major storm flow may have to be contained under-ground.
- On rural areas, all stormwater runoff generated by initial storm, is to be managed using drainage systems constituted mainly by culverts and open channels.

While roadways may form a floodway, they are not to be viewed as primary drains and flood ways. Public amenity, usability, risk, and safety are to be paramount considerations.

Considerations is to be given to the impact of the proposed drainage system on existing drains and buildings and downstream catchments. Council may require approval from affected properties with regards to the proposed stormwater plan.

To avoid mosquito breeding and associated issues, all drainage systems and associated structures should be designed in consultation with The NT Environmental Protection Authority (NTEPA) and NT Government Entomology Section of the Department of Health and Community Services. Council will not accept large bodies of standing water for periods longer than 5 days after a major storm event. Council will only consider standing water bodies where used in conjunction with wetland environments and supported by the above Agencies.

2 PRELIMINARY DRAINAGE PROPOSAL AND INVESTIGATION

Prior to making a Development Application, a preliminary drainage proposal and investigation will be required:

- A Plan showing all external catchment areas affecting the development including topographical features e.g. lagoons, perched swamps, watercourses, etc.
- The proposed drainage system draining to and through the whole development showing direction of the flow, existing drainage infrastructure (e.g. I/O culverts indicative levels, channels, etc.)
- drainage Calculations (in the design Calculation Document) defining the drainage requirements for initial and major storms,
- A hydrological analysis demonstrating that the post flow design does not exceed the pre-design flows (applicable in rural environment and / or large developments)
- Recommending types and locations for WSUD strategies,
- Consideration to future high tide occurrences,
- Identifying necessary flood ways and any upgrades required to existing infrastructure.

Results of this investigation shall be included on a master plan for drainage which shall be provided to Council for approval prior to commencing any stage of the development.

In case a new development is to be staged, overall drainage plans for the whole catchment(s) is to be provided prior to the Developer seek Council's approval for any individual stage. Drainage for each individual stage must be designed and constructed in accordance with the master plan and in a manner that connects and disposes of all storm water to the ultimate solution.

2.1 Flood Management and Control

The stormwater management system shall incorporate flood retardation to the satisfaction of Council where it is considered feasible and practical in the context of the proposed development, with the aim of preserving post-development peak flows discharged from the site close to pre-development levels.

Flood retardation storages can be designed with WSUD systems such as wetlands and bio-retention systems and can be placed in naturally waterlogged areas. These facilities should ensure that the size of downstream infrastructure is appropriately managed and favour the creation of 'natural' waterways rather than hard engineered open drainage channels.

2.2 Design Criteria

Stormwater drainage design is to conform to the current version of the following publications:

- Australian Rainfall and Runoff - (IEAust).
- Stormwater Drainage Design in Small Urban Catchments – (ARRB Report No 34)
- Sub-surface Drainage of Road Structures – (ARRB Report – Gerke)
- Managing Urban Stormwater - Soils and Construction -NSW Department of Housing
- Resources Management for the NT - Erosion and Sediment Control - Nat. Res. DLPE

2.3 Easements

The minimum easement width is to be 3.0 m for pipe diameters of 450 mm or less and depths up to 1.5 m.

An increase in easement widths is to be provided for pipe diameters and depths greater than the above as advised by the Officer.

Council will not take possession or accept drainage at the rear of allotment for future care or maintenance nor will it accept responsibility for easements over the drainage.

3 PRIMARY AND SECONDARY SYSTEMS

Generally, all drainage must be designed in accordance with the provisions of the Australian Rainfall and Runoff (ARR) and other relevant guidelines such as Austroads and ARRB.

Drainage system must be calculated by a method that complies with current Australian Hydrologic Engineering Practice. In the absence of more appropriate methods, the Rational Method can be used when catchments are no greater than 500 Ha in Urban developments and 25 Km2 on rural developments.

The Primary and Secondary Systems must be designed to control and carry all storm flows of the recurrence intervals specified on Clauses 4 and 12 of this document.

The Developer must clearly show to the Director the calculation of 2 drainage systems:

3.1 Primary system (Minor System)

This system comprises the main channels and storage basins of natural watercourses defined by the Water Act, properly constructed table drains, open unlined drains, culverts, pipe networks and other drainage structures.

3.2 Secondary system (Major System)

This system comprises elements of the Primary System, the flood plains of natural watercourses, other natural depressions, properly constructed floodways, road reserves, and other defined flow paths.

The Secondary System must be designed:

- To collect and control all storm flows of the recurrence interval specified on Clauses 4 and 12 of this document without significant damage to road pavements and ancillary structures, property accesses, the watercourses and all constructed drains and ancillary structures. Where the road

reserve form part of the Secondary System, all roads and accesses within road reserves must meet the drainage requirements for Major Storm (Q100) conditions.

- Any subdivision downstream of a catchment must design the drainage system to the ultimate purpose of the land –According to the Current Planning Scheme- to prevent future flooding issues.
- To ensure that overflow from a catchment to an adjacent catchment does not cause hazardous conditions. The Sheet flow across rural lots must be restricted, to avoid noticeable flooding of the downstream lots under design conditions.
- The Drainage easement and/or reserves downstream from the project area must be incorporated into the design where flows are generated from the project area.
- The flood level lines (Q100) defining the areas of inundation must be clearly shown on the drainage plans and the related calculations must be shown separately in the design calculations sheet.
- Where the lots to be created by a rural subdivision are less than 2ha in area, Council may require the construction of piped drainage for part or all of the subdivision.
- To achieve the requirements for the Secondary System, it may be necessary to upgrade the capacity of the Primary System above the initial criteria.
- To minimize the risk of flooding downstream due to the development, the drainage system design shall aim to maintain the characteristics of the pre-existing catchment. This is possible to achieve by detaining / controlling subdivision storm flows, or dispersing concentrated catchment outflows. The methods used and the degree of outflow attenuation required, must be dependent on the magnitude of subdivision storm flows and the characteristics of the watercourses downstream of the subdivision.
- Generally, natural watercourses, lagoons, and perched swamps must be retained in their natural state in order to maintain the existing catchment outflow characteristics and groundwater aquifer inflow characteristics. Any proposed works on or near natural watercourses, lagoons, and perched swamps must require the prior approval of the Department of Land Resource Management (LRM).

4 Rainfall Intensity and Recurrence Intervals

Consultants shall be responsible for determining suitable runoff coefficients and characteristics for a drainage system based on the ultimate development of all allotments for the relevant land zoning. Generally, a minimum time of concentration of 5 minutes can be used for an urban standard allotment.

Storm recurrence intervals for the two defined storm events shall be in accordance with the following table. The design intensity for a calculated time of concentration is to be determined from the appropriate Design Rainfall Intensity Diagram contained in Australian Rainfall and Run-off.

Catchment Zoning	Initial Storm	Major Storm
Urban and Industrial Areas	5	100
Rural Environment *	5	100
All other Zones - to be confirmed by the Officer	5-10	100

*Headwater shall not raised over the external edge of the pavement shoulder

5 WATER SENSITIVE DESIGN, STORMWATER, EROSION & SEDIMENT CONTROL

Environmental considerations are major design requirements for all drainage infrastructure therefore, subdivision / development designs must be undertaken in consultation with NTEPA, LRM and other relevant Agencies.

Developers shall include a WSUD Strategy at the early stage of the application describing the proposed WSUD elements and addressing how the WSUD targets will be achieved.

WSUD is a holistic approach to the planning and design of urban development that aims to minimise the impacts of urban development 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:

- To reduce both the peak flow and total volume of stormwater runoff.
- To control pollution and minimise affect on downstream waterways and the environment.
- To collect stormwater and reuse (stormwater harvesting).
- Protect and enhance natural water systems (creeks and rivers etc.)
- Treat urban stormwater to meet water quality objectives for reuse and/or discharge to receiving waters
- Match the natural water runoff regime 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

As a minimum, retardation basins should reduce peak flows from a development to the capacity of the downstream drainage facilities. Council will require additional restrictions on stormwater quantity discharge, including reducing peak flows to the undeveloped state from a catchment.

Stormwater harvesting through retention and reuse should be adopted for all new Developments. In particular, stormwater should be harvested for use in irrigation of reserves and open space. Applications of third pipe and bores are to be considered in the 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.

Compensating basins, retardation basins, artificial wetlands, 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 Run-off and other relevant publications and are to be sited to suit the requirements of the drainage system.

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

Stormwater from greenfield subdivisions is to be treated to reduce the load targets. These targets relate to stormwater leaving a development site and therefore all treatment must be within the development boundaries.

6 SEDIMENT AND EROSION CONTROL AND STORMWATER MANAGEMENT

It is essential to thoroughly plan for stormwater management and erosion control in any proposed development.

Council will not issue approval to any Development who does not have an ESCP approved by DLRM.

The Developer is to maintain all sediment and erosion control structures throughout the whole development period, including the maintenance period. Private land should be left uncleared to assist in erosion control for as long as possible before clearing or excavating.

Consideration must be given to curtailment of construction activities during the wet season. Extensive erosion and stormwater controls will be required for any work carried out during this time.

6.1 Environmental Plan: Water Quality, Gross Pollutant and Litter Traps

Council will require an Environment Management Plan, relevant to the types of works being proposed prior to the commencement of construction.

Council will not accept any polluted stormwater run-off into its drainage system. Stormwater discharges from a development must be of suitable quality to not adversely affect the downstream environment.
All drainage systems and structures are to be designed with limited water retention to avoid mosquito breeding.
It is the Developer's responsibility to incorporate gross pollutant traps and other water cleansing facilities throughout the development. These measures should be appropriately designed and located to produce optimum removal of pollutants to minimise future maintenance costs and suitable accesses. Pollutant treatments are to be discussed with the Officer during the design stage.

6.2 Tidal Action and Surge Levels (Urban and Industrial Developments)

Where drainage outlets or outfalls are influenced by tidal action, an appropriate analysis is to be undertaken to ensure major storm design criteria are met and that there is no surcharge at stormwater pits during the minor design storm.
The recorded surge levels and future estimated sea level increases must be taken into consideration for the design of both the subdivision layout and drainage system. Climate change and rising sea levels must be a consideration within the design.

7 ALLOTMENT DRAINAGE

Sediment and erosion control measures shall be put in place on all lots until they are fully developed and landscaped.
Where practicable, all lots shall have a minimum surface grade of 0.5%, be self-draining and shall be graded so as to sheet flow to the adjacent road reserve. Drainage shall not be directed from one lot to another unless the natural terrain is too steep to make lot regrading practicable. In such situations, rear or side of lot drainage shall be provided with suitable infrastructure to convey drainage underground to the public drainage system in the nearest road reserve, open space or drainage reserve. Council will not accept ownership or maintenance responsibility on drainage constructed within lots.

Drainage run-off from SD Residential lots can be discharged (sheet flow) across the lot surface to the main drainage system or by the use of an approved alternate connection.

To prevent the stormwater run-off be discharged into adjacent properties, the Developer should channel the run-off from residential SD lots - using a system of underground pipes or other appropriate method - from dwellings and other buildings and connect it into Council's system.

Drainage of all other lots including

- medium and high density residential development lots (including Duplex and Unit sites),
- all lots greater than 600 square metres in size,
- any lot with a zero lot line,
- commercial and industrial lots,

is to be collected within the allotments and conveyed by underground pipe(s) to the main drainage system to the Coucnil's approval.

The connection to Council's public drainage system shall

- not be kerb,
- be directly to the underground system, and
- be constructed at the time of subdivision development.

This includes the control of storm water runoff originated from within the site and/or from exterior catchments by means of underground drainage and/or open cut-off drains as warranted.

8 ADJACENT CATCHMENTS AND DRAINAGE NETWORKS

Where a new 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 examines the complete downstream drainage network and evaluates the maximum quantity of stormwater that can be discharged into the existing network.

If the capacity of the existing network is exceeded, then the surplus water shall be detained within the new subdivision or the existing network shall be upgraded to the satisfaction of Council and at the Developers cost.

In situations where the new 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 and to the satisfaction of Council. These easements shall be granted to Council and provided at no cost to the Council.

Where an existing drainage path or formal system from an upstream catchment passes through a new subdivision, the drainage system within the new development must be designed to cater for the ultimate flow from the upstream catchment.

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.

9 GROUND WATER AND DRAINAGE MEASURES

Important part of the available land for development within the Municipality is low lying and susceptible to ground water and tidal influences. Ground water level must be taken into consideration for drainage and all other aspects of sustainable design for the subdivision / development.

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

Any failure resulting from high wet season ground water levels shall be reinstated together with any additional sub-soil drainage required, by the Developer at their cost. The following issues need to 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 ground water.
- The effects of salinity and acid sulphate.
- Climate change and rising sea levels.

Sub Soil Drainage

The Consultant shall be responsible for undertaking a detailed investigation of the site to determine the scope of sub surface drainage works required. Sub soil drains are to be provided to all road infrastructure to protect road pavements from the effects of groundwater seepage and are to be located and constructed as per Councils Standard Drawings. All roundabouts and islands must also contain sub soil drainage.

Where necessary, subsoil drainage shall also be incorporated into new allotments, walkways, roundabouts, drainage reserves, tree planting pits, garden beds and open space to ensure adequate protection of buildings, structures and public amenities from groundwater.

10 OPEN DRAINS AND OPEN DRAINAGE STRUCTURES

Open drains and open drainage structures are not permitted within, or in easily accessible proximity to residential subdivisions and other areas of high public use such as shopping centres, business complexes, parks with designated meeting places, playgrounds and picnic/barbeque facilities, etc.

Large open drains will only be approved on rural environment and/or within dedicated drainage reserves (granted to Council) and must be designed to ensure publics safety and amenity is maintained as a

priority. With the exception of ornamental lakes and wet lands, all other structures or facilities are to be designed to retain water only during storm conditions and for a short time thereafter.

The size and extent of major open drains may be controlled through the use of retardation basins combined with other WSUD features as recommended in the Darwin WSUD Strategy.

Where open drains and open drainage structures are to be generally utilised as outfall drainage. Drainage structures are to comply with the following requirements:

- All batters and disturbed areas to be topsoiled and grass established with a minimum of 60% cover.
- Risk assessment of the drain to be provided as part of the stormwater management plan.
- Side slopes on table drains should not exceed 1 in 6 (V:H).
- Minimum 0.15 m freeboard to be maintained in all flows.
- Drop structures will be required on grassed table drains to maintain longitudinal grades of 0.6% and velocities under 1.0 m/s.
- Appropriate safety measures shall be provided to protect the public from being trapped within a drain during flash flooding:
- Warning Sign(s) are to be installed: "DANGER – WATER LEVEL MAY RISE QUICKLY DUE TO STORMS" were required;

Additional Requirements for Rural Major Open Drains

In rural areas all drains are to be a minimum dry land grassed and be accommodated by open drains both alongside roads within the road reserve and through drainage easements.

- Roadside open drains in rural and semi rural subdivisions shall be designed to accommodate the 1 in 5 year storm (minimum), with the road reserve and open drains in easements capable of conveying the 1 in 100 year storm.
- Cross drainage culvert shall be designed to convey 1 in 20 year storm event.
- Flat bottom (Trapezoidal)
- Time of Concentration must be calculated by the Developer / Consultant as the time for flow to travel from the most remote part of the catchment to the outlet, or the time taken from the start of rainfall until all the catchment is simultaneously contributing to the outlet.
- The design of the top water flow level shall not overpass the external edge of the road shoulder for the initial storm event.
- Scour protection will be required at changes of direction, drop structures and at the inlet and outlet to pipe or culvert structures.

11 WALKWAY DRAINAGE

Walkway reserves may serve as a storm water drainage reserves but must meet the following requirements;

- The walkway drainage is to be designed to cater for particular design storm events and must be such that the drain must not function as an open drain to the extent that it excludes the use as a walkway and endangers pedestrians,
- Kerb and gutter, underground drainage and other forms of treatment may be required.
- Inverts to centres of walkways are not acceptable.
- The stormwater flow contained within the walkway must be collected and directed into the underground drainage system before it discharges onto the road reserve.

12 USE OF ROADS, OPEN SPACE AND DRAINAGE RESERVES FOR RUN-OFF

Roadways are to primarily serve the purpose of catering for vehicular and pedestrian traffic as well as providing access to abutting property. Whilst forming part of the formal drainage system, roadways are not considered primary drains or flood ways and public amenity and safety shall be paramount considerations.

Stormwater must be absolutely contained within the parameters tabulated below:

- In all cases the flow is to be contained totally within the road reserve.
- The limits stated are absolute maximum and will only be utilised where there are no other options.

- Where the depth of flow particularly within road reserves and public spaces can be effectively reduced by the introduction of more underground drainage and/or capture points then this will be required.

Road or space classification	**Initial Storm**	**Major Storm** where D = depth (m) and V = velocity (m/s)
Access Roads, Collector Roads and Arterial Roads	Flow must be below the edge of the shoulder in rural areas and not overtop kerbs in urban environment.	Flow may spread to road reserve boundary but maximum depth in roadway is not to exceed 250mm nor should D x V exceed 0.25
Open Space & Drainage Reserves	Subject to Risk Assessment.	Flow to be contained within boundaries and meet all open drainage requirements. Subject to Risk Assessment.
Walkways	2m of pathway to be maintained at all times. Subject to Risk Assessment.	Flow to be contained within boundaries and meet all walkways drainage requirements Subject to Risk Assessment.
Industrial Commercial All Roads	Flow shall not overtop kerbs and shall leave at least 3.0m width of roadway free of water.	Flow may spread to road reserve boundary but maximum depth in roadway is not to exceed 400mm nor should D x V exceed 0.40
Floodway		Depth of flow shall not exceed 300mm nor D x V exceed 0.40. Concrete margins are to be extended until Q5 Immunity is reached.

13 DRAINAGE INFRASTRUCTURE

All concrete drainage structures shall conform to AS3600 and are to be constructed in accordance with the Standard Drawings and these Guidelines. All concrete infrastructure material must be reinforced concrete or fibre reinforced concrete manufactured to Australian Standards.

All infrastructure within marine environments, including areas subject to tidal influences (RL 3.95 AHD or lower), must be designed and constructed to be seawater resistant over the life of the structure.

13.1 Pipes and Culverts

All drainage pipes and culverts must meet the following requirements;

- The minimum pipe diameter for a drain located within the road reserve is 225 mm.
- 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.

13.2 Pits

All pit design 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 structures.

Grates are to be avoided as they are susceptible to blockage, if they are included then alternative means for the flow to enter the system must be considered in the design. Cyclists, pedestrians and vehicles must also safely traverse them.

All pits deemed to be at high-risk of vehicles driving over the pits, must be designed to withstand the expected loads. Pits greater than 1.2 m deep shall have non-corrosive (plastic) material step rungs provided for access.

Alternatives including precast concrete inlet structures may be used subject to approval by the Officer.

13.3 Side Entry Pits

- May be either side entry type or combined grated/side entry.

- Shall not be located on intersection tangent points or within the kerb radius.
- Are to be placed at low points located immediately upstream from intersections on the side road of the intersection.
- To be placed on the upstream sides of pedestrian / crossings to limit the flow to 500 mm maximum width for a 20yr design storm in these locations.
- Road low points are to be located as close as possible to the centre of SD/MD lots and opposite the side boundaries of multi-unit lots.
- Side entry pits shall include the use of deflectors within the kerb water table at all structures.
- Each drainage structure shall have a minimum fall across the bottom of the pit of 30mm.
- Spacing and size of side entry pits shall be designed to ensure minimum flow widths and depths as specified are achieved.
- Side entry pits should be located so as to avoid conflict with driveways on all new allotments.
    - Where a conflict occurs, any stormwater pit relocations shall be undertaken by the Developer at their expense.
    - To avoid such conflicts, a master plan shall be produced prior to commencement of development which shall show the nominated location for driveways in each new allotment.
- The clearance between the kerb invert and the underside of lid, or lid support where applicable should be at least 100mm. Where the inlet clearance is greater than 100mm a 12mm diameter bar shall be placed across the opening for safety purposes.

13.4 Junction Pits / Manholes

- To be constructed at all pipe junctions and where pipes change direction, diameter, or grades. (side entry pits may also be used).
- The maximum distance between Junction Pits / Manholes / Kerb Side Access Chambers is to be 90m. Closer spacing may be required at the discretion of the Officer.
- Are not to be located within the trafficked part of the road reserve.

13.5 Letter Box Pits

- Letter box pits are to be constructed within the invert of open drains or at low points in open space reserves so as to contain stormwater flows.
- Appropriate erosion control measures, such as stone pitching, must be included
- Appropriate safety measures must also be included, such as consideration of flow velocity at the pit, height of the pit opening etc

13.6 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.

13.7 Bandage Joints

- 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.

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C - ROADS AND PATHWAYS

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1. ROADS AND PATHWAYS

This section sets out the minimum standards required by Council for the Design and Construction of roads and pathways in Urban, Rural, and Industrial / Commercial subdivisions.

These Guidelines, along with Council's Standard Drawings and Policies are to be utilised by the Developer / Consultants. When Council standards are not available, the NT Government Department of Planning and Infrastructure standards should apply. Design outside of these Guidelines may be considered if supporting documentation is provided, including all engineering aspects of the design and risk analysis. This is to be included in the design report submitted with the initial plans.

Road designs must conform to the relevant current Australian Standards, AustRoads, Australian Road Research Board (ARRB) and all other relevant publications.

The Contractor will be deemed to have made all necessary investigations to judge the nature of materials to be excavated. For all subdivisions, this is to be included in the geotechnical report submitted as part of the design approval application
The Developer/Contractor shall be diligent in design and construction of all roads, drainage, and associated structures in salt water environments.

All sediment from construction is to be managed in accordance with the approved sediment and erosion control plan. It is the Developers responsibility to ensure that all subcontractors working within the site manage their discharges into the stormwater and ensure that all litter and rubbish is contained on site and removed accordingly.

2. ROAD HIERARCHY

Developers must match Council's road network, forming their development and pattern of land use to be an integral part of this system.

A road hierarchy is to be established for the proposed development which can be achieved by reference to Council's Guidelines and/or by reference to a specific traffic design report prepared by a qualified traffic engineer commissioned by the Developer.

The allocation of road hierarchy will be dependant on the roads intended use and proposed traffic volumes which will then determine its minimum design requirements in accordance with Council's Guidelines.

Proposed Road Classification

Road Class	Class Type	Service Function description
A	Arterial Road	Primarily provides main connectivity from town centres and local areas to the federal main road network
B	Collector Road	Provides for collecting and distributing traffic and acting as a feeder service to local arterial roads
C	Local Road	Provides predominantly for direct access to properties, recreational areas an Industries in urban and rural zones

3. TRAFFIC MANAGEMENT

Traffic management design is to comply with the following minimum standards:

- Guide to Traffic Engineering Practice – (Austroads All Parts)
- Turning Path Templates (Austroads)
- Traffic Acts and Regulations

4. DESIRABLE DESIGN SPEED

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

Traffic studies will be requested to Subdivisions that may require traffic-calming works on existing roads abutting or providing access to the proposed development. A community consultation at the Developer's expense may be necessary under these circumstances.

The following should be considered and included as required:

- A 50 km/hr default speed limit applies to all areas within the Northern Territory.
- A master plan shall be provided showing the proposed speed limits on all new roads.
- The design of roads within the subdivision development shall conform to the following design speed requirements:

Urban Environment

	Local	Collector	Arterial
Maximum desirable operating speed km/h	50	60	As advised

Rural Environment

	Local	Collector	Arterial
Maximum desirable operating speed km/h	80	80	As advised

Industrial / Commercial Roads

	Local	Collector	Arterial
Maximum desirable operating speed km/h	50	60	As Advised

Developers are encouraged to make use of the following restrictions, features, and measures to create an urban speed environment within their subdivision:

- Varying horizontal geometry;
- Isolated width restrictions;
- Variations to pavement surface texture;
- Variations to pavement surface colour (at boundaries to low speed areas, etc);
- Street furniture placement;
- Landscaping to verges and traffic control devices;
- Local Area Traffic Management (LATM) or Traffic Calming devices:

The traffic management plan for the development should include all required traffic calming devices to provide safe thoroughfare for traffic. All required infrastructure must be constructed by the Developer at the time the road is built.

5. PARKING TO BE PROVIDED

Roads abutting public open space and other areas specifically denoted as requiring parking are to be provided with car parking bays at appropriate locations designed to accommodate either angle or parallel parking, depending on the available road width, verge width, length of road frontage and defined road hierarchy.

6. SCHOOL SITES

Council considers that parking and 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.

7. BUS ROUTES AND BUS STOPS

The Developer shall provide an approved master plan developed at the planning stage in liaison with the Northern Territory Government Public Transport Division showing the ultimate and interim locations of

proposed bus routes and bus stops including nominated sheltered bus stops and/or where bus stops include other types of street furniture (e.g Bus shelters, seats, bins etc).

8. SPECIAL TREATMENTS

Where the Developer proposes to construct an alternative surface treatment such as a form of subdivision entry statement, driveway delineation, or special feature throughout the subdivision, plans and specifications for the alternative treatment are to be submitted for Council approval.

9. TRAFFIC CONTROL DEVICES

All warning, regulatory, direction signs and road marking are to conform to current Australian Road Rules and current versions of the Australian Standards and Guidelines, including;

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

A Traffic Signage Plan is required indicating

- 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 signage
- line marking and pavement markers
- bicycle and shared path signage and linemarking

Linemarking and Signage

As a minimum, the following signage and linemarking shall be provided for each development:

- Minimum regulatory signage
- Warning signs at the approach to all hazards;
- Advisory signs as required;
- At a temporary termination of road construction, such as a subdivision or stage boundary, a diagonal striped sight board shall be erected,
- Parking signs where required;
- Bicycle and shared path signage and linemarking (if required)
- Road marking as required on distributor and collector roads;
  - Single unbroken lines on road centreline at locations on two-way roads where the sight distance available is less than the desirable minimum,
  - Separation lines on distributors and collectors,
- Holding lines at intersections as required, including the following as a minimum;
  - All roundabouts
  - All T intersections with collector or arterial roads
  - All T intersections with non-perpendicular centrelines
  - All T intersections not meeting minimum sightlines
- All other advisory and traffic control devices necessary for effective traffic control;

10. STREET NAME SIGNS

Council's Standard Drawings are to be used for the design of street name signage. The preferred location for street name signs is on the through road adjacent to the centreline of the intersecting road.

11. ROAD GEOMETRY

11.1. Intersections

Y-junctions and crossroads are not acceptable. Staggered "T" intersections or roundabouts are to be provided and separated to meet Austroads Guidelines. The traffic management plan should address all proposed intersection design.

Adequate stopping sight distance is to be provided at all intersections.
At all intersections, the through road having the higher road hierarchy is to maintain its cross section. The terminating road is to match its longitudinal grade with the pavement cross fall of the through road.

11.2. Intersection Turning Criteria Including Roundabouts

On Rural Environment Intersections are to be designed according to Council Standard Drawings indicated on the table below.

Rural Intersections
Intersections must be designed according to the Council Approved Standard Intersections Type 1, 2 and 3 as follows:

	Local	Collector	Arterial
Local	Type 1	Type 1 / Type 2 [(1)]	Type 3
Collector	Type 1 / Type 2[(1)]	Type 2	Type 3

Urban Intersections - Turning Criteria Including Roundabouts
Intersections are to be designed for the movement of Austroads Design Vehicles as follows:

	Local	Collector	Arterial	Arterial
Local	Type A	Type A	Type A / Type B[(1)]	Type B
Collector	Type A	Type B	Type B / Type C[(1)]	Type C
Industrial / Commercial (All Roads)	Type B	Type C	Type C	Type C

[(1)] To be assessed case by case.

Type A: To be designed according Austroads 12.5 m single unit truck/bus vehicle with a turning path radius of 15m.
Type B: To be designed according Austroads 19m single articulated vehicle with a turning path radius of 15m.
Type C: To be designed according Austroads 25m single articulated truck with a turning path radius of 15m.

The Design vehicle turning path templates should be applied to ensure that:

- The outside edge of the swept path remains within the paved area.
- The outside edge of the swept path must remains within the paved area and a minimum offset of 0.6m to be provided between the inside wheel paths and face of kerb or pavement edge.

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

A minimum clearance of 0.6 m outside the swept path should be provided to objects such as road furniture (e.g. traffic Islands) and utility poles.

In situations where space is restricted and turning speed is low, the Officer 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 intersections; however, the Director reserves the right to nominate superior design requirements if he deems to be appropriate.

Minimum Radii in Cul-de-Sacs

	Urban	Industrial / Comercial
Cul-de-sac	9	15

11.3. Gradients and Radii

Roads are to be designed to provide the best possible grade to suit the natural / existing ground and conditions and minimise the amount of cut and fill. Grades are to comply with the object and intent of the Disability Discrimination Act and the requirements and provisions of relevant standards.

General Maximum and Minimum Longitudinal Grades

		Residential		Industrial
		Local	Collectors / Arterials	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.
This considerations will be approved only in special cases and must be addressed in the design report.

12. TYPICAL CROSS SECTIONS

Typical cross sections must be designed in accordance with the Council's Standard Drawings.
All road design must be developed for tropical living with the objectives of accommodating roads and verges, on street parking and sustaining shade street trees, services, pedestrian access and shared footways, bus stops / services and appropriate disabled access. Road reserve widths may be increased to accommodate all items.

12.1 Road Widths

Minimum road, verge and reserve widths required

Rural Environment

	Carriageway	Road Reserve
Local Road	9.0	30.0
Collector Road	10.0	30.0
Arterial Road	10.0	30.0

Urban Environment

	Verge (m)	Carriageway (m)	Road Reserve (m)
Local Road (including Cul-de-Sac)	4.5	8.0	17.0
Primary Collector	4.5	11.0	20.0
Arterial	4.5	11.2	20.2

Urban - Industrial Roads

Urban Local Road	4.5	10.4	19.4
Urban Collector Road	4.5	11.2	20.2
Industrial Collector Road (Accesses shall not be provided from this road)	4.5	13	22.0
Industrial Local Road	4 or 3 one side and 4 other side	13	21-20

13. Pavement Cross Fall

Two way cross fall 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 the Officer. All cross sections must be designed in accordance with the Council Standard Drawings.

On urban areas, one way cross fall will only be considered when the adjacent property is a dedicated drainage reserve, or a public reserve with specifically designed stormwater infrastructure to cater for the water. This includes medians within road reserves. One way cross fall will not be permitted where private properties are adjacent to the low side. This includes all residential, commercial, and industrial properties.

The following design requirements are to be followed;

- Nominal 3% cross fall
- Stormwater design to suit, including width and velocity of water across road during storms and all other stormwater design requirements.
- Kerbing to be either flush, gapped or barrier depending on stormwater design requirements.
- 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.

14. VERGES

All verges are to be designed in accordance with the Council Standard Drawings, Policies, and relevant legislation.

Verge widths for all roads depends on a number of criteria including but not limited to the location of footpaths, shared paths, services, bus stops, landscaping and the provision of access.

Verge grading is to be as indicated on Council Standard Drawings. Where shared paths are accommodated within the road reserve verge, the slope of the verge must be such that it does not exceed the stated grade limits and it must be demonstrated that vehicle access can be accommodated without scraping.

Minimum standards include;

- A minimum of 4.5m verge width between the kerb invert and property boundary
- 2% to 8% grade falling to the road including compliance with minimum access standards
- Grading at footpaths and shared paths to be within disability standards, including consideration for driveway tie-in grades to the path
- All services to be located as per the Standard Drawings
- Verge widths to be increased as required to allow for shared footpaths and/or landscaping
- Verges to be designed for easy maintenance
- Bus stop design and location to be considered
- Services, driveways, road infrastructure, landscaping and footpaths to be considered

- Cut and fill batters may be extended into allotments where the design cross section cannot be contained within the road reserve. In these cases the batter slope should not exceed 1 in 6 unless in special cases, geotechnical testing indicates that steeper slopes are sustainable and maintainable.
- In all cases the maximum grade for vehicular access and approaches from and to the property line to the allotment is to be 1 in 8.

15. LOT TRUNCATION

Lot truncation is required at all corner blocks. The minimum truncation is 2m by 2m, but may be increased to allow for intersection sight distances, verge width and path installation.

16. Conduits

Conduits shall be design and constructed by a licensed trade / professional for the conveyance of communication, irrigation lines, and electrical cables under roadways, footpaths, access strips, and elsewhere as required, with consultation with the appropriate authority or as directed by the Officer.

On urban environment conduits for irrigation purposes shall be provided to all landscaped traffic islands and roundabouts and beneath footpaths and driveways constructed at the time of subdivision construction.

All conduit locations are to be marked on as constructed drawings and on site.

17. KERBS

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

Some rules apply to kerb selection on urban / Industrial areas;

- Layback profile kerbing is only to be used in local roads servicing single dwellings only
- Barrier kerb (and gutter) is to be used on
  - collector roads,
  - adjacent to open space
  - industrial roads
  - commercial roads
  - where required for traffic control and safety

Alternative treatments will be considered subject to supporting documentation being provided, including showing the design meets relevant Australian Standards. Approval is at the discretion of the Officer.

18. DRIVEWAYS

All driveways must be designed and constructed in accordance with Council's Standard Drawings, Policies and all relevant Australian Standards.

The Director will determine the acceptable location or relocation of all driveways in accordance with the following criteria:

- Where allotments abut or front onto more than one roadway, the driveway(s) shall access the roadway with the lower road hierarchy.
- The location of the driveway shall be 15 metres from any intersecting roadway.
- The driveway shall meet Austroad sight distance criteria for both entry and exit.
- Where practicable, driveways shall be located to have minimal impact to on-road 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.

Driveways must be provided by the Developer for each property. The table below summarises the minimum requirements. The minimum material is 25MPa plain, broom finished concrete with reinforcing mesh. Where footpaths exist, the material of that section of the driveway must be the same as the footpath.

Zoning	Width	Construction
Urban Areas		
Single Dwelling*	3.5m	100mm deep, SL72 mesh
Duplex	6.0m	100mm deep, SL72 mesh, Located at the centre of the allotment and an expansion joint along the driveway and perpendicular to the road
Medium Density Residential	6.0m	100mm deep, SL72 mesh
High Density Residential	6.0m	150mm deep, SL82 mesh
Commercial / Industrial**	6.0m	200mm deep, SL82 mesh
Rural Driveways		
Standard Vehicle Access*** To be placed no less than 20m from any other driveway, obstacle, or 60m from intersection.	4.0m	100 mm Compacted depth of approved gravel pavement (Type2) compacted to 100% MMDD over a 150mm-Compacted depth approved Subgrade material compacted to 95% MMDD, Prime and single coat seal 10mm nominal size aggregate.

*Two 3.5m wide driveways are suitable for corner duplex blocks.

**Wider driveways and/or or additional driveways may be approved at the Officer's discretion considering vehicle design and /or development requirements.

*** Second driveway may be permitted by the Director prior written request from the owner of the property and to be constructed and maintained at the owner's expense.

19. PATHWAYS

On urban areas, footpath design and construction must comply with Council's Policies and Standard Drawings. All pedestrian access must meet or exceeds Australian Standards for Access and Mobility. Footpaths must be provided within the road reserve of both sides of all roads in new developments and subdivisions.

Road Hierarchy/Locality	Minimum Width Concrete 25 MPa; 100 Thickness and SL 72 Mesh
Local Roads	1.2m
Collector Roads	1.2m one side 2.0m one side
Arterials	1.2m one side 2.5m one side
Parks	2.0m
Schools, shops, centres	2.5m

A master plan for subdivision design developed during the planning process is to incorporate a system of footpaths, shared paths and on road bicycle routes to provide access through the subdivision and connecting with neighbouring suburb pathway systems, proposed schools, shops, unit/ flat developments, residential areas, open space and playing fields.

The need for any form of shared path, bicycle path or on-road cyclist facility is to be determined as an outcome of subdivision design traffic studies. In the absence of a traffic study, the Officer will determine the requirement.

20. WALKWAYS PEDESTRIAN LINKAGES

Walkways shall only be designed as landscaped open space for pedestrian linkages and must meet the following design requirements.

- The walkway reserve shall have a minimum width of 15 metres.

- The paved section must be a minimum 3m width and constructed to residential driveway standard, including meeting all disability and mobility standards for pedestrians
- Lighting must be permanent and non-intrusive to neighbouring properties
- Straight line visibility must exist from end to end
- Bollards and barriers must be provided to prevent general vehicle access, with lockable/removable barriers provided for service vehicle access
- The paved section of walkways must connect to the footpath network
- Walkways may act as drainage reserves and must meet the requirements as detailed in the relevant section
- In all circumstances, accesses must comply with the objectives and intent of the Disability Discrimination Act.

21. BATTLE AXE ALLOTMENTS

Council accepts Single Battle Accesses only; however, it will not receive the handover of these reserves for future care and maintenance.

22. ROAD PAVEMENT AND SURFACE DESIGN

The minimum lifespan for a pavement design accepted by Council for is 40 years.

All design must be in accordance with these Guidelines, the Australian Standards and the Northern Territory Department of Construction and Infrastructure (DCI) specifications, unless otherwise specified. All testing must be carried out according the DCI specifications and documents provided at hold points, or as required for handover.

The Design Consultant shall submit their pavement design including proposed Design ESA's to Council for review and approval.

22.1 Minimum Design Pavement Thickness and Make-up

Pavement Course	Compacted Thickness	Compaction MMDD	Pavement Material	Compaction MMDD
Subgrade	150mm min	95%	In Situ	95%
Sub-base	-	98%	Fine Crushed Rock	98%
Base courses	150mm min	100%	Fine Crushed Rock	100%

22.2 Wearing Surfaces

Rural Environment

- All Rural Road Types: Prime and single seal 14mm coat aggregate
- Intersections
  - Local / Collector: Prime and double 14/10 mm coat to the end of tapers.
  - Local/Arterial: Prime and 25mm compacted thickness asphalt to the end of tapers.
  - Collector/Arterial: Prime and 40mm compacted thickness asphalt to the end of tapers.
- Cul-de-Sac: Prime and double 14/10 mm coat.

Urban Road types:

- 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.

Industrial / Commercial Road types:

- All Road Types and Intersections: Prime and 40mm compacted thickness asphalt.

22.3 Design Loadings

The design consultant shall undertake an analysis of design traffic and is responsible for determining design traffic loadings and appropriate pavement structure.

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 requirements for design loading and wearing course according to the road classification are shown below:

Road Classification	**Residential design loading (E.S.A)**	**Industrial design loading (E.S.A)**
Rural – Arterial / Collector	5.0×10^5	-
Rural - Local	5.0×10^4	-
Urban and 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

The Consultant is to prepare detailed designs for all pavements in accordance with current versions of relevant guides, standards, or manuals as necessary.

D - LIGHTING

The Developer is to provide street lighting, including lighting of traffic management treatments, external works, parks, walkways, footpaths and shared paths and other public areas of the proposed subdivision / development in accordance with Australian Standards for illumination level, materials and installation and the requirements and specifications of Council and the Power Water Corporation. The Lighting Design must be carried out and supervised by a registered qualified electrical engineer.

Lighting design shall meet the applicable relevant legislation / Guidelines such us Road Lighting AS/NZS 1158.1.3 and Austroads.

1. STREET LIGHTING IN URBAN, COMMERCIAL AND RURAL AREAS

Street lighting design in land subdivisions, urban, commercial, industrial, and rural residential subdivision of less than 2 Ha lots is to meet the following criteria:

- Intersections, cul-de-sacs, traffic calming devices, and pedestrian crossings shall be directly lit.
- Lights are to be placed opposite to the boundaries of allotments where possible.
- Light poles shall not conflict with any infrastructure including stormwater pits, pedestrian crossing points, or driveway crossovers.
- Minimise the light shining into private properties.
- Frangible poles to be installed where there is an unacceptable risk of collision with a light pole.
- Non-frangible poles shall not be installed within the clear zone.
- Lamps are to be the highest energy efficient.
- Lighting to be designed considering the adjacent surrounding areas and to minimise future maintenance costs.

2. PATHWAY AND OPEN SPACE LIGHTING

- Lights are to be placed at each end and each bend of a walkway and at appropriate intervals in between and comply with standard illumination minimum levels.
- Mature development of street trees shall be accommodated.
- All light poles are to be numbered.
- All open space areas intended to be used or traversed at night should allow appropriate levels of visibility and conform to CPTED principals.
- Lighting should be designed so that it is resistant to vandalism.
- Alternatives to reticulated power should be considered (e.g. solar, battery etc).

E – LANDSCAPE

The developer will be required to undertake the design and construction of the following road landscaping and other works to protect against the erosion and to control sources of sediment:

- Top soiling
- Grassing

1. STANDARDS

- Conform to the following Publications unless specified otherwise:
- AS/NZS 3500 Plumbing and drainage
- AS 4419 Soils for landscaping and garden use.

2. TOPSOIL AND GRASSING

- Re-spreading of stripped topsoil, or, spreading of imported topsoil and grassing, shall be undertaken by 30th September of each year to allow the best opportunity for germination of seeds.
- The responsibility lies with the Developer to ensure that Council's requirement of 60% coverage of grass is performed prior the Developer seeks the On Maintenance Certificate from Council (Please refer to the Document Part A: General Planning Requirements, Section On Maintenance Request).
- If 60% grass coverage is not achieved by the time of the On Maintenance Inspection request, the Developer shall install the required erosion and silt control measures in accordance with the approved ESCP, and submit an application to bond the value of the re-establishment of grass (Please refer to the Document Part A: General Planning Requirements, Section Bond – Outstanding Works).
- Grass coverage is to be nominally 60% at the completion of the Litchfield Council Defects Period of Liability. Should the coverage of grass does not comply with the specification provided on these guidelines, Council may utilise the bond amount to achieve the required re-establishment of grass in case the Developer takes no appropriate action.
- The Developer is encouraged to monitor the growth of grass over the Defects Period of Liability to ensure specified coverage is achieved.

3. RECOMMENDED TOPSOIL TREATMENT

- Strip existing topsoil and stockpile at the location nominated in the ESCP or windrow 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, then this top 50 mm 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 than I to 1.5m in height. Stripped topsoil should be used as soon as possible (for seed viability),

and preferably not 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 guidelines, or site-specific specialist advice.
- Prior to the application of the topsoil, lightly rip the finished earthworks to a depth of 50-100mm ensuring ripping operations occur along the contour.
- Spread topsoil to a lightly compacted (i. e. firm) depth of about 40 to 60mm where the slope exceeds 6:1(H:V) and 75 mm 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 limited, import clean, weed free topsoil as required.
- Utilising a pad foot roller (not vibrating) complete one pass over the topsoil area to introduce surface roughness.

4. GRASS SPECIFICATION

- Applied grass must be sown with a mix and rate approved by the Litchfield Council.
- The developer must 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 must establish and maintain all grassed areas for a minimum of 13 weeks or until the end of the Litchfield Council Defects Liability Period, depending on the grass coverage. Areas of unsatisfactory grass strike or scoured/damaged areas must be repaired and re-sown as soon as the problem becomes apparent.
- The developer must maintain and mow the grass to a maximum height of 150mm in Rural Areas and 70mm on Urban Areas.

5. GRASSING OF TABLE DRAINS, VERGES, BATTERS AND ALL DISTURBED AREAS.

3.1 Topsoil

The developer must apply a mix of the topsoil removed from the construction site and fertilizer free from sand, stones, timber, turf clumps and any other foreign materials to all road verges, table drains, pavement shoulder areas, and / or any other disturbed area or with potential to scour.

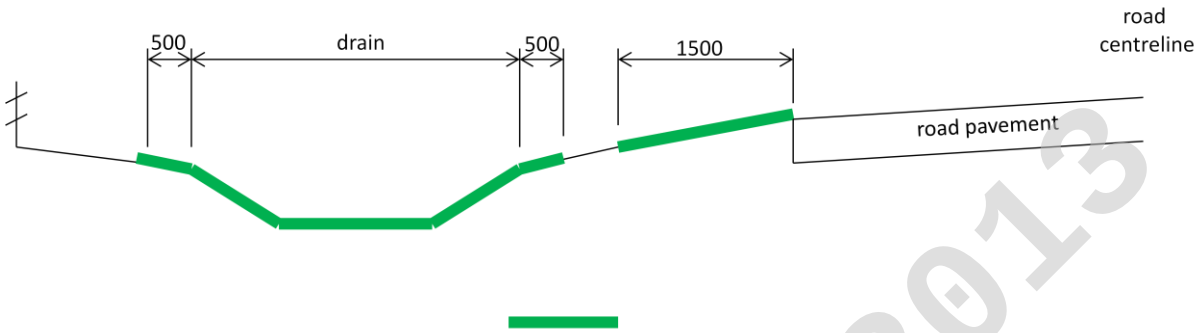
Developer must place the topsoil at appropriate time of the year considering the NT weather conditions. Nevertheless, Council will only accept the works if they have achieved the reestablishment addressed in this document.

The extent of the placement of topsoil must be as follows (subjected to the site conditions):

		Coverage
Road Pavement Shoulders	1500mm wide from the seal edge. The finished level of the topsoil must be the same as the seal edge with a 4% slope away from the seal edge as per Council standard roads cross sections.	60%
Table Drains	On both sides of the drain including invert plus extend 500mm from the top of the drain either side.	60%
Other disturbed areas	All disturbed areas that may or will scour plus extend 500mm past affected area.	50%-60% As requested by the Officer

Verges Urban Areas	On all verges	60% minimum cover or as requested by the Officer

3.2 Schematic of Required Reestablishment of Grass



TOPSOIL PLACEMENT AND GRASS ESTABLISHMENT