

SUBDIVISION and DEVELOPMENT GUIDELINES

Prepared by
Technical Services Department
Darwin City Council

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INTRODUCTION

This document supersedes the 2001 edition of the Darwin City Council Subdivision and Development Guidelines. It is a Controlled Document (refer to the provisions stated in this section) and it is the Developer / Consultants responsibility to ensure that they are referring to the most current edition of the Guidelines.

The document remains unique to the specific requirements of the Darwin Municipality while reflecting relevant Acts, Regulations and other Governmental Guidelines that govern development throughout the Territory.

The document is aimed at providing a clear, structured and practical set of requirements and procedures to assist developers, planners, consultants and contractors within the development industry.

DISCLAIMER

The Guidelines shall be read in conjunction with relevant legislation and any Council approved policies or documentation.

All due care has been taken in producing these Guidelines and its consistency with relevant legislation and standards however if any inconsistency is noted Council will provide the necessary clarifications. Council does not guarantee the completeness of the information contained within these Guidelines and does not accept any loss or damage that may result from the use of the Guidelines.

Council reserves the right to deviate from particular aspects of the Guidelines for any Subdivision or Development where it deems it to be warranted.

The Developer (or its Consultants) is responsible for ensuring that all works are designed and constructed in accordance with the Guidelines.

DOCUMENT CONTROL PROVISIONS

Controlled Document

The Subdivision and Development Guidelines is a **controlled document** with the latest edition available for purchase (hardcopy and/or electronic PDF format) from Darwin City Council or available free (PDF format) via Darwin City Council's website.

The Darwin City Council will always retain the copyright for the Guidelines and will retain the Master Copy.

It is the Developer or Consultant's responsibility to ensure that they are referring to the latest edition of the Guidelines.

Document Amendment Control

These Guidelines are a "living" document and will be subject to changes / revisions from time to time, to maintain relevance to Council's policies, evolving best practices and procedures and changing industry standards.

Suggestions for changes to the Guidelines will be welcomed and may be initiated externally or from within Council.

To maintain the integrity of the document, the following protocol will apply to proposed changes.

- Make request / proposals for change on the "**Guidelines Amendment Request**" form (Refer to Appendix A).
- Submit the completed form to the Development Officer at Darwin City Council. Council will then consider the request.
- All requests for amendments will be acknowledged within two weeks of receipt and responded to within three months, giving the reasons for adoption or rejection.
- No changes will be implemented until the Officer has endorsed the amendment. The Guidelines will then be updated and reissued as a New Edition.

GUIDELINES STRUCTURE AND CONTENT

These Guidelines are presented in four (4) parts with an additional Introduction Section and Appendices.

The Parts are divided into sequential sections however the Guidelines should always be interpreted as a total document.

The Parts and general description as to what it covers is as follows:

INTRODUCTION

The Introduction covers the general intent of these Guidelines, Document Control and Definitions used within the Guidelines.

PART 1 THE PLANNING AND DEVELOPMENT PROCESS

This Section covers the general planning and development process with reference to the Planning Act and identifies Council's role and responsibilities.

PART 2 GENERAL REQUIREMENTS

This Section covers the general Statutory and Council requirements as to how subdivisions and developments works are to be initiated and completed to the satisfaction of Council.

PART 3 DESIGN REQUIREMENTS

This Section covers the specific design requirements of subdivisions and developments. Reference is made to the various standards, guidelines and codes with the Developer / Consultant being responsible for the appropriate design of all items to be constructed.

PART 4 CONSTRUCTION REQUIREMENTS

This Section covers the specific construction requirements of subdivisions and developments. Reference is made to the approved Technical Specification and Drawings and the Developer / Contractors responsibility to complete all works to the satisfaction of Council.

APPENDICES

The appendices cover the appropriate forms and checklists to be used in conjunction with the Guidelines for the various stages of the subdivision / development process.

DEFINITIONS

The following is the definition of specific wording and terms used throughout the guidelines.

Access	Provision of infrastructure to cater for the adequate movement of vehicles, pedestrians and cyclists to each allotment.
The Act	The Northern Territory of Australia Planning Act
Application Fee	The Fee payable to Council to lodge an application for approval of any works based on the current Fees and Charges.
Approved Drawings	Those Drawings submitted by the Developer or Consultant and approved by the Officer for construction purposes. If no Drawings are submitted or the submitted Drawings are deficient then the Standard Drawings shall be deemed to be the Approved Drawings be it in part or full.
The Authority	The Authority established under the Act that determines Development
Building Code of Australia	The current version of the Building Code of Australia
Certifier	The person engaged to certify the construction work. (Ideally this person should not be the Superintendent).
Construction Approval Fee	The Fee payable to Council by the Developer for administration, management and supervision of approved Construction Works. The Fee is based on 0.5% of the actual construction cost and is payable before On Maintenance can be granted by the Officer.
Construction Cost	The cost to construct the subdivision or development works in 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 or Consultant shall provide Construction Costs in a legible Schedule format to the Officer for ratification and approval.
Consultant	The Consultant(s) and/or their duly authorised representatives(s) appointed by the Developer to undertake various design and/or construction Certification associated with a Subdivision or Development.
Contractor	The person bound to execute the Subdivision or Development Works.
Contribution Plan	A Plan developed by Council under Section 27 of the Planning Act to facilitate payment of a Contribution as assessed by Council towards the upgrade of Infrastructure and/or Facilities as a consequence of the Development.
Council	The Darwin City Council

Council Property	Any land owned or maintained by Council, either by licence, statutory requirement or agreement.
Deed of Agreement	The formal agreement entered into between Developer and Council describing the works required by Council to be carried out under the subdivision or development and the conditions under which Council's requirements may be met.
Defect	An unsatisfactory or non-complying item of work noted by the Superintendent, Certifier or Officer. All defects are to be rectified to the satisfaction of the Officer.
Defects Liability Period	That period (usually 12 months) from Practical Completion or On Maintenance until such time as the Developer or Contractor can apply for an Off Maintenance inspection and the Officer deems the works to be Off Maintenance.
The Department	That Northern Territory Government Department which is responsible for the administration, compliance and/or approval of Government requirements referred to within these Guidelines.
Design Approval Fee	The Fee payable to Council by the Developer for administration, management and approval of Design Documentation. The Fee is based on 0.5% of the Estimated Construction Cost and is payable before Design Documentation is approved by the Officer.
Design Documentation	Technical Specification, Drawings, Calculations, Reports and any other such documents required by Council to satisfactorily show the intended works for the Subdivision or Development.
Developer	The Owner(s) or Lessee of the land proposed to be subdivided / developed.
Development	Includes Subdivision Development and/or Re-Development and any other Development that Council can make formal requirements upon.
Development Assessment Services	The section of The Department that assesses Development Applications.
Development Consent Authority	The Authority established under The Act that determines Development Applications.
Development Permit	Is that Permit issued by the Development Consent Authority which permits the Developer to proceed with Subdivision or Development Works subject to the conditions stated therein.
Development Works	The Development Works shall include, but not be limited to, road works and associated earthworks and site works, drains, pathways and cycle ways, street lighting, streetscapes and landscaping of public spaces owned or maintained by Council. The works are not restricted to the proposed development, but may be extended to include existing or other proposed roads, drains, reserves or public or privately owned lands giving access to or affected by or having effect on, the proposed Development.

Disability Discrimination Act	The Federal Government of Australia Disability Discrimination Act 1992 and any amendments made thereto. (DDA)
Fees and Charges	The published Fees and Charges currently adopted by Council.
Local Government Act	The Local Government Act of the Northern Territory of Australia
Maintenance Bond	That Monetary Bond lodged by the Developer or Contractor for the duration of the Maintenance Period and may be drawn upon by Council to carry out defect rectification, if after due process, no appropriate action is taken by the Contractor / Developer. The Maintenance Bond is calculated at 2.5% of the Actual Construction Cost of the works and is to be lodged prior to the Works being placed On Maintenance.
Maintenance Period	The statutory period as specified, in which the Works, having been deemed to reached Practical Completion and placed On Maintenance by the Council, remain the responsibility of the Developer to care for and maintain and repair defects resulting from faulty workmanship, and/or defective materials and design defects and omissions. This is usually the same as the Defects Liability Period.
The Minister	The Minister (of the Northern Territory) for Infrastructure, Planning and Environment
Occupational Health and Safety	Reference to the provisions of the Work Health Act NT & the Work Health (OH&S) Regulations
The Officer	The Chief Executive Officer of the Council or the duly authorised or delegated person acting on behalf of the Officer in the matter(s) of subdivision or development – usually the Council’s Director of Technical Services or an authorised representative.
Off Maintenance	When works have reached the end of the Maintenance Period and have been deemed to be accepted by the Officer, at which point in time Council takes responsibility for Maintenance of the completed works. All defects raised at the Off Maintenance inspection must be adequately addressed before Council accepts responsibility.
On Maintenance	When works have reached Practical Completion and have been deemed to be accepted by the Officer, at which point in time the Maintenance Period begins. The Officer may accept minor defects on the proviso that they are adequately addressed by the Developer or Contractor within a specified period.
Permit Holder	Is that person or party taking out the Permit(s) from Council who is contracted to carry out or be responsible for carrying out any works on Council Property.
Planning Authority	The Northern Territory Planning Authority (NTPA). The Development Consent Authority established under the Act.
Planning Scheme	The Northern Territory Planning Scheme

<p>Practical Completion</p>	<p>The stage reached when all works have been constructed to the true intent and meaning of the Approved Drawings and Technical Specification; the whole of the works being able to be used for the purpose for which they have been designed and on the proviso that the relevant requirements of the Development Permit have been complied with. The Officer is the only person that can deem Practical Completion.</p>
<p>Road Hierarchy</p>	<p>That classification of roads as adopted by Council, into a series of categories dependent upon functionality.</p>
<p>Security Bond</p>	<p>That Monetary Bond lodged by the Developer or Contractor for an indefinite duration to cover specific works that have yet to be completed, are deemed to be defective or non-compliant or in cases where a specific risk or liability has been identified. Council may draw on the Security Bond to carry out defect rectification or to rectify damages incurred, if after due process, no appropriate action is taken by the Contractor / Developer. A Security Bond is calculated at the Estimated Construction Cost of the works to be secured against or the Estimated Cost of the Risk.</p>
<p>Standard Drawings</p>	<p>The current Council Standard Drawings.</p>
<p>Superintendent</p>	<p>The person employed to oversee the progress and standard of site works. Generally the consultant fills this position.</p>
<p>Subdivision Works</p>	<p>Subdivision Works shall include, but not be limited to, road works and associated earthworks and site works, drains, pathways and cycle ways, street lighting, streetscapes and landscaping of public spaces owned or maintained by Council. The works are not restricted to the proposed development, but may be extended to include existing or other proposed roads, drains, reserves or public or privately owned lands giving access to or affected by or having effect on, the proposed Subdivision.</p>
<p>Technical Specification</p>	<p>That Technical Specification lodged by the Developer or Consultant and approved by Council for construction purposes. Where no Technical Specification has been so approved or the approved Technical Specification is deficient, Council's Standard Technical Specification shall be deemed to be the Technical Specification be it in part or full.</p>

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PART 1

THE PLANNING AND DEVELOPMENT PROCESS

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1.3 DEVELOPMENT PROCESS AND COUNCIL'S ROLE

1.1 GENERAL

1.1.1 Scope

This section deals with the initial Subdivision Planning and Development process in the Northern Territory as it affects Developers dealing with Council.

It is essential that applicants discuss their submission with the Development Assessment Services section (DAS) of the Department of Lands Planning and Environment. Equally, it is essential that developers discuss their proposals with Council at an early stage. This ensures that all Council requirements have been discussed, negotiated, agreed and understood prior to the issue of the Development Permit.

Parts of the following have been extracted from the **User Guide for the Northern Territory Planning Scheme**. The User Guide in whole can be obtained from Development Assessment Services Department of Land Planning and Environment for further reference if necessary.

1.1.2 The Role of Council in the Subdivision and Development Process

The Planning Act establishes the Development Consent Authority as the body responsible for approving subdivision and development in the Territory.

Council is not responsible for issuing subdivision and development permits. Its role in the planning process is one of a referral agency or service authority and also as the body representing the wider Darwin community.

The Planning Act requires that Council to be formally advised of development applications within the municipality and this allows Council the opportunity to comment on development applications within the public exhibition period defined under the Act.

Council has a wide range of responsibilities under the Northern Territory Local Government Act (**LGA**) in addition to its role under the Planning Act. Under the LGA, Council is specifically responsible for:

- Maintenance and management of most public roads and verges;
- Traffic control;
- On street and off street car parking;
- Footpaths and cycle-ways;
- Foreshore protection;
- Stormwater drainage;
- Waste collection;
- Council owned land and public spaces.

In the case of re-subdivision and/or development / substantial re-development of existing allotments, Council has the right under the LGA to require the upgrading of all assets such as roads and drains, street and public lighting and landscaping of verges or parks or public spaces.

1.1.3 Preliminary Consultation with Council

For both subdivision and individual site development, it is essential that developers discuss their proposals with Council at an early stage. This ensures that all Council requirements have been discussed, negotiated, agreed and understood prior to the issue of the Development Permit. This will save time and money and alleviate frustration that may arise by learning of Council's requirements after a Development Permit has been issued.

Council issues requiring discussion during the initial Planning process are as follows:

- **Stormwater Drainage**

- Design, construction and maintenance of internal (on-site) drainage
- Design and construction requirements for external catchments
- Connection to existing drainage infrastructure
- Upgrading of existing drainage infrastructure
- Location of existing stormwater drainage easements
- Requirements for new stormwater drainage easements

- **Environmental Matters**

- Environmental Management Issues
- Erosion and Sediment Control
- Stormwater Management
- Waste bin storage and collection

- **Roads, Traffic and Vehicular Access**

- Internal roads layout and design
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- External roads and traffic issues
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- **Landscape Requirements**

- On site landscape requirements
- Landscaping within road verges
- Upgrading of existing landscaping

- **Footpaths and Pedestrian Access**

- Disabled access issues
- Design, location and maintenance of footpaths
- Upgrading of existing footpaths

- **Council Owned Land**

- Road verges
- Parks and reserves
- Walkways

1.1.4 Preparing and Lodging a Development Application

The Owner or a person authorised by the owner may apply for a Development Permit.

A Development Application must be lodged with Development Assessment Services (DAS), Department of Infrastructure, Planning and Environment.

All applications must be accompanied by adequate information to enable it to be properly assessed by DAS. A checklist of necessary information is included with the application form.

An application fee is payable at the time the subdivision or development application is lodged with DAS. DAS should be contacted for more information about application fees and payment.

1.1.5 Developer's Agents and Consultants

Depending upon the nature of the application, the applicant can seek professional assistance. Planners, engineers, architects, environmental, heritage and other consultants may be engaged as required. For matters in which Council is responsible, Consultants need to hold recognised qualifications and be acceptable to Council.

1.1.6 Public Notifications and Submissions

Development applications are required to be advertised in a newspaper circulating in the area and one or more signs must be placed on the land, notifying details of the application.

The Development Assessment Services (DAS) organises notification in the newspaper. All planning notices are published weekly, each Friday, in the NT News and similarly in local newspapers depending on their day of publication.

DAS will also provide the applicant with a pre-printed sign(s) to be erected on the subject land. The details of the application are to be filled in on the sign by the applicant. The sign(s) must not be removed until the end of the statutory period, a minimum of 14 days after notification in the press.

In addition to the public notice and sign(s), a copy of the development application is available for viewing during the public exhibition period at DAS and at Council's Customer Services section.

A separate copy of the development application is forwarded to Council and to other authorities such as PowerWater, Department of Infrastructure, Planning & Environment and Telstra for assessment and comments during this time.

1.1.7 Objections and Submissions

Any person or body, including Council, may make a submission to the Consent Authority regarding the application during the 14 day exhibition period.

1.1.8 Assessment by Council

Council employs planners, engineers and other technical staff to provide proper advice to the elected members (Aldermen) regarding development applications.

During the 14 days exhibition period, Council staff assesses the application. This usually includes an on site inspection and may include Council speaking with the applicant to clarify matters if necessary.

In addition to matters for which Council has statutory responsibility under the Local Government Act, the submission is assessed by Council in terms of the Darwin Town Plan, any declared Land Use Objectives for the area and incorporated documents including the Design Guide for Residential and Commercial Developments in the Northern Territory, prepared by the Department of Lands Planning and Environment.

Council staff's recommendations to the elected members are generally framed in terms of support for the proposal, either conditional or subject to conditions or objecting to the proposed development for specific reasons.

A copy of Council's recommendations is forwarded to the Consent Authority as soon as possible after consideration by the technical staff. A copy of the letter is also forwarded to the applicant.

Council's recommendations are written in two parts;

- One part addresses matters under the Planning Act;
- The other part addresses matters under the Local Government Act and other pertinent legislation such as the Disability Discrimination Act.

At this stage the comments are the views of Council's technical staff and do not necessarily represent those of the elected members. All of the recommendations are subject to endorsement by Council.

The elected members consider the staff's recommendations at their Town Planning Committee meeting, generally held the day before the Development Consent Authority meeting. The Aldermen may endorse the recommendations or alternatively may modify and amend the recommendations.

Council notifies the applicant and the DCA as soon as possible after the Town Planning Committee meeting of any changes to the recommendations.

At all stages of the process, the recommendations of Council and Council's staff are confidential. This means that aside from the DCA and the applicant, the recommendations are not made available to the public.

1.1.9 Consideration by the Development Consent Authority

Development Assessment Services (DAS) planners assess subdivision and development applications.

Each development application will be scheduled for consideration by the Development Consent Authority at one of its regular monthly meetings.

The Authority must take into consideration any submissions received during the exhibition period and must take into consideration the matters listed in the Planning Act. Generally these accord with those matters that have to be addressed by the applicant when making the application.

Prior to determination, copies of submissions received and also copies of responses from service authorities and Government agencies will be made available to the applicant.

The Development Consent Authority will invite the applicant and any person who made a submission to be present at its meeting and they will have the opportunity to address the Authority and answer any questions they may have in relation to the proposal.

A representative of Council attends each meeting of the Consent Authority to answer any queries the Authority may have regarding Council's submissions and to advise of any last minute changes, if any, to Council's position.

1.1.10 The Consent Authority Decision

After the meeting, the Consent Authority discusses each application and makes a determination to either refuse the application, to grant consent subject to conditions, to defer consideration pending receipt of additional information or to delegate approval to the Chairman subject to receipt of additional information.

A statement of reasons usually accompanies any decision of the Authority.

In the event that the application is deferred or delegated subject to further information being submitted, the applicant may need to obtain approval from Council, or some other service authority, for some aspect of the development.

It needs to be noted that Council is not formally notified of decisions of the Development Consent Authority until the minutes of the Authority meeting are finalised. This could be 2-3 weeks after the meeting. Council officers are therefore not necessarily aware of any particular requirements or conditions regarding the application.

1.1.11 The Development Permit

Subdivision and Development Permits are usually issued subject to Conditions that have been recommended by Council and also other service authorities as well as the Development Consent Authority. Many of the conditions are standard conditions that appear on the majority of development permits. Some conditions of course may be specific to the particular site / development.

1.1.12 Certification of Compliance with Development Permit Conditions

Once the development permit has been issued, construction of the development may proceed subject to the developer having taken out all the necessary permits and received the necessary approvals.

In the case of subdivisions, these procedures are set out in detail in the following sections of these Guidelines.

Prior to obtaining a certificate of occupancy in the case of a new development or titles release in case of a subdivision, it will be necessary to obtain Council's clearance that all relevant conditions set out on the development permit have been complied with to Council's satisfaction.

This usually involves inspection(s) of the site and works by Council officers then issue of a clearance certificate.

1.2 STATUTORY REQUIREMENTS

1.2.1 The Northern Territory Planning Act

The current Act, which came into operation in April 2000, provides for a consistent approach to planning throughout the Territory. It promotes a performance-based approach to planning rather than the prescriptive development and land use controls of the past.

The Act provides for a single integrated Northern Territory Planning Scheme managed by the Minister, with provision for community input and a planning appeals process.

1.2.2 The Northern Territory Planning Scheme

The Northern Territory Planning Scheme is established under the Planning Act 1999 and comprises three elements:

- Land Use Objectives – Statements of Planning Policy;
- Development Provisions – Control development and land use;
- Incorporated Documents – Guidelines, assessment criteria, etc.

1.2.3 Development Consent Authority

The Act establishes a Development Consent Authority, whose function is to assess and determine development applications.

For the Darwin area the Consent Authority comprises the Chairman, a Deputy Chairman and three (3) division members. All members of the Authority are appointed by the Minister.

Two of the division members are elected members of the Darwin City Council, however these members do not formally represent Council on the Authority.

1.2.4 Development Control

The Planning Scheme provides the mechanism for Development Control, as well as defining directions for future development. Development includes the following:

- Subdivision of land into separate parcels (new allotments) including the consolidation of parcels and
- The use of the land.
- Works to be carried out to comply with subdivision or conditions.

1.2.5 Subdivision & Consolidation of Land and Development Leases

Under the Act, the subdivision or consolidation of land, no matter where the land is located, can only be carried out with the consent of the Authority.

A lease or other arrangement for a period of 12 years or more (including any right of extension of the original term), for the separate occupation of a parcel of land, requires consent as a subdivision. This does not include leasing off a part of a building or sub-letting of pastoral land.

1.2.6 Development Assessment

Applications for subdivision and development of land are assessed in terms of the requirements of the Planning Scheme. In the Darwin area. Some of the relevant documents comprising the Planning Scheme include:

- Central Darwin Planning Concepts and land Use Objectives 1999;
- Darwin Town Plan 1990;
- Design Guide for Residential and Commercial Development in the Northern Territory.

1.2.7 Developer Contributions

The Planning Act provides that a Service Authority such as Council may put in place a Contribution Plan under which a developer is required to contribute to:

- Infrastructure external to the development (currently restricted by the Regulations to Roads and Drains);
- Public car parking (if the required number of car parking spaces cannot be accommodated on site).

Council's contribution plans are available from Council and may be updated on occasion to reflect charges.



1.3 DEVELOPMENT PROCESS AND COUNCIL'S ROLE

The following flowchart relates specifically to the Subdivision / Development Process and Council's role and requirements. The Developer is responsible for obtaining the necessary approvals from the Planning Authority (Development Consent Authority) and other Authorities as required. This flowchart does not address or identify any other Authority requirements or procedures.

The flowchart shows progressive stages of a typical Subdivision / Development process with advancement through the various stages based on satisfactory outcomes from the previous stage. The flowchart is a simplistic outlook of the process and should be read in conjunction with the relevant Sections of the Guidelines.

Stage of Development		Developers prompts	Councils Role	Guideline References
1	Conceptual Stage	Initiate preliminary discussions with Council.	Provide initial feedback to Developer in regards to Council's requirements.	Section 1.1.2 & 1.1.3
2	Prior to Development Application to Planning Authority	Conduct further discussions with Council to ensure that the development submission would be acceptable to Council.	Provide feedback to Developer in regards to Council's requirements. This will specifically relate to stormwater disposal, access type and location, garbage disposal and general traffic issues.	Section 1.1.2 & 1.1.3
3	Lodgement of Development Application	Provide all necessary information (including relevant drawings) to the Development Consent Authority; keeping in mind any comments made by Council prior to application and any specific information required by Council to support/clarify the Development proposal.		Section 1.1.4

Stage of Development		Developers prompts	Councils Role	Guidelines References
4	Assessment of Development Application		The Development Consent Authority forwards a copy of the Application to Council for comments / requirements. Council assesses the Application in respect to stormwater disposal, vehicle and pedestrian access, verge and landscaping requirements, garbage disposal and traffic issues. Other issues relevant to the Local Government Act will also be assessed. Council's Planning Committee assesses applications. All comments are forwarded to the Development Consent Authority with a copy to the Applicant.	Section 1.1.8 & 1.1.9
5	Approval of Development	Approval is either declined or granted by the Development Consent Authority. Approval is subject to the conditions stated on the Development Permit.		Section 1.1.10 & 1.1.11
6	Design Approval	Submit all relevant design documentation (Drawings, Specifications & Reports) to Council for design approval.	Assess design documents and provide comments as necessary. The Developer / Consultant may be required to supply additional information or amend documents to meet Council requirements. Design Approval is granted when Council is satisfied with all Development requirements.	Parts 2 & 3 Appendix B - Development Application Form Appendix C - Design Approval Checklist Appendix D - Deed of Agreement
7	Approval for Construction	Organise a pre-commencement meeting with the Council Officer.	Assess construction programme and inspection plan. When Council is satisfied with all relevant construction criteria approval for construction will be granted.	Section 4.1.4 & 4.1.5
8	During Construction	Developer / Contractor to inform Council at predetermined Hold Points during Construction. Developer is responsible for the satisfactory certification of the works.	Council to inspect works at predetermined Hold Points during Construction and at any other time it deems to be necessary.	Part 4 Section 4.1.7, 4.1.8 & 4.1.9



Stage of Development		Developers prompts	Councils Role	Guideline References
9	Completion of Construction	Developer to inform Council once all construction has been completed and arrange a Practical Completion inspection with the Officer.	Council to conduct a Practical Completion inspection with the Developer / Contractor. On Maintenance will be granted once Council is satisfied that the intended works have reached Practical Completion.	Section 2.8
10	On Maintenance	Developer to apply for On Maintenance to Council. Ensure that all necessary information is provided to Council and the Construction Approval Fee and relevant Maintenance and Security Bonds have been lodged.	On Maintenance will be granted once Council is satisfied that all relevant information, fees, bonds have been lodged.	Section 1.1.12 Appendix E - On Maintenance Procedure Checklist Appendix F - On Maintenance Site Inspection Checklist Appendix J - Asset Register Forms Appendix K - CAD Drawing Requirements
11	Maintenance Period (defects liability period)	Developer is solely responsible for the maintenance of works during this period.	Council may conduct inspections as necessary to ensure that an acceptable level of maintenance is being achieved.	Section 2.9 Appendix G - Certificate of Acceptance
12	Off Maintenance	Developer to inform Council once the Maintenance Period has been completed and apply for Off Maintenance. Ensure that all necessary information is provided to Council.	Off Maintenance will be granted once Council is satisfied that the works have been satisfactorily maintained and no further defects have been identified. Relevant Maintenance and Security Bonds will be returned once Off Maintenance is granted.	Section 2.11 Appendix H - Off Maintenance Procedure Checklist Appendix I - Off Maintenance Site Inspection Checklist
13	Outstanding Defects	Developer / Contractor is solely responsible to rectify all defects to the satisfaction of Council. Once any defect has been rectified the Developer / Contractor is to notify the Officer to arrange an inspection.	Council may conduct inspections as necessary to ensure that defects are being or have been adequately rectified.	Part 2

PART 2

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2.10 AS CONSTRUCTED DOCUMENTATION

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- 2.11.3 Off Maintenance Certificate
- 2.11.4 Notification to Operations Engineer, Parks Manager and Others

2.1 GENERAL

2.1.1 Scope and Interpretation

The Guidelines may be interpreted as setting out Council's requirements prior to granting clearance of applicable conditions imposed on a subdivision or other development. Definitions of wording within the Guidelines are shown in the appendices.

Council's policy is to achieve better than minimum standards, particularly in the matter of access. The Guidelines prescribe what are considered to be the current best practices and standards applicable to the design, construction and functionality of infrastructure associated with subdivision and other development and works proposed to be carried out on Council owned or controlled property.

Each development therefore needs to be considered on its merits and the acceptable design criteria and standards should always be discussed with Council prior to the commencement.

The Guidelines are not to be used to form the basis of a construction contract, however Council's Standard Technical Specification and Standard Drawings may be reproduced and included in Contract Documents.

2.1.2 Developer Accountability

A responsible and accountable approach is required of the Developer and the Developer's Representative(s). The Developer will be held entirely accountable for all actions during the development process.

The Developer will be required to enter into a Deed of Agreement with Council, including the lodgement of a Security / Performance / External Works bond as noted in this Section of the Guidelines.

In particular it is expected that the Council's requirements are adhered to, particularly in the areas of programmed construction inspections, environmental controls, testing and certification during construction.

2.1.3 Developer Liabilities and Insurances

The Developer is to be responsible for all damage to existing facilities, services and structures in both public and private ownership sustained as a result of the subdivision / development.

Sufficient public risk insurance must be carried by the Developer to cover the proposed development. The insurance is to specifically indemnify Council. Evidence of appropriate insurance must be demonstrated prior to commencement of any construction works.

2.1.4 Developer to Discuss Proposal

It is imperative that Developers discuss their proposals with Council at an early stage ensuring that all conditions and requirements have been negotiated, agreed and understood prior to the issue of the Development Permit.

2.2 STATUTORY REQUIREMENTS

2.2.1 The Northern Territory of Australia Planning Act

The provisions of the Northern Territory of Australia Planning Act (**The Act**) regulate the subdivision and development of land in the Northern Territory.

2.2.2 The Northern Territory Planning Authority

The Northern Territory Planning Authority (The Authority or NTPA) is responsible for administering the Act.

When approval to subdivide or develop is given by the Northern Territory Planning Authority, a Development Permit will be issued (see Part 1 - The Development Process). The permit is almost always subject to a series of conditions that must be complied with to ultimately gain title to the subdivided land. These conditions may mean that the requirements of authorities other than Council (Other Authorities) have to be complied with.

2.2.3 The Northern Territory Local Government Act

The Northern Territory Local Government Act sets out Council's powers to prescribe standards and procedures for subdivision and development within the Municipality.

2.2.4 The Disability Discrimination Act and Building Code of Australia

Under all circumstances, all foot and road access design and construction is to comply with the objects and intent of the Disability Discrimination Act and the standards and requirements of the Building Code of Australia.

Council's policy is that design and construction will reflect better than minimum standards.

2.2.5 Other Acts and Regulations

All Acts and Regulations administered by the relevant Government Authorities are to be complied with throughout the development process.

2.2.6 Work Health Act NT & Work Health (OH&S) Regulations

The Developer's attention is specifically drawn to the requirements of the current Work Health Act & Work Health (OH&S) Regulations, Clean Air Regulations, Environmental Protection Act and other relevant Acts.

The Developer must understand the ramifications of any actions that are not in accordance with these and other legislative requirements and regulations.

In the case of a development by the Developer, OH&S documentation providing proof of the Contractors Safety Management System detailing how OH&S and General Risk Management is to be achieved and sustained, is to be provided to Council by the Consultant.

The safety of the general public, contractor's employees and road users on adjacent streets or accesses utilised during the project, is paramount and details of how this is to be achieved is to be included on the project drawings and in the project specifications.

2.2.7 Clean Air Regulations and Environment Protection Act

Details of how dust suppression and sand drift control is to be carried out and how erosion and sediment is to be controlled, are to be shown on the project drawings and in the specifications.

In locations where wind borne dust and sand may result in significant problems to the public or the environment and/or where wet season conditions will result in significant soil and silt transportation, Council may require an Erosion and Sediment Control Bond to be lodged by the Developer. Lodgement may be required with the design drawings as a condition of approval or at Practical Completion as a requirement for Acceptance, On Maintenance and Title release.

2.2.8 Territory Health Services – Biting Insects

On proposed developments adjacent to, or draining to or from significant sources of biting insects, guidelines set down by Territory Health Services – Medical Entomology Branch are to be adhered to.

These publications are as follows:

- Guidelines for Preventing Biting Insect Problems for Urban Residential Developments or Subdivisions in the Top End of the Northern Territory
- Guidelines on Urban Mosquito Control Drains
- Drainage Considerations for Mosquito Controls

This matter should be addressed at the Development Application stage and if Conditions subsequently apply, the matter is then to be addressed further at the design and construction stage of the development.

Territory Health Services is not a referral agency, however the Developer is to be aware of the requirements of the guidelines. Advice on the potential biting insect problems for residential developments is to be sought from Territory Health Services at the initial Subdivision Application stage.

2.3 COUNCIL REQUIREMENTS

2.3.1 Approved Documents and Commencement of Works

The Developer shall provide to Council for approval, all relevant designs, drawings and specifications for all proposed works associated with the subdivision / development to be taken over and maintained by Council.

Approval of Documents does not constitute permission to commence construction works.

2.3.2 The Works

The subdivision or development works may include, but are not be limited to, road works and associated earthworks and site works, stormwater drains, pathways and cycle ways, street lighting, streetscapes and landscaping of public open space owned or maintained by Council. The works are not necessarily restricted to on site works; they may also include external works associated with or affected by the proposed development.

2.3.3 Developer to Engage Consultants

The Council may require the Developer to engage Consultant(s) and Superintendent(s) as necessary to design, construct and supervise the proposed works associated with the Subdivision or Development, to be taken over and maintained by Council.

2.3.4 Developer to Carry out Works

A Developer, who is Subdividing or Developing land and is required to carry out works as described above, may:

- a) Carry out or cause to be carried out, the required design and construction works at the Developer's cost and expense;
- b) If it is the policy of Council, arrange for Council, as far as it is able, to carry out part or whole of the works on the Developer's behalf at the Developer's cost.

2.3.5 Developer to Pay Council Fees

Where the Developer carries out the design and construction works, Council shall be paid on demand, an amount to cover reasonable costs incurred in administering, assessing and inspecting design and construction of the works as follows:

- i) A Development Application Fee as set by Council's current Fees and Charges;
- ii) A **Design Approval Fee** in the amount of 0.50 % of the Estimated Construction Cost of the works as estimated by the Developer or Consultant and approved by Council, to be paid prior to Design Approval;
- iii) A **Construction Approval Fee** in the amount of 0.50 % of the Actual Construction Cost of the works as declared by the developer or Consultant and approved by Council, to be paid prior to the works being accepted On Maintenance.

2.3.6 Council May Carry out Works

Where Consultants and Superintendents have not been engaged by the Developer to design, construct and supervise the works, Council may be approached to carry out those activities subject to agreement by the Officer:

- i) A fee for administration, design, construction and supervision by Council, as far as it is able, commensurate with recommended consultants fees as approved by Council.

2.3.7 Deed of Agreement

The Developer shall enter into a **DEED OF AGREEMENT** with Council for the proper execution of the works required for the development in accordance with the Guidelines prior to or at the time of the Officer issuing design plan approval.

The Deed is to contain among other things, a SCHEDULE, detailing all conditions and requirements for subdivision / development works referred to under the Development Permit, to be ultimately taken over and maintained by Council,

The SCHEDULE of conditions, requirements and agreements reached should have evolved as a result of the consultations, discussions, negotiations and agreements between Council and Developer during the Planning process.

The Developer is to lodge all securities and pay all fees required by the Council, as set out in the Deed prior to or at the time of the Officer issuing design plan approval.

The NAME appearing on the Deed and any other Agreement(s) or Bond(s) is to be the NAME of the Developer appearing on the Development Application and Permit documentation. Council will not enter into any dealings with the Developer unless the foregoing is the case.

An example of a Deed of Agreement is shown in the Appendix D.

2.3.8 Maintenance and Security Bonds

The Developer is to lodge a Maintenance Bond with Council for an amount of 2.5% of the Actual Construction Cost of the Subdivisional / Development works at the time of the Officer approving design plans.

The Developer is to lodge any necessary Security Bond for an amount estimated to be the cost of all outstanding works or where a risk or liability has been identified. Estimates of works will be based on Council's current Fees and Charges where applicable.

Security Bonds may be required at any time during development, the amount of which is to be approved by the Officer.

2.3.9 Permits for Works on Land Controlled by Others

Where works are to be carried out on land owned or controlled by other Authorities and private owners, suitably documented permission to construct is to be obtained from the relevant Authority or person. This is to be presented to the Officer prior to the commencement of works and a clearance obtained and presented at completion.

Works will not be Accepted and placed On Maintenance until all necessary clearances are obtained and submitted to the Officer

2.3.10 Permits for Works on Land Controlled by Council

Where works are to be carried out in an existing road reserve or land owned or under the control of Council, a permit to construct the works is to be obtained.

Reinstatement works are to be carried out as specified in the Guidelines.

If the Officer is of the opinion that damage to Council property may result from the type of works and risk involved, the Officer may determine that an appropriate bond is to be lodged prior to the permit being issued and the works commenced. As well, the Officer may require that the Developer arrange for, or keep in operation, sufficient insurance policies to indemnify and protect Council against any claims that may arise during the works.

2.3.11 Development on Crown Land

Where development is to take place on Crown Land leased from the Government, The Department generally acts for the Owner, ie, the Government.

The Developer may have entered into a Deed of Agreement with The Department requiring securities to be lodged with them under the terms set out in the Deed.

Where Council is to take over and maintain any of the associated infrastructure, Council then becomes the Responsible Authority and the requirements, as set out in the Guidelines, apply.

Dependent upon the type of agreement the Developer may have entered into with The Department, it may not be necessary to enter into a Deed of Agreement with Council. Council will decide in this matter.

2.3.12 Existing Road and Drainage Upgrading

Where it is determined that the associated existing roads and drains are sub standard or inadequate to accommodate the expected drainage run off or additional traffic generated by the proposed subdivision / development, or if the existing roads and drains are in some way detrimentally affected by the proposed subdivision / development, Council may require the upgrading of the existing roads and drains to the appropriate standard.

The upgrading of roads and drains may be achieved by actual construction by the Developer at the Developer's cost, or by contribution of agreed amounts or contribution of amounts as determined under a Contribution Plan(s) or by Council for that purpose.

Where construction is to be carried out by the Developer, the Developer is to submit an External Works Bond at the time of the Officer approving design drawings.

2.3.13 Street and Place Names

The Responsible Authority for street and place names is the Place Names Committee who recommend and approve proposed names for all streets, places and parks.

The Developer is to liaise with and make submissions to the Committee at the planning stage of the development. Proposed names are submitted by the Committee to Council for support / comment in accordance with Council's Place Names Policy. These are then referred to Council for formal decision. Council's decision is then forwarded to the Committee. Government then formally adopts the approved names.

2.3.14 Street and Other Areas Lighting

Council is the authority responsible for providing and maintaining streetlights throughout the municipality. PowerWater contracts to Council to physically provide power to and maintain the lights.

The Developer is to provide street and other lighting in public areas of the proposed subdivision / development in accordance with current Australian Standards for illumination level, materials and installation and the requirements of Council and PowerWater.

The Developer is to provide street lighting, including lighting of traffic management treatments, 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 PowerWater.

The works are not restricted to internal subdivision roads, but may be extended to include existing roads providing access to or affected by the proposed subdivision / development.

Council will specify the required lighting categories as described in the Australian Standards.

“The works” are defined as subdivision works set out under the Development Permit. This includes all roads drains, streetscape, landscape of parks etc.

Council will be responsible for the operating costs of street and other areas lighting only after the works have been placed On Maintenance by Council and the Developer has arranged to have the works transferred to Council’s name.

In the case of lighting being located on Council property or land to be transferred to Council, eg, a park created under the subdivision, the works are to be separately metered. The meter is to be registered in Council’s name as soon as the works are placed On Maintenance.

For more detailed information on lighting and procedures to be followed, see Section under Design Requirements – “Street Lighting”.

2.3.15 Council Policy on Access, Footpaths and Verge Widths

Council’s current policy seeks to provide footpaths on both sides of the road for high pedestrian and or high traffic volumes.

Council requires that all pedestrian access meets or exceeds Australian Standards for Access and Mobility.

Under Council’s current policy, in residential R1 areas where there is no footpath, pedestrian movement is facilitated via the roadway (given that traffic volumes are considered low and roads in this category are considered safe for all pedestrians). Current driveway standards do not necessarily cater for wheelchair access from the road pavement to the property and therefore for roads without footpaths, access may be limited. Council will consider modifications to driveways (if required), on an as requested basis or require all driveways where footpaths are not provided to meet disabled access standards.

For Design Criteria refer to Section 3.7 of the Guidelines and the Standard Drawings.

For all new allotments, car parking for all, including disabled persons will generally be accommodated on site. For existing allotments, where this is not likely to be achieved, pram crossings or driveways in low traffic sites shall be provided adjacent to car parking to meet or exceed Australian Access Standards. Pram crossings shall be connected to the property via a footpath to Council standards.

2.4 OTHER AUTHORITIES

2.4.1 Engineering Services and Other Authorities

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

- **Council** for all road works and associated earthworks, drainage works, pathways, street lighting, streetscape and landscaping of Council owned public places;
- **The Department** for all road works and associated earthworks, drainage works, pathways, street lighting and streetscaping for all roads defined as “96(2)” gazetted as being controlled by the Department of Transport of Works;
- **PowerWater** for all electricity reticulation, water supply and sewerage reticulation;
- **The Department** for all development proposed on Crown Land, environmental matters and stormwater pollution (see below);
- **The Department - Natural Resources Division (Natural Resources)** for all matters concerning water quality, clearing and erosion and sediment control. Natural Resources are not a Referral Agency, but Council will be forwarding all proposals for comment prior to any approvals being given.
- **Telstra or other Providers or Carriers** (eg Austar) for all communication facilities;
- **Fire and Rescue Services** for fire fighting requirements.

2.4.2 Approval Requirements

Council requires that approvals from Other Authorities be submitted prior to Council approving designs / construction. Council will not approve plans or construction without these approvals.

All proposals should be discussed with **The Department** – Natural Resources Division with respect to stormwater run-off quality and erosion and sedimentation control.

Plans and specifications must be submitted to each Authority for review and / or approval during the design period prior to commencement of construction.

Clearances, or approvals to construction will also be required by Council from the Authorities at completion of construction.

2.5 CONSULTANT REQUIREMENTS

2.5.1 Consultants

The Developer may liaise directly with Council through the Officer or employ Agent(s) or Consultant(s) to act as the Developer's Representative(s).

There are usually a number of different referral authorities and range of complex and interwoven tasks involved in approval procedures and therefore a necessity to employ a number of different consultants with specific experience and qualifications in a range of disciplines.

Council advises that in the case of any reasonably sized development, the Developer should employ a suitably qualified and experienced Project Manager.

Council is not able to act in the role of Project Manager, however, it is always available within reason, to act in an advisory capacity throughout the course of the development.

2.5.2 Engaging Consultants

The Developer is required to engage a suitably qualified consultant(s) to design, supervise and certify the works associated with the subdivision / development.

If the works are of a minor nature, then at the Officer's discretion, persons other than suitably qualified consultant(s) may prepare plans acceptable to Council.

Ideally, the Certifier should not be the Superintendent.

The Officer reserves the right, without reservation, to reject any nominated Consultant.

2.5.1 Developer's Representative(s)

Designs and specifications are to be prepared by suitably qualified consultants nominated by the Developer.

In the case of engineering consultants, Council requires the following criteria:

- Eligible to be elected to the National Professional Engineers Register;
- Eligible for Corporate Membership of the Institution of Engineers, Australia;
- Adequate recognised professional experience in subdivision and / or development;
- Possess professional indemnity insurance to a minimum amount of \$500,000.00 or appropriate to the perceived risk involved with the project works;
- Have no conflict of interest in the time or cost of completing the works and the completion of the works to the required standards.

In the matter of consultants in other disciplines, such as landscape (see Section 6) and environmental areas, similar qualifications will apply and the matter should be discussed with the Officer.

In all cases the Officer shall decide and have the right to reject any nominated representative without reservation.

2.6 ENVIRONMENTAL, EROSION & STORMWATER MANAGEMENT ISSUES

2.6.1 General

Pollution of the sea, waterways, rivers, streams and drains can be caused by water borne and wind blown debris from a development site. To cause or allow this is an offence under a variety of Acts, Regulations and By-laws.

Environmental matters such as clearing of vegetation, stormwater quality, stormwater drainage management and erosion and sediment control are critical to the responsible development of subdivisions and other projects.

Soil erosion and sedimentation, particularly as a result of clearing, stormwater run-off or wind effects, is a significant problem in any development whether in urban, rural or remote areas and results in inordinate economic, social, environmental and cultural costs to the Developer, Council and community.

The Developer has a responsibility to protect the natural assets and resources of the Territory and is totally responsible for clearing operations, erosion and sediment control and the quality of stormwater run-off during the overall development process.

In particular there is a significant and vital need to plan for, manage and maintain best practices for the control of erosion and sediment on any proposed subdivision development.

The developer is to take all the above matters into consideration during all aspects of the development process.

2.6.2 Other Environmental Management Issues

As well as the engineering aspects of clearing, dust management, drainage and erosion control issues, there are other Environmental Management issues that must be addressed with any proposed development.

These are generally categorised as:

- Aboriginal Land Claims and Native Title Claims;
- Coastal Development and/or Reclamation of Coastal Areas
- Flood or Storm Surge affected land
- Environmental Impacts and Heritage Planning -
 - Sacred Sites
 - Heritage or Archaeological Places or Objects
 - Beneficial Uses and Users
 - Development within National Park or Conservation Reserve
- Fire Management
- General Pollution
- Acid Sulfate Soils
- Use of Appropriate Fill Materials

All of the foregoing will require some form of approval, comment or input from The Department and all may require Council input and approval.

2.6.3 Guidelines for Erosion and Sediment Control - Natural Resources

The Department - Natural Resources Division have drafted Resource Management Guidelines - Erosion and Sediment Control Guidelines for Roadworks, Subdivisions, Construction Sites and Linear Developments in the Northern Territory.

This document is not a statutory requirement, however, it provides guidelines for best planning and management practices. Adoption of the design principles, work practices and techniques as set out in Natural Resource's Guideline, will result in overall savings and benefits in all areas of development.

2.6.4 Erosion and Sediment Control – Council Responsibilities and Requirements

Whilst Council currently has no direct responsibility for the actual physical development of and construction carried out on allotments within a subdivision or on existing allotments, it is totally responsible for the collection, transportation and maintenance of the stormwater run-off from the whole of the development.

Council will not accept any polluted stormwater run-off into its drainage systems nor will it allow dust and sand drift to cause a nuisance to the detriment of the public or any Council or public asset.

Council has developed its stormwater drainage, erosion and sediment control requirements as set out in the Subdivision and Development Guidelines in conjunction and in line with Natural Resource's Guidelines.

Council's requirements shall apply.

Council is also responsible for public safety and the effect or result of any work, construction and maintenance practice not in accordance with the applicable Acts and Regulations employed during the development process.

2.6.5 Appropriate Fill

The range of materials suitable for landfill and reclamation of a coastal development site is dependent upon several factors including the proposed use of the site and construction methods.

Fill materials for allotments must be solid, inert and non-hazardous.

Fill material suitable for placement in road reserves, under pavements and in fill embankments for road works, is to be as per Council's standard specification.

Contaminated fill containing any of, but not limited to the following, are unacceptable:

- household rubbish, vegetation, timber and iron and other metals, whitegoods etc,
- liquid waste, oil drums and plastic containers,
- car bodies, tyres,
- pesticides and containers, gas bottles, dangerous goods, hazardous wastes,
- acid sulfate and other contaminated soils.

2.6.6 Management of Acid Sulfate Soils – Council Approval

Acid sulfate soils usually occur with the development or reclamation of Coastal areas, ie canal type developments on the coast or rivers and land fill of mangrove or low lying coastal areas and subgrade replacement and filling in road reserves in tidal or coastal areas.

During the development of such projects, the occurrence of mangrove mud is common. Mangrove mud will generally have acid sulfate potential.

It should be understood that a Developer has a legal liability in the matter of Acid Sulfate soils encountered in a proposed development. Acid Sulfate soils must be investigated, dealt with and properly managed.

It should also be understood that currently there is no facility for the dumping and treatment of acid sulfate soils in Darwin.

If not already in place, a management plan for the removal or treatment of mangrove mud is required. Mangrove mud is to be removed from beneath road pavement construction works.

The matter of acid sulphate soils will generally be addressed at the Planning Application (Development Permit) stage.

The direct management of acid sulfate soils will generally be the responsibility of The Department.

Council is vitally concerned with the prospect of its drainage systems being adversely affected by acid sulfate leachate, therefore Council must approve any proposed Acid Sulphate Management plan.

The Department – Environment and Heritage Division have produced Guidelines titled “Environmental Guidelines for Reclamation in Coastal Areas” which are to be consulted and the recommendations adhered to.

Further information in this matter can be obtained from The Department.

2.7 RE-SUBDIVISION AND RE-DEVELOPMENT OF EXISTING ALLOTMENTS

2.7.1 Council Requirements

Where existing allotments with unconstructed, partially or fully constructed street frontages and/or partially or fully constructed existing drainage systems are re-subdivided into additional allotments, or the site re-developed in a significant manner, Council may require the following:

- Partial construction or full reconstruction of the abutting road and/or the surrounding road(s) including road pavements, kerbs and gutters, footpaths, crossovers and driveways, shared footways and bikeways, verges and landscaping/streetscape works;
- Partial construction or full reconstruction of the abutting, internal and/or out-falling drainage system;
- Partial construction or full construction of new shared internal access roads or driveways and associated drainage where access easements or battle-axe legs apply;
- Extension of services or provision for extension of services (conduits) from the front boundary to the top of the battle-axe leg or access easement.
- Internal drainage where necessary and the provision of appropriate easements where the proposed drainage from one site or allotment is concentrated and discharges over another allotment being created or downstream.
- Removal of existing driveways and crossings where necessary and replacement with kerb and/or kerb and channel.

The design/construction standards for access roads are to be similar to those for battle-axe allotments as set out in Section 3.

The proposed re-subdivision or re-development is to be adequately drained to Council requirements.

2.8 PRACTICAL COMPLETION, ON MAINTENANCE & SURVEY RELEASE

2.8.1 Practical Completion

Defined as “the stage reached when all the works have been constructed to the true intent and meaning of the approved drawings and specifications; the whole of the works being able to be used for the purposes for which they have been designed provided that all requirements of the Approval Conditions having been complied with”.

2.8.2 Application for Works to be Inspected for On Maintenance

Upon the Practical Completion of the works, including landscape/streetscape works, the Consultant is to notify the Officer in writing that the works have been completed in accordance with the approved drawings and specifications and request an inspection to have the works placed On Maintenance.

2.8.3 On Maintenance Inspection

The inspection will require the presence of the Officer, the Consultant and the Contractor. All drainage pit covers are to be temporarily removed and all drainage lines flushed for the inspection. The Officer may have other special requirements to be attended to prior to inspection.

The Consultant shall then organise the inspection at a mutually convenient time.

The **On Maintenance Inspection Checklist** is attached as Appendix F and has been produced to aid Consultants in their estimation of whether works have reached Practical Completion.

2.8.4 Outcomes of On Maintenance Inspection

As soon as possible after the inspection, the Officer will inform/confirm with the Consultant any items not in accordance with the requirements of the drawings and specification and the conditions set out in the Development Permit.

The items shall be divided into:

- Items requiring completion, repair or alteration prior to any clearance being issued to The Department. A further inspection of these works when completed or rectified shall be deemed to be an extension of the Practical Completion inspection. These works are to be completed prior to works being placed On Maintenance;
- Other items that may be completed, repaired or altered by an agreed date during the Maintenance Period. These works may require a Security Bond(s) to be lodged;
- Items that are to be monitored for performance during the maintenance period. These works may require submission of a Security Bond.

As well the following items will noted:

- Relevant Items or conditions on the Development Permit not completed.
- Any other outstanding matters requiring attention

2.8.5 Items to be Submitted for Acceptance

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

- As Constructed Drawings and Documentation;
- Completed On Maintenance Checklist;
- Certification of Works (Statement of Compliance), outstanding Materials and Compaction Test Results;
- Clearances from Other Authorities and Private owners;
- Proposed Cadastral Survey Plan showing all easements;
- 0.5% Development Inspection Fee;
- 2.5% Maintenance Bond. The Security Bond may be rolled over if sufficient;
- Lodgement of all Outstanding Works Bonds;
- Lodgement of Environmental Bond.

When all works are completed in accordance with the above, the Officer shall issue the Consultant with an Acceptance and On Maintenance Certificate.

2.8.6 Bonding of Outstanding Works

Council requires works to be completed prior to Practical Completion rather than bonded, however in certain cases the Officer may allow bonding in lieu of outstanding works.

Cash bonds/payments are required for incomplete or outstanding works.

Unconditional Guarantees from a financial institution acceptable to Council are required for refundable items such as Security and Maintenance Bonds.

The name of the Developer appearing on the bond is to be the same as appears on the Planning Application and Development Permit and other documentation lodged with Council.

The rates applicable to costings for these bonds, will be Council's current rates as set out in its Annual Fees and Charges. If no relevant rate exists, then the bond will be of an amount mutually agreed by both parties.

Council policy requires that footpaths and driveways be bonded to enable construction at the time of building works. The bond is to be in the form of cash.

Landscape works are to be constructed prior to the works being placed on maintenance. Landscape works will only be bonded under the most extenuating circumstances.

2.8.7 Environmental Bond

An Environmental Bond may be required, at the Officer's discretion, if it is considered that drainage, erosion and sediment control measures are not adequate or a perceived risk of erosion and sedimentation exists over the Maintenance Period. The bond will be of an amount determined by the Officer.

2.8.8 Bond Applications

If a bond for outstanding works is sought, the Developer is to lodge an application to the Officer requesting that the works be bonded. Applications are to be in writing and are to include the following information:

- Concise reference to the location, extent and nature of works to be bonded;
- A timetable for the future completion of the outstanding works;
- An itemised estimate of the cost of the works to be bonded;
- Reasons for requesting the bonded work;
- Any other information that will assist in the assessment of the application.

2.8.9 Maintenance Bond

A Maintenance Bond calculated at 2.5% of the certified cost of the works, is to be lodged prior to the Works being placed On Maintenance.

The bond is to be held for the duration of the Maintenance Period and may be drawn upon by Council to carry out defect rectification, if after due process, no appropriate action is taken by the Contractor / Developer.

2.8.10 Bond Information

All bonds submitted to Council shall clearly state the following information:

- Name and address of the person or persons responsible for the payment or the arranging of the unconditional guarantee;
- The amount of the payment or unconditional guarantee;
- Name, stage and location of subdivision and Development Permit Number;
- A concise explanation of the purpose of the bond referring to all items for which it is to be utilised.

Compliance with the above submission requirements does not necessarily imply acceptance of the bond and each request shall be subject to acceptance by the Officer.

2.8.11 On Maintenance Certificate.

When the foregoing requirements to have the works placed on Maintenance have been complied with, the Officer will issue the Developer with an On Maintenance certificate.

The certificate will have no effect until both the Officer and the Developer have signed and dated the document.

2.8.12 Survey Release

The original of the Acceptance and On Maintenance certificate will be issued to the Developer who may then utilise the document to obtain titles release from The Department.

2.8.13 Notification to Operations Engineer, Parks Manager and Others

Council's Development Officer shall formally notify the Operations Engineer, Parks Manager and any other interested party (ie, the Recreation Officer in the case of playgrounds), that the works have been placed On Maintenance, the duration of the Maintenance Period and any special provisions that may apply, all in accordance with Council's internal procedures.

2.9 MAINTENANCE PERIOD

2.9.1 Maintenance Period (Defects Liability Period)

Defined as “The statutory period, in which the Works, having been deemed to be Practically Complete and Accepted and placed On Maintenance by the Council, are to remain the responsibility of the Developer, to care for and maintain and repair any and all defects resulting from design errors or omissions, faulty workmanship and/or defective materials.”

The responsibilities and the requirements of the developer are set out in the following.

2.9.2 Civil Works Maintenance Period

Civil works generally refer to roads and drainage associated with the Subdivision or Development.

For works carried out on solid ground, the normal defects liability (maintenance period) is 12 months, however if there are special circumstances, Council may decide that a longer period is required: ie, over two wet seasons and one dry season.

Civil works constructed on filled/reclaimed land or major trenching carried out in Council’s pavements will be subject to a 24 months maintenance/defects liability period.

2.9.3 Landscape / Streetscape Works Maintenance Period

Landscape /Streetscape works can be broken into two main sections:

- Street trees, grassing, plantings and irrigation works;
- Landscape hard works; ie, footpaths, pavements and structures associated with the works.

2.9.3.1 Street Trees, Grassing, Plantings and Irrigation Maintenance Period

The maintenance period for these works shall be 12 months, ie, the same length of time as the civil works. In the case of the 24 months civil works maintenance period, then the 12 months maintenance period will apply. for street trees etc.

Where the contract between the developer and the contractor specifies a maintenance period of less than 12 months, Council’s 12 months maintenance period will apply. The developer will be required to make arrangements for the proper maintenance or extension of guarantees/warranties for any additional periods.

2.9.3.2 Landscape Hard Works Maintenance Period

The maintenance period for these works shall be the same length of time as the civil works. In the case of the 24 months civil works maintenance period, then this 24 months maintenance period will apply.

As for 2.9.3.1 above, if there is a different/shorter guarantee/warranty or maintenance period stated under any contract between the developer and any contractor/supplier, then Council’s maintenance period applies.

2.9.4 General Maintenance & Defects Requirements & Responsibilities

The following is a list of maintenance and defects liability period requirements for all works applicable to subdivision / development and includes, but is not limited to:

- Seed, water and fertilise all disturbed areas to obtain 80% grass coverage within six months of the works being accepted On Maintenance;
- Water, weed, fertilise and carry out all necessary maintenance to all landscaped areas provided as part of the works.
- Maintain to the manufacturer's and Council's specifications and requirements all structures located within the defined development;
- Mow road verges, pathways and park areas and other areas under Council's future control to maintain a grass length as specified and agreed;
- Sweep roads to maintain a surface free of loose stones and excessive dirt deposits;
- Remove silt and debris washed into kerbs, kerb and channel and underground drainage pipes, drainage structures and overland drains;
- Clear temporary and permanent stormwater control and erosion control structures of debris and silt on a regular basis and as necessary when filled to 50%;
- Repair all scours, replace topsoil and grassing to areas eroded by stormwater. Upgrade existing erosion control measures or install new temporary or permanent control structures where severe scouring indicates the need;
- Repair all trench subsidence to all infrastructure and services;
- Repaint line marking as necessary;
- Repair or replace all subsided pipes, kerbs and pavements;
- Replace all construction providing a risk to the public;
- Replace or repair any cracked, chipped or broken kerbs, paving, pipes and structures.

At any time during the Maintenance Period, Council may undertake random inspections to determine the satisfactory maintenance of the works.

2.9.5 Notification of Defects during the Maintenance Period

Council will carry out regular audits and inspections of the works during the Maintenance Period. This does not relieve the Developer of this responsibility.

Where Council believes that the Developer is not carrying out the necessary inspections and audits during the maintenance period, the Council's time in these matters will be charged to the Developer.

Where maintenance requirements or defects are noted, written advice will be issued to the Developer requiring works to be carried out within a stipulated time. Where public safety or health is at risk, verbal advice may be given followed up by written advice. In this instance appropriate action can be required within 24 hours from the time of the verbal advice.

Where notifications are not complied with by the due date, Council can, without further reference, undertake the works at the Developer's cost.

If at any time after the works have been declared Practically Complete, Accepted and placed On Maintenance by Council, the subdivisional works are found to be not in accordance with the approved specification and drawings, then the works are to be rectified at the Developer's cost. Minor items may be monitored and the works undertaken at the end of the Maintenance Period.

2.9.6 Builder's and Other's Damage

Council will not be responsible for damage caused as a result of builder's or any Other's operations. This applies to all works. All damaged works are to be rectified prior to being accepted off maintenance by Council. If the works are not rectified, the cost of any works deemed to be necessary to repair the damage will be deducted from the Maintenance Bond and/or any other relevant bond that is in place.

2.9.7 Construction and Design Defects and Omissions

The repair of construction defects or the rectification of design errors and omissions are to be undertaken as they are identified.

Construction defects include but are not limited to:

- Shrinkages of materials used in construction: eg, movement of asphalt away from kerbs, pavement cracking, subsidence in trenches, pavements, kerbs, etc;
- Incorrect installation of materials; eg, deflection of pipes, incorrect bedding, broken and chipped kerbs, paths, paving or concrete structures, etc;
- Use of materials that do not comply with the specification: eg, gravels and bedding sands with incorrect gradings, incorrect class of pipes, low concrete strength, etc;
- Defects that were identified during construction, but were monitored rather than rectified.
- Incorrect operation of irrigation system and pipe leaks;
- Trees not establishing and dying.

Any defect occurring because of non compliance with any of the relevant policies laws, codes, specifications and after acceptance of any or all of the constructed works, is to be rectified immediately by the developer at the developer's cost.

2.9.8 Statement of Compliance

The Consultant is to certify to Council that the relevant conditions imposed on the Development Permit have been complied with and that the works as constructed comply with the approved drawings and specifications. See As Constructed Documentation.

2.9.9 Non Compliance Reports

The consultant is to submit Non Compliance Reports as part of the As Constructed Documentation referring to the items of construction not in accordance with the approved drawings and specifications.

2.10 AS CONSTRUCTED DOCUMENTATION

2.10.1 As Constructed Drawings

The Developer is to provide As Constructed Drawings in hard copy and digital format to the Officer prior to acceptance and On Maintenance.

The following requirements apply:

- The drawings are to be clearly marked “AS CONSTRUCTED” and certified by a Registered Surveyor as follows:

“ This drawing is an accurate representation of the works as constructed and the information is suitable for use by Council and others. As constructed levels have been provided by a Registered Surveyor.....
Certified by

- Correct street names and lot numbers are to be shown on the plans.
- Earthworks
 - + Certification of the design plans is sufficient provided adequate As Constructed spot levels are shown adjacent to design level.
- Roadworks
 - + Certification of the design plans is sufficient provided as constructed grade and cross section information and levels is shown adjacent to the design levels and information.
 - + Location of street signs etc is to be confirmed but accurate survey is not required.
 - + As constructed pavement thicknesses and make-up including minimum CBR values for the pavement materials are to be noted.
- Stormwater Drainage
 - + Certification of the design plans is sufficient provided as constructed pipe diameters and types, invert levels, surface levels, pipe lengths and grades are shown adjacent to the design information.
 - + The design drainage calculations are to be amended as constructed.
- Landscape Works
 - + Certification of the design plans is sufficient provided all works were carried out in accordance with the design.
 - + Any amendments are to be noted on the plans.
- Other Works eg Structural
 - + Certification of the design plans for structures constructed within Council roadways or Public Land is sufficient
 - + Any amendments are to be noted on the plans.

All drawings are to be drafted in accordance with Council’s mandatory CAD requirements, which are stated in the Appendix K. This is particularly important for As Constructed electronic copies.

The following Australian Standards shall be adhered to:

- AS 1100 Part 101 1992 Technical Drawing – General Principles
- AS 1100 Part 401 1984 Technical Drawing – Engineering Survey and Engineering Survey Design Drawing

2.10.2 Other As Constructed Documentation

Other As Constructed Documentation shall consist of:

- Statement of Compliance –
- Non Compliance Report(s) –
- Inspection and Testing Results and Reports;
- Other documentation such as:
 - + Structural Certification;
 - + Certifications by other disciplines and trades.

Inspection and Testing Verification and Records are to include all items required under the agreed and/or approved Inspection and Testing program. As well it will include any other job specific items ordered by the Officer and carried out.

Should any of the above test results not meet the required standards or specification, the Consultant shall include in his submission, details of re-testing and/or rectification carried out.

The documentation is to be presented in logically assembled and bound documents including a table of contents.

2.10.3 Asset Register

Council maintains an Asset register in an electronic format.

As part of the process of works being placed “On Maintenance”, the details and value of the works is to be submitted so that it can be placed on Council’s Asset Register.

The Consultant is required to provide the necessary details of costs and quantities, broken up into sections and allocated to specific sections of roads and drains.

The information is to be recorded on Council’s standard Asset Register Forms, a copy of which is in Appendix J.

2.11 OFF MAINTENANCE

2.11.1 Acceptance of Works Off Maintenance

A written request is to be submitted to Council for acceptance of the works Off Maintenance and for the release of the Maintenance Bond at the end of the maintenance period.

This request is to follow a satisfactory Off Maintenance inspection.

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

2.11.2 Off Maintenance Inspection Checklist

An Off Maintenance inspection will be carried out after submission of the written request. The Off Maintenance Inspection Checklist is to be referred to by the Consultants in their estimation of whether the works are satisfactory to be taken over by Council and during the Off Maintenance inspection.

The Checklist is shown in Appendix I and is to be referred to and submitted with any other relevant Off Maintenance information and documentation.

2.11.3 Off Maintenance Certificate

When all requirements and inspections have been complied with, the Officer will issue the Developer with an Off Maintenance certificate.

The certificate will contain the following information:

- Developer's name;
- Development Permit Number;
- Brief Description of the Works;
- Confirmation from Council that the whole of the works are satisfactory and from the date stated, Council will take over and maintain the works;
- Space for signature and dating by the Officer;
- Space for signature and dating by the developer.

The certificate will have no effect until both the Officer and the Developer have executed the document and the Deed of Agreement is "Signed Off" by both parties.

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.

2.11.1 Notification to Operations Engineer, Parks Manager and Others

Council's Development Officer is to formally hand over the following to the Operations Engineer, Parks Manager and other interested parties, when works are certified Off Maintenance:

- Notification that the works have been taken over by Council;
- As Constructed drawings and any relevant test results or other information requested.
- Asset Register Forms.

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PART 3

DESIGN

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3.1 DESIGN APPROVAL PROCESS

3.1.1 Design Approval Process

The Developer and/or the Developer's Consultant(s) are advised to discuss the proposed development and work with Council throughout the Planning, Design and Construction phases.

The Developer is ultimately responsible for all design and construction activities carried out during the course of the project.

All submissions for approval are coordinated through Council's Development Officer.

3.1.2 Design Works and Design Reports

Design works required are as shown but not limited to the following:

- Roadworks, drainage, erosion control and associated site works and earthworks;
- Landscaping of streets and public open spaces as required;
- Pathways and Cycle ways;
- Street lighting;
- Any other associated works required under the Development Permit and as required by Council.

A Design Report(s) describing the intent, criteria, considerations and philosophy of the design for all works is to be submitted as part of the design documentation for approval. Any departure from Council's policies, as set out in the Guidelines, should be noted and justified.

Landscape, environmental, erosion and drainage control works form an integral part of any subdivision development and are not to be viewed as add-ons to the other works required by Council.

3.1.3 Deed of Agreement

The Developer is required to enter into a Deed of Agreement with Council for the proper execution of the development works and lodge all securities and pay all fees prior to the same time as the Officer issuing design plan approval.

3.1.4 Geotechnical Investigation

Prior to the Consultant(s) undertaking the design for the subdivision / development works, the Developer is to organise the appropriately qualified people to carry out a site inspection and investigation to determine the soil types and geotechnical properties of the soils. The level of the investigation is to be determined by the classification of the in situ soils and the particular soil characteristics.

Such information is to form the basis of the design for road and drains and associated works, erosion control, site works, landscape works and environmental works. A copy of the report is to be forwarded prior to or with the design drawings being lodged for approval.

3.1.5 Development Application and Design Approval

The Officer will not approve plans until all securities and fees are lodged. Securities include a Security Bond and/or an External Works Bond.

All applications, or variations to applications, are to be accompanied by an executed **Development Application Form** with appropriate fees paid.

3.1.5.1 Development Application and Design Approval Fees

The current approved **Development Application Fee** as stated in the current Fees and Charges shall be charged for every application

A Design **Approval Fee** based on 0.5% of cost of subdivisional works is to be paid.

If the developer chooses to submit the application in parts (ie road and drainage design, landscape design, irrigation design, etc), then there will be a separate Application Fee payable for each submission. Application in parts is subject to approval by the Officer.

3.1.5.2 Significant Variations.

Where, in the Officer's opinion, significant variations to existing or new submissions are made by the Developer, fees will be charged at an hourly rate, in accordance with Council's approved Fees and Charges, for the Officer's time.

The Officer will confirm any significant variations immediately upon submission.

The fee charged will be payable prior to the variation being approved.

3.1.5.3 Submissions for further information.

No fees will be charged when the Officer requests submissions for further information, however, fees may be charged if the Officer deems the request constitutes a significant variation.

3.1.6 Approved Documents and Commencement of Construction Works

The stamped approved plans do not constitute permission to commence construction of subdivision or development works.

Construction shall commence only after a Notice to commence construction works and a Pre Commencement meeting is held.

3.1.7 Submission and Review of Documents

One copy of the Documents, which shall include relevant plans and specifications marked **DRAFT** is to be submitted to the Officer for preliminary perusal and comment.

The documents must be signed as **CHECKED** and **APPROVED** for the purposes of the issue by the Consultant or they will not be accepted.

These documents are to be accompanied by the following:

- Executed Development Application Form and Application Fee;
- Design Approval Fee (based on 0.5% of construction cost);
- Copy of Current Development Permit;
- Design Report(s) including Drainage Calculations and Pavement design calculations;
- Certificates / Approvals by Other Service Authorities;
- Geotechnical and Soil Type Report;
- Concept landscape drawings;
- Any other information deemed necessary by the Officer – eg Traffic Control Plans

The submission will not be accepted unless accompanied by all items.

Once the submission has been accepted, the Officer will check the plans and specifications against the required standards and the Guidelines and make comments back to the Consultant, or if satisfied that the submission meets all requirements, inform the Consultant of such.

Amended plans are then to be resubmitted by the Consultant for approval. The plans must be signed as **CHECKED** and **APPROVED** by the consultant or they will not be accepted.

When satisfied that the plans and specifications meet all requirements, they will be stamped and signed ‘Permission to Use for Construction Purposes’ by the Officer, subject to any conditions required and noted.

This approval does not mean that Council accepts responsibility for the technical adequacy of the design. This is the responsibility of the design Consultant.

3.1.8 Non-conforming Designs

Where a design has been unable to meet the specific requirements of the Guidelines and current Australian Standards, the Developer is to submit a certified Non-conformance Report. One report per instance of non-conformance is required.

3.2 GENERAL ROAD DESIGN REQUIREMENTS

3.2.1 General

The application of the various standards, codes and principles to road design is intended as a guide in providing minimum standards for the geometric elements of the road.

Of importance to the total subdivision development, are factors such as the coordination of vertical and horizontal alignments, fitting the road to the natural contours of the land, preservation of natural features (including vegetation) and using higher than minimum standards to provide a functional and aesthetically pleasing streetscape. Also, consideration must be given to practicalities of lot access, building requirements and the provision of a pleasant living environment.

It is therefore important and highly desirable that during the planning process, engineering input occurs. This will ensure that both good engineering and planning principles are achieved from the outset without compromise.

Council's Technical Specification and Standard Drawings are to be used by the Developer. Variations from these may be necessary from time to time and these are to be discussed with the Officer and approved prior to detail design work.

3.2.2 Design Standards and Publications

Road designs should conform to the relevant current Austroads, Australian Road Research Board (ARRB) and other publications that include, but are not limited to:

- Guide to Traffic Engineering Practice – All Parts – (Austroads);
- Pavement Design – A Guide to the Structural Design of Road Pavements - (Austroads 1995);
- A Guide to the Design of New Pavements for Light Traffic (APRG Special Report No 21, 1998);
- Sealed Local Roads Manual – Guidelines to Good Practice for the Construction, Maintenance and Rehabilitation of Pavements (ARRB Transport Research Ltd., 1995);
- Guide to the Design of Typical Urban Intersections;
- Guide Policy for the Geometric Designs of Major Urban Roads – (NAASRA);
- Policy for Installations by Public Utility Authorities within the Road Reserve;
- AMCORD URBAN – Guidelines for Urban Housing;
- Road Lighting Code - Parts 0, 1.1 & 3.1;

3.2.3 Disabled Access

In all circumstances, access is to comply with the objects and intent of the Disability Discrimination Act and the requirements all relevant Australian Standards and Guidelines.

Access is to be provided to all parts of the subdivision or development.

3.2.4 Traffic Calming Works

Subdivision development may require that traffic calming works be carried out in existing roads, abutting or giving access to the proposed development.

In these cases, community consultation may have to be carried out at the Developer's expense or cost shared with Council.

3.2.5 Speed Environment in Residential Areas

The following features and measures are encouraged in the design of Urban road structure to create a safe urban road environment:

- Variable alignment (meandering carriageway);
- General and isolated width restrictions;
- Selected variations to pavement surface texture and colour;
- Street furniture placement;
- Streetscape planting;
- Other appropriate measures.

Care is to be taken that no unacceptable traffic hazards are introduced.

3.3 ROAD HIERARCHY

3.3.1 General

Planning and traffic engineering policies and practices for subdivision structure design involve the classification of roads into a series of categories or hierarchy dependent upon function.

A road hierarchy needs to be established for any proposed development that allows the safe and orderly movement of vehicles, cyclists and pedestrians within, across and between roads within the development.

The main road network for Darwin consists of a defined road hierarchy and is generally fixed in relation to any proposed works.

Developers are required to match into this road network with the proposed pattern and use of the development. All new roads shall be assessed by Council based on its interim and future functionality and a level of road hierarchy determined by the Officer.

3.3.2 Road Hierarchy

Council has the following definition of road hierarchy:

Residential Roads

Cul de sac

Council defines Cul de sacs as a type of Local Road with specific design requirements. They will provide frontage and access to a maximum of 25 residences with a generally the maximum length should not exceed 200m.

In exceptional circumstances permission may be given for a cul de sac to access more than 25 lots provided that the cross sectional details are increased to those for Local Roads.

Local

Provides frontage and gives access to a maximum of 60 residences.

Secondary Collector

Provides access to a maximum of 250 residences and entry to one or more Local Roads.

The number of residences for each Local Road is included in the accesses for the Secondary Collector Road.

In most cases, the Secondary Collector Road provides access to only a small percentage of the residences it services and may also service as a bus route.

A road servicing more than 250 residences may be defined as a Secondary Collector Road if its layout and position within the subdivision supports this lower status.

Secondary Collector Roads servicing more than 125 residences shall have more than one access outlet.

Primary Collector

Has the same definition and criteria as a Secondary Collector Road, however Primary Collectors have a stronger connectivity between suburbs and usually act as a strong connection to the Arterial Road system.

Arterial

Arterial Roads connect major focal points in the Municipality and provides serviceability to a series of suburban areas. For all new Arterial Roads or extensions thereto, direct access to adjoining land will not be permitted. Arterial Roads service numerous bus routes.

Industrial Roads

Local

Street of relatively short length providing access for up to 70 lots primarily or wholly servicing traffic whose origin or destination is a lot fronting the street. These include cul de sacs where approved.

Collector

Streets of relatively longer length having a significant traffic handling function not associated with properties fronting the street. These streets also provide access to properties that do not directly front the street

3.4 TRAFFIC MANAGEMENT

3.4.1 General

Traffic management design is to comply with the following:

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

A traffic environment is to be provided such that the vehicle speeds recommended in the following are not generally exceeded, with due consideration being given to the requirements of various emergency services.

3.4.1.1 Desirable Design Speeds

Residential Roads

	Cul-de-sac	Local	Secondary Collector	Primary Collector	Arterial
Maximum desirable operating speed km/h	20	40	50	60	As advised
Speed for sight distance km/h	40	50	60	60	As advised

Industrial Roads

	Local	Collector
Maximum desirable operating speed km/h	50	60
Speed for sight distance km/h	60	60

3.4.1.2 Channelisation of Intersections

Intersections, except those being treated with roundabouts or signalisation are to be channelised (minimum 1.2m wide splitter islands) as indicated in the following:

	Cul-de-sac	Local	Secondary Collector	Primary Collector	Arterial
Local	No	No	Yes	Yes	Yes
Secondary Collector	No	Yes	Yes	Yes	Yes
Primary Collector	No	Yes	Yes	Yes	Yes

3.4.1.3 Intersection Turning Criteria

Intersections are to be designed to allow for the movement of Austroads design Vehicles in accordance with the following:

	Residential				Industrial
	Cul-de-sac Local	Secondary Collector	Primary Collector	Arterial	All Roads
Residential Cul-de-sac & Local	SU	SU	SU	SU	ST
Residential Secondary Collector	SU	ST	ST	ST	ST
Residential Primary Collector	SU	ST	ST	ST	ST
Industrial All Roads	ST	ST	ST	ST	ST

ST denotes an Austroads design 21m semi trailer with a turning path radius of 12.5m.

SU denotes an Austroads design 11m single unit truck with a turning path radius of 12.5m.

The Officer reserves the right to nominate other design vehicles to be catered for especially in the case of arterial and industrial roads.

3.4.1.4 Parking provisions

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

3.4.1.5 School Sites

The design of subdivisional roads abutting school sites is to incorporate provision for the safe picking up and setting down of students and crossing facilities as required.

3.4.1.6 Bus routes

The design of subdivisional roads shall cater for the adequate provision for proposed bus routes. Road widths need to be adequate to cater for bus stops especially on collector roads. Indented bus bays may be required in certain circumstances.

3.5 ROAD GEOMETRY

3.5.1 Radii and Gradients

Roads are to be designed to give the best possible grade to suit the natural / existing ground, and minimise the amount of cut and fill.

Under all circumstances, all design and construction is to comply with the object and intent of the Disability Discrimination Act and the requirements and provisions of relevant standards.

Design ground levels are to be obtained from actual field survey. The assumption of levels from contour or other types of plans is unacceptable.

General Maximum and minimum grades are as shown below.

		Residential		Industrial
		Cul-de-sac / 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	0.50	0.50	0.50
	Up to 60m radius curve	0.50	0.50	0.50
	Less than 60m radius curve	0.75	0.75	0.75

The absolute maximum grades may be approved in special cases. Redesign is to be considered where these grades are contemplated and only after complete examination of all options will they be accepted.

The minimum gradient for all kerb returns shall be 0.75 %.

3.5.1.1 Minimum Radii and Gradients for Kerb Returns at Intersections

	Residential				Industrial
	Cul-de-sac Local	Secondary Collector	Primary Collector	Arterial	All Roads
Residential Cul-de-sac & Local	7.5 m	7.5 m	7.5 m	7.5 m	7.5 m
Residential Secondary Collector	7.5 m	10 m	15 m	As advised	15 m
Residential Primary Collector	7.5 m	15 m	15 m	As advised	15 m
Industrial All Roads	7.5 m	15 m	15 m	As advised	15 m

3.5.1.2 Cul de sacs

Cul de sacs are considered undesirable in industrial areas, but where this cannot be avoided approval may be given for a maximum of ten lots to be serviced. In this case, lots should be smaller sizes so as not to attract heavy transport. There is no specific shape for the cul de sacs, however, any reasonable proposal that permits turning for a semi trailer and provides acceptable frontage and access will be considered. No reversing movements or multi-point turns will be considered for turning in these cul de sacs.

The minimum gradient for kerbs at the cul de sac head shall be 0.75 %.

The minimum acceptable radius for circular turning areas at the cul de sac head is as follows:

Residential Roads 8.5 metre radius
Industrial Roads 13.5 metre radius

The verge reserved for the location of services shall not be less than 4.5 metres at any location.

3.5.2 Horizontal Curves on Road Alignment

Minimum horizontal curve radii for roads alignments shall be as follows:

Deflection Angle Degrees	Residential			Industrial	
	Cul-de-sac Local	Secondary Collector	Primary Collector	Local	Collector
75 or greater	20	60	60	60	100
60	35	70	70	70	110
40	65	80	80	80	120
30	75	100	100	100	130
20 or less	100	120	120	120	150

3.5.3 Vertical Curves

To be simple parabolas and to be used where change of grade exceeds 2%.

The length of all vertical curves are to be in accordance with the relevant Austroads publications and will take into account overtaking and stopping sight distances and comfort factors.

Where the gradient of the intersecting road is 5% or less, consideration may be given to a concrete dished invert across the intersection.

Inverts may be used at intersections between Local Roads and Collector Roads and Local Roads and Local Roads.

Minimum vertical curve lengths (m) to be:

	Residential				Industrial
	Cul-de-sac Local	Secondary Collector	Primary Collector	Arterial	All Roads
Minimum VC length (m)	20	25	25	30	25

Absolute Minimum – to be applied at intersections only

Special consideration to be given to intersection design. Consideration to be given to non ponding of stormwater in channels and retention of minimum velocity of channel flows.

3.5.4 Intersections and Separation Distances

Adequate stopping sight distance to be provided at all intersections.

Cross roads and “Y” intersections are not acceptable unless signalisation, roundabout or other approved traffic control is warranted and utilised.

Staggered “T” intersections are to be provided and separated as far as possible.

Minimum separation distances of intersections for industrial and residential road types are as follows;

	Residential				Industrial
	Cul-de-sac Local	Secondary Collector	Primary Collector	Arterial	All Roads
Minimum separation (m)	50	80	80	400	80

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. This may be waived where circumstances warrant, ie, in the case of concrete inverts where the terminating road is a Local Road intersecting with a Local Road or Collector Road.

3.5.5 Extent of Intersection Construction

In the instance where the through road is constructed by the developer and the terminating road location is fixed and is to be constructed by another Developer in the future, the former Developer will construct the intersection in full at their expense, including all drainage requirements. This may necessitate construction outside the boundaries of the subject land. In this case all necessary permission is to be obtained prior to the approval of design drawings.

3.6 TYPICAL CROSS SECTIONS

3.6.1 General

Typical cross sections are to be in accordance with the Standard Drawings.

3.6.2 Road Widths

The minimum cross section details depend upon a number of criteria including the location of footpaths, services and the provision of access. Typical road cross sections are shown on the Standard Drawings and the following road widths will be adhered to:

Residential Roads

	Verge	Carriageway	Road Reserve
Cul de sac	4.5	6.0	15.0
Local Road less than 250m length	4.5	6.0	15.0
Local Road greater than 250m length	4.5	8.0	17.0
Secondary Collector not adjacent to high density housing	4.5	8.0	17.0
Secondary Collector adjacent to high density housing	4.5	11.0	20.0
Primary Collector	4.5	11.0	20.0
Arterial	to be advised		

Industrial Roads

Local	4.5	11.0	20.0
Collector	4.5	13.0	22.0

3.6.3 Crossfall and Configuration

3.6.3.1 Residential Local Roads

The crossfall and configuration shall be one of the following:

- 3% crossfall from the centre line with a layback kerb at each edge;
- 3% one way crossfall with a layback kerb on the lower edge and a buffer (flush) kerb on the high edge.
- 3% crossfall and a dished bituminous invert at the centre line and flush kerbs both edges. This option is only to be used where the longitudinal grade of the road is between 2% and 5%.
- Where road surfacing other than asphalt is proposed, ie concrete or segmental pavers, the cross section shall be determined by discussion with the Officer.

3.6.3.2 Industrial Roads and Residential Collector Roads

The crossfall is to be generally 3% from the road centreline.

3.6.4 Verges

Verge widths for all roads are dependent upon footpath and services locations and access requirements. See Council policy on these criteria, Section 2.3.15, Council Policy on Access, Footpaths and Verge widths.

Verge grading is to be as indicated on the Standard Drawings, ranging from 2% minimum to 8% maximum. The objects and intents of the Disability Discrimination Act and the requirements of all access standards are to apply.

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. Consideration is to be given in this case to ongoing maintenance of the steeper slope. In all cases the maximum grade for vehicular access from the property line to within the allotment is to be 1 in 6.

3.7 KERBS, FOOTPATHS & OTHER ITEMS

3.7.1 Kerbs and Gutters

3.7.1.1 Layback Kerb

To be used only Cul de sacs or Local Roads that exclusively service R1 residential allotments.

3.7.1.2 Standard Barrier Kerb and Gutter

To be used in the following:

- All residential areas other than that stated in Section 3.7.1.1;
- In Collector Roads adjacent to R1 zoning development;
- Roads adjacent to Public Open Spaces;
- In all industrial and commercial zoned developments;
- Where required for road safety and/or traffic control / calming

3.7.1.3 Alternative Kerbs

Attractive and functional edge treatments using concrete or bituminous concrete may be considered dependant upon a supporting proposal being made to the Officer by the Developer.

3.7.2 Footpaths

Footpaths are to be a minimum of 1200mm wide 75mm thick non-reinforced concrete. Other construction materials will be considered on merit. Where footpaths are located within 300mm of or against boundaries or kerbing, the width is to be increased to 1500mm.

Access is to be provided for all to all areas of the subdivision as per the objective and intent of the Disability Discrimination Act and the requirements of relevant access standards.

Footpaths shall be constructed as per the Standard Drawings and the requirements as follows:

Cul de sacs and Local Roads less than 200m long (R1 zoning only)	No footpaths required.
Cul de sacs and Local Roads more than 200m long (R1 zoning only)	Footpaths to be located on one side of the road.
Cul de sacs, Local Roads (other than R1 zoning)	Footpaths to be located on the side that has allotment zoning other than R1. This can mean both sides of the road.
Collector and Arterial Roads	Footpaths to be located on both sides of the road.
Arterial Roads	Both sides of the road reserve at the property line
Industrial / Commercial Areas	Footpaths to be located on both sides of the road.

Refer also to Section 3.7.6 Cyclist facilities.

3.7.3 Driveways

Council requires that all access meets or exceeds Australian Standards for Access and Mobility.

Access must be provided to every part of the subdivision. All verges, whether they contain a constructed footpath or not, are to be provided with access.

Where there is no footpath, Council's current driveway standards do not necessarily cater for wheelchair access from the road pavement to the property and therefore access may be limited. Council will consider modifications to driveways (if required), on an as requested basis or require all driveways where footpaths are not provided to meet disabled access standards.

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

- All R1 zoned allotments (including duplex allotments) shall have one 3.0 metre wide driveway access to the roadway.
- All R2, R3 and R4 allotments shall have one 6.0 metre wide driveway access to the roadway. Two driveway accesses may be considered based on safety, traffic management and serviceability issues. Entry only and Exit only driveways may also be considered based on safety, traffic management and serviceability issues.
- All Commercial and Industrial allotments shall have one 6.0 metre wide driveway access to the roadway. Wider driveways may be considered where serviceability of an acceptable design vehicle is an issue. Two driveway accesses may be considered based on safety, traffic management and serviceability issues. Entry only and Exit only driveways may also be considered based on safety, traffic management and serviceability issues.
- Where allotments abut or front onto more than one roadway, then Council prefers that the driveway(s) shall access the roadway with the lower road hierarchy status. I.e. If the allotment abuts a Collector Road and a Local Road then driveway access be to the Local Road.
- The location of the driveway shall be at least 15 metres from any intersecting roadway.
- The driveway shall meet Austroad sight distance criteria for both entry and exit.
- Where practical, driveways shall be located such to have minimal impact to on-road parking.
- Under certain circumstances Council may require deceleration or turning lanes to the allotment or the elimination of certain turning movements based on safety and traffic management issues.

Driveways are to be to the sizes, dimensions, grades and locations as specified and detailed on the Standard Drawing.

Access ramps (pram crossings) are to be provided as per the Standard Drawing at the appropriate locations at all intersections and any other nominated location.

3.7.4 Walkways

Walkways are to provide access for all as required under Council's policies.

Security of users is a key consideration and walkways are to be permanently lit and have good straight-line visibility from end to end. The ultimate safety of pedestrians and safety from all viewpoints is paramount. Long narrow walkways are not to be considered and walkways incorporated in road reserves are considered to be more secure. Walkways are to have a minimum width of 3.0m.

The standard construction for walkways is concrete or asphalt with pavement design to cater for the anticipated service vehicles. Other material as agreed, discussed and negotiated, may be considered for construction by the Officer.

The walkways are to have permanent lockable and removable vehicle barriers at each end and constructed in accordance with the Standard Drawings.

Walkway reserves shall serve as storm water cut off drains where possible. The walkway is to be designed to cater for particular storm events and flows hence kerb and gutter 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.

The walkway pavement is to continue from the property line to the kerb line narrowing down to 2.0 m in the connecting section. Access ramps are to be provided at the adjoining roadway kerb lines.

Inlet pits to collect stormwater run off are to be located in a sag point 150mm minimum deep adjacent to the road reserve boundary. In the case of grated inlet pits, they should be sited such that they provide no hazard for pedestrians. The grating bars are to be oriented perpendicular to the longitudinal direction of the walkway.

3.7.5 Footpath and Driveway Construction Timing and Bonding

Council's Policy generally is that, footpaths, share paths and driveways located within road reserves will not be constructed until building construction within the development is substantially complete (75% absolute minimum).

Where it is not practical to complete this construction prior to Practical Completion, a cash bond for the construction based on Council's current Fees and Charges are to be lodged with Council to enable clearance for Titles release.

Footpaths are to be constructed in or adjacent to areas such as parks and other identified areas at the time of development.

3.7.6 Cyclist facilities

The provision of safe and convenient facilities for pedestrians and cyclists (and in some more rural areas horses and riders) is a prime consideration in designing a road network within any subdivision.

Council requires developers to provide facilities for pedestrians and cyclists in all proposed developments in accordance with the overall network plan.

As for roads, Darwin Municipality has an existing road hierarchy and network of bicycle and pedestrian paths, which is constantly being extended and upgraded.

Off-road facilities comprise of footpaths, share paths, bicycle only paths, pedestrian only paths and pedestrian access way paths.

On-road facilities comprise cycle ways constructed as an integral part of the roadway.

Paths and cycle ways are to be constructed in accordance with the following guidelines and publications:

- 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)

Bicycle ways are to be 2.5 metres minimum width, refer to Standard Drawing for all details. The standard drawings detail only asphalt and concrete surfacing, however alternative treatments may be considered.

The Officer shall determine the need for any form of shared path, bicycle path or on-road cyclist facilities.

3.7.7 Access to Open Space (Park) Areas

General vehicle access is to be prevented however, service access is required to Open Space areas and shall be lockable. The number of accesses required depends on the size, shape, location and proposed use of the Open Space.

The following indicates the minimum requirements to each Open Space area.

- One service access;
- 300 metres maximum between accesses in elongated areas;
- Preferable that the proposed access is from a Local Road rather than a Collector Road.

3.7.8 Traffic Islands and Roundabouts

All traffic islands are to be finished with a maintenance free or minimum maintenance surface. Generally speaking, traffic islands less than 5 square metres in area shall be concrete paving with a finished surface as specified by the Officer. Larger traffic islands may require landscaping to the approval of the Officer.

3.7.9 Regulatory and Traffic Control Signs and Pavement Markings

All traffic control signs and pavement markings are to conform to the Australian Standards and Guidelines as follows:

- Austroads Guides to Traffic Control Devices;
- AS 1742 – Manual of Uniform Traffic Control Devices.

Suitably presented design plans are to be forwarded to Council for Approval.

3.7.10 Street Name and Community Signs

Street name signs are to be provided at the Developer's cost at each intersection in accordance with:

- Standard Drawing 5041/3 and
- AS1742.5 Part 5: Street Name and Community Facility Name Signs and Section 4.16: Street Name Plates.

Overall, the following signage and marking is to be provided for each development:

- Street name signs at each intersection in accordance with the Standard Drawings.
- Warning and advisory signs as required;
- Road marking as required on distributor and collector roads;
- Parking signs where required;
- All other advisory and traffic control devices necessary for effective traffic control.
- All signs shall be Retroreflective Class 1.

The Responsible Authority for street names is the Place Names Committee of The Department who will decide on and approve the proposed names of streets in the subdivision / development. Proposed names are to be submitted to the Officer who will comment on them and forward them to Place Names Committee for approval.

3.8 ROAD PAVEMENTS & WEARING SURFACES

3.8.1 Design for Flexible Pavements

The Consultant is to prepare detailed designs for flexible pavements in accordance with the following:

- A Guide to the Design of New Pavements for Light Traffic – (APRG Report No 21)
- Pavement Design – A Guide to the Structural Design of New Pavements – (Austroads)
- Sealed Local Roads Manual - (ARRB)

Notwithstanding anything stated in the design Guidelines, the minimum design life for a pavement in the City of Darwin is **40** years.

The minimum accepted pavement thickness and make-up for urban residential roads is;

- Subgrade shall be 150mm minimum compacted thickness and compacted to 95% MMDD;
- Subbase and Base courses shall be 150mm minimum compacted thickness and compacted to 98% MMDD and 100% MMDD respectively;
- Wearing surfaces shall be 25mm minimum compacted thickness of asphaltic concrete.

The wearing course on all urban roads is to be asphalt over a primer seal.
Asphalt is to conform to Urban Mix Type 2 as Specified in the Technical Specification.

3.8.1 Design of Other Types of Pavements

Other types of pavement construction such as Rigid Pavements and Segmental Pavements may be proposed and these will be considered by Council.

Council is supportive of alternative pavements, especially in lesser use environments such as accessways and roads.

For segmental Pavements the following publications by the Concrete Masonry Association of Australia (CMAA) are to be consulted and the guidelines set out are to be followed:

- Concrete Segmental Pavers - Design Guide for Residential Accessways and Roads;
- Concrete Segmental Pavers - Guide to Specifying;
- Concrete Segmental Pavers - Detailing Guide.

3.8.2 Pavement Drainage

The Consultant is to design for pavement drainage where necessary to maintain a moisture free sub-grade and base course as determined by the site geotechnical investigation.

All roads are to be provided with appropriate sub-surface drainage to both sides of the pavement and at any other location in or across the pavement, unless it can be adequately demonstrated that such drains are not required.

To demonstrate the above, investigation and design is to be carried out in accordance with the provisions and recommendations of:

- Sub-surface Drainage of Road Structures – (ARRB Special Report no 35).

Sub surface drains are to be located and constructed in accordance with the Standard Drawings.

3.9 STORMWATER DRAINAGE DESIGN

3.9.1 General Requirements

Developers subdividing land for urban residential, commercial or industrial developments are required to provide an adequate stormwater drainage system. The subdivision of rural land will require the provision of a similar system.

All areas except rural require sub soil drainage to be installed to road pavements. Subsoil drains may be required for rural road pavements in special circumstances.

Developers, through their Consultants, should discuss Council's requirements for drainage of a new subdivision at the following times:

- Prior to making a Development Application – a preliminary drainage proposal and investigation will be required, ie, if a drainage problem is deemed to exist;
- Prior to preparation of engineering or other drawings.

3.9.2 Drainage Philosophy and Considerations

Council's general stormwater drainage design philosophy is as follows:

- The stormwater drainage design is to be based on a system of sealed roads, kerb and gutter, entry pits and underground drainage supplemented where applicable by a system of floodways preferably located in open spaces or drainage reserves;
- Roadways are to be viewed as primarily for use by vehicular and pedestrian traffic and for providing access to property by vehicle and foot. They are not to be viewed as primary drains and floodways. Public amenity and safety are to be paramount considerations;
- Consideration is to be given to the impact of the proposed drainage system on existing drains and buildings and downstream catchments.
- The drainage system is to be designed to accommodate two different storm events:
 - a) The initial storm;
 - b) The major storm.
- Drainage of all lots, apart from residential R1, is to be collected within the allotments and conveyed by underground pipe(s) to the main drainage system. This includes the control of both the initial and major storm events emanating from either within the site and/or from exterior catchments by means of underground drainage and open cut-off drains as warranted. If necessary, part or all of the Q100 flow may have to be undergrounded.
- Drainage run-off from residential R1 lots may be discharged (sheet flow) across the lot surface to the main drainage system. If drainage run-off from residential R1 lots is concentrated then it may not be discharged in that form onto public land or over adjacent private property;
- Subsoil drainage is required;
- Environmental considerations are a major consideration. Erosion and sediment control are required.
- No encumbrance of any land designed, or intended to be utilised as a floodway will be permitted.
- No drainage low points with associated ponding will be allowed within the kerb radial section of intersections. The low points are to be located before the tangent point on the side road of the intersection.
- During the wet season, the ground becomes saturated and all drainage design should be carried out with the view that there will be 100% runoff from any and all sites.
- To avoid mosquito breeding, all drainage systems and associated structures should be designed to have no ponding of water.
- Where drainage outlets or outfalls are influenced by tidal action a discharge vs probability analysis is to be undertaken to ensure that the appropriate annual exceedance probability is being catered for.

3.9.3 Design Criteria

Stormwater drainage design is to conform with the philosophy, methods and guidelines laid down above and in the following publications:

- Australian Rainfall and Runoff - (IEAust).
- Stormwater Drainage Design in Small Urban Catchments – (ARRB Report No 34 - Argue)
- Sub-surface Drainage of Road Structures – (ARRB Report – Gerke)

As well the following published guidelines are to be consulted:

- Managing Urban Stormwater - Soils and Construction - (NSW Department of Housing)
- Resources Management for the NT – Erosion and Sediment Control - (Nat. Res. DLPE)
- Section 2.7 of these Guidelines.

In addition to the foregoing, the following is to apply for all drainage systems:

- The minimum pipe diameter for a drain picking up surface flow within the road reserve is 375 mm and Class 2 concrete or equivalent is the minimum strength standard.
- The piped system is to have the capacity to accommodate the design rainfall with the top water level in side entry pits a minimum of 150 mm below the surface entry level and for junction pits and manholes and other structures, a minimum of 300 mm below the surface.
- Energy losses must be allowed for in drainage lines.
- Stormwater drainage lines in road reserves are generally to be aligned in accordance with the requirements of the services locations and the pit details and pipe laying and subsoil drainage details as set out in the Council Standard Drawings.
- Sealed joints are to be used for all drainage lines, ie, external bands or rubber ring type joints.
- Pipes located within properties are to be laid centrally in easements granted to Council.
- The minimum easement width is to be 3.0 m for pipe diameters of 450 mm or less and at depths up to 1.5 m. Increased easement widths are to be provided for pipe diameters and depths greater than above as advised by the Officer.
- Drainage connections to Council's system shall be located at the lowest point of each allotment.
- All drainage systems subject to tidal influence (RL 3.95 AHD or lower) shall be marine grade. Concrete structures shall conform to AS3600.

3.9.4 Drainage Run-off Coefficients

Due to the variation of land, land use and soil types it is not practical to list Coefficients of Run-off in these Guidelines. The designer is to assess and confirm the coefficients prior to undertaking drainage design for the proposed development. The designer is to treat any and all drainage catchments as being totally saturated.

Runoff coefficients and characteristics for the ultimate development of the allotments based on land zoning must be considered in designing an adequate stormwater system.

3.9.5 Recurrence Intervals, Time of Concentration and Rainfall Intensity

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. The minimum time of concentration to be used for a fully developed catchment is 5 minutes.

The designer is to adopt the following minimum Storm Recurrence Intervals.

Catchment Zoning	Initial Storm	Major Storm
B1, B2, B3, B4	10	100
Open Space and Drainage Reserves	1	100
Industrial, & R1 (R2, R3 & R4 zones to be determined by the Officer)	2	100

3.9.6 Use of Roads, Open Space and Drainage Reserves for Run-off

Stormwater must be contained within the absolute maximum limits tabulated below for the Initial and Major Storms. In all cases the flow is to be contained totally within the road reserve.

Residential

	Initial Storm	Major Storm
Local Road	Flow may spread to crown of road for two-way crossfall or road centreline for one-way crossfall or to flush kerbs in dished drains	Flow may spread to road reserve boundary but maximum depth in roadway is not to exceed 400mm nor should $D \times V$ exceed 0.45 where D = depth (m) and V = velocity (m/s)
8m Collector Roads	Flow shall not overtop crown of road or kerbs.	Flow may spread to road reserve boundary but maximum depth in roadway is not to exceed 400mm nor should $D \times V$ exceed 0.45 where D = depth (m) and V = velocity (m/s)
11m Collector Roads or Arterial Road	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 $D \times V$ exceed 0.45 where D = depth (m) and V = velocity (m/s)
Open Space & Drainage Reserves		Flow to be contained within boundaries and velocities not to exceed scour velocity (1.5 m/s in OUD's)

Industrial

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 $D \times V$ exceed 0.45 where D = depth (m) and V = velocity (m/s)
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3.9.7 Drainage Catchments and Networks

3.9.7.1 Upstream Catchments Passing Through Subdivision

The Consultant is to examine the total drainage catchment and ensure that the drainage system for the subdivision is capable of carrying the ultimate design flow from the upstream catchment.

In this instance, Developers are responsible for negotiating their own cost sharing arrangements.

3.9.7.2 Shared Catchment

Developers, who are developing simultaneously and whose land shares a common drainage catchment, have a shared responsibility for ensuring that the whole of the catchment is drained as required.

3.9.7.3 Staged Subdivision

Where development is staged, an overall drainage plan for the whole of the catchment is required before approval will be given to any individual stage. Drainage of each stage is to be in accordance with the overall plan.

3.9.7.4 Subdivision Occupies Upper Part of the Catchment

Where a new subdivision occupies the upper part of a catchment in common with existing developed land for which there is no overall drainage catchment plan, the existing drainage system of the Council may not be able to carry the design storms applicable to the design recurrence intervals detailed in these Guidelines.

In these circumstances the Developer:

- is to prepare and submit an overall drainage plan; and
- is to examine the complete downstream drainage network to evaluate the maximum quantity of stormwater that may be discharged into the existing network. If the capacity of the existing drainage network is exceeded, the surplus water, if feasible, is to be retained and disposed of within the subdivision or if not, the existing system is to be upgraded at the Developers cost to accommodate the design run-off.

3.9.7.5 Discharge of Stormwater Drainage onto Land Owned by Others

In cases where the stormwater drainage is to be discharged onto land owned by Others, arrangements are to be made by the Developer with the owner of the land, to provide easements as required over the route of the drain and to construct or improve the drain as required.

3.9.7.6 Drainage Outfall

The Developer is to liaise and negotiate outfall requirements with the appropriate authority where the drain discharges into a watercourse, creek, river or the sea.

3.9.8 Ground Water and Subsoil Drainage

Much 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 design for the subdivision.

Development in these areas may require the importation of fill and the provision of special drainage measures such as sub soil drainage.

Not only is it important to ensure that areas are adequately drained for road construction and maintenance purposes, but consideration must also be given to adequate separation of future building floor levels from the ground water.

Other matters, such as salinity and acid sulfate, must be taken into consideration.

The need for sub soil drainage may not be apparent when construction is carried out in the dry season, however the Developer should be aware that it is required for pavement construction and total pavement maintenance during the wet season.

To maintain a relatively moisture free environment for the road pavement sub grade year round, sub soil drains are to be provided to all road pavements unless it can be demonstrated by appropriate testing and site investigation that they are not required. All testing and investigation to be carried out in accordance with the provisions and recommendations of "Sub Surface Drainage of Road Structures – (ARRB Special Report no 35).

Any failures resulting from high wet season ground water levels are to be reinstated, together with additional subsoil drainage if required by the Developer at the Developer's expense.

Sub surface drains are to be located and constructed as per Standard Drawing.

3.9.9 Freeboard for Drainage System Flows and Building Floor Levels

All developments along watercourses and main drains will require floor levels of buildings to be constructed at least 300 mm above the major flood level.

For existing buildings, provisions are to be made in the design to achieve the freeboard.

A plan is to be submitted at the design stage indicating the minimum design floor level of any affected building on the development. The plan must also indicate the minimum design levels of the affected allotments and in the case where it is determined that not all of the allotment(s) require filling to the 100 year flood level, the allotment must show the nominated building envelope(s) and the proposed filling level(s).

3.9.10 Intersection Design and Ponding at Low Points

No drainage low points and the subsequent ponding that may result, are permitted within the kerb radial section of intersections. The low point is to be located in the side road of the intersection before the tangent point.

In the case of minor, steeper than usual intersections with minor drainage flows, if a low point must be designed within the kerb radial, the gutter of the kerb and channel may be designed to fall out across the road pavement. In this case, stormwater drainage may be required to be collected by means of drainage pits located at the tangent points each side of the low point.

3.9.11 Gross Pollutant and Litter Traps

The use of gross pollutant traps must be considered as part of the drainage design. As a principle, these are to be installed at the source, particularly in industrial areas, rather than at the bottom of a catchment.

The Officer may require that litter traps be installed for specific catchment areas where litter may be an issue eg: shopping centres.

3.9.12 Stormwater Management, Erosion and Sediment Control

All drainage systems are to be designed to incorporate water sensitive design principles.

Council will not accept any polluted stormwater run-off into its drainage systems. It is therefore essential to thoroughly plan for Stormwater Management and Erosion Control in any proposed development.

The planning and management practices set out in Sections 2.7 these Guidelines and the guidelines produced by The Department are to be adhered to.

Compensating basins, retardation basins, artificial wetlands, nutrient stripping basins, gross pollutant traps, sedimentation and erosion control and siltation basins are to be incorporated. 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.

A Sediment and Erosion Control Plan together with or incorporating a Stormwater Management Plan is to be provided as part of the civil and landscape design drawings for approval.

In particularly sensitive areas, these drawings may have to be presented in preliminary forms and considered as part of the Planning Process - Development Application.

3.9.13 Council Responsibility for Drainage on Allotments

Historically, Lands Planning and Environment have been and still are responsible for the control of drainage on allotments. Council has been responsible for drainage within road reserves, drainage easements and on Council owned or controlled land.

In cooperation with Lands, the control of drainage works, including, design, construction, run-off and maintenance of drainage on and from allotments may be extended to Council.

In these cases, all Council drainage policies and requirements will apply.

3.9.14 Drainage Pipes and Culverts

All drainage pipes and culverts are to be proprietary brand Reinforced Concrete or Fibre Reinforced Concrete of suitable strength and manufacture constructed and tested to Australian Standards. If other types of drainage pipes or culverts are proposed for use, these are to be approved by Council.

All drainage pipes and culverts are to be constructed in accordance with the Standard Drawings and Technical Specification.

Particular attention is to be paid to site requirements such as coastal or marine exposure.

3.9.15 Drainage Pits and Structures

All drainage structures are to be constructed in accordance with the Standard Drawings and Technical Specification.

All structures to comply with access requirements for Occupational Health and Safety issues.

3.9.15.1 Side Entry Pits

- May be either side entry type or combined grated / side entry. Grated pits in isolation are susceptible to blockage and are not the preferred option.
- To be placed at all low points, immediately upstream from intersections and at intermediate positions to limit the amount of flow in gutters.
- To be placed on the upstream sides of pedestrian / crossings to limit the flow to 500 mm maximum width in these locations. The transition of the kerb and gutter must not intrude into the pram crossing.
- Road low points are to be located as close as possible to the centre of R1 lots and opposite the side boundaries of multi-unit lots.
- Grates for grated side entry pits are to be designed to be safely traversed by pedestrians and cyclists.

3.9.15.2 Junction Pits

- 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 is to be 90 m.
- Junction pits in the area of roadway where the main traffic flow is predominant should be avoided.

3.9.15.3 Catch Drains, Letterbox Pits and Stone Pitched Gullies

- Concrete catch drains appropriate to contain Q100 flows, in tandem with a 2 year underground pipe drainage system, are required on all development sites other than R1 allotments. Q100 drains to be covered by an easement.
- Concrete catch drains are required at the top and bottom of substantial cut and fill embankments at the discretion of the Officer.
- Concrete catch drains are to be provided to the satisfaction of the Officer in parks and along allotment boundaries where catchment sheet flows exceed 0.5 ha.
- Grassed catch drains with 1.0 m wide concrete invert may be substituted for standard catch drains in parks. If deflections in park alignments are required, horizontal curves of 5 m radius are to be provided.

3.9.15.4 Underground (Blind) Pits

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

3.9.15.5 Bandage Joints for Pipe Connections

- Bandage joints may only be used 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 must be located within 5 m of the joint on either of the lines.

3.9.16 Open Drainage Structures

Open unlined drains are to be avoided. Generally the invert is to be fully concreted and have a flat vee shape. Concreting shall be incorporated to the batters to a level equal to or greater than the Q10 flow level.

Where it is not proposed to restrict public access, open drainage structures and /or facilities are to comply with the following requirements:

- Maximum side slopes not to exceed 1 in 6 (16%);
- Maximum depth is to be no more than 0.75 m with additional 0.15 m freeboard;
- To be equipped with a sign(s) – “DANGER – WATER LEVEL MAY RISE QUICKLY DUE TO STORMS”;
- Surface is to be grassed where the structure or facility is integrated into public open space;
- With the exception of ornamental lakes and wet lands, all other structures or facilities are to be designed to only retain water during storm conditions and for a short time thereafter

Where it is proposed to restrict public access, or where the following requirements cannot be met, fencing is to be provided with suitable gates for maintenance access.

3.9.17 Submission for Formal Approval

The following drainage design information and calculations are to be submitted for formal design approval:

- Design computations for the initial and major storm event;
- Catchment plan;
- Plan showing the extent of flooding in the major storm;
- Stormwater Management and Erosion and Sediment Control Plan;
- Sub-surface drainage investigation report if it is proposed that sub-soil drains are to be excluded.

3.9.18 Drainage Design in Rural and Semi Rural Areas

- Developers of rural and semi rural subdivisions are required to provide for run-off from all areas in accordance with Australian Rainfall and Run-off and the following guidelines.
- Drainage will normally be accommodated by open drains. Acceptance of open unlined drains are to be avoided wherever possible. The invert is to be fully concrete lined and have a flat vee shape. Concreting shall be incorporated to the batters to a level equal to or greater than the Q10 flow level. Open unlined drains are to be subject to grades and soil types.
- Open unlined drains are to be subject to grades and soil types.
- Drainage system to be designed for a 2 year recurrence interval underground and 100 years overland flow.

- The minimum time of concentration needs to be determined but is to be no more than 8 minutes.
- The top water level for the design water flow is to be 300 mm below the level of the road shoulder.
- The maximum velocity of flow is not to exceed 1.0 m/sec in unlined drains and 2.0 m/sec in lined drains.
- The longitudinal slope may be varied by means of drop structures to maintain the velocity at minimum design flow.
- Mortared stone pitching or concrete lined channel is to be provided where there is more than 20 degrees change in direction.
- The minimum radius for the above change of direction is 5 m.
- Appropriate safety devices, such as guideposts are to be provided at the road shoulder to protect and advise road users of the presence of the drain.
- All culverts under roads and crossovers and all pipe entries and outfalls are to incorporate standard headwalls.
- Protective works are required at entry and exit from culverts to reduce velocity and guard against erosion.
- Retardation basins are to be constructed as part of the development to reduce peak flows to the capacity of the downstream drainage facilities.
- Nutrient stripping basins are to be provided prior to the entry of all drainage systems into natural watercourses and receiving bodies.
- Appropriate public protection, is to be provided at all drainage structures, particularly open drainage structures.

3.10 BATTLE AXE ALLOTMENTS

3.10.1 General Requirements

Battle-axe allotments are not favoured or encouraged for subdivision development, however, it is recognised that there may be some situations for which there are no other options. All options are to be explored before Council will agree to this form of subdivision.

Where urban, rural or semi rural type subdivisions contain proposed battle-axe allotment(s), then the battle-axe leg(s) (access driveway) is to be constructed at the time of subdivision in accordance with these Guidelines.

Council requires that the following minimum construction takes place:

- Construction of the access driveway pavement;
- Construction of appropriate drainage;
- Construction of the services and infrastructure from the frontage road to the top of the battle-axe leg.

3.10.2 Urban Areas

The minimum access leg width for single battle-axe allotments is to be 4m, with a 3m wide pavement placed centrally in the access leg, for a maximum 20m length.

For two or more battle-axe allotments with a common access driveway, the minimum access leg width is to be equivalent of 3m per lot serviced with a minimum road pavement width of 4m for a maximum length of 20m.

Battle axe legs with lengths more than 20m, are to be treated as roads ie access ways.

Battle-axe road access pavements may be constructed from:

- Concrete;
- Segmental paving;
- Standard asphalt type pavement.

The access leg is to be adequately drained to Council requirements ensuring that no stormwater from the access-way flows onto the frontage road or into the adjoining lots.

3.10.3 Rural or Semi-Rural Type Developments.

In rural, semi-rural or special rural type developments, the access leg and pavement widths are to be in accordance with the following:

	Lot size	1000sqm to 2Ha	2Ha to 5ha	> 5Ha	
Single lot	Minimum access leg width	5m	6m	8m	
	Minimum pavement width	3m	3m	3m	
Two lots	Minimum access leg width	4m	5m	6m	
	Common	Minimum pavement width	4m	4m	4m
	Legs	Minimum width of Access Leg	10m	10m	12m
	Width of shoulders	500mm	500mm	500mm	

The minimum standard for access leg pavements is to be bitumen aggregate seal.

Appropriate drainage is to be provided for the length of the leg.

3.11 STREET AND OTHER AREAS LIGHTING

3.11.1 General

The Developer is to provide street lighting in accordance with current Australian Standards for illumination level, materials and installation and the requirements of Council and PowerWater.

The works are not restricted to the subdivision boundaries, but may be extended to include existing roads providing access to or affected by the proposed subdivision.

While lighting must be in accordance with Australian standards, when assessing risk in particular areas, designers are reminded that there is a need to take into account the fact that people with a disability have a higher risk when using facilities at night.

The Consultant is encouraged to try new equipment and technologies to improve the efficiency and aesthetics of the street lighting, but at the same time must consider the ramifications of long term maintenance and replacement issues. Council will not consider the use of any alternative lantern and/or pole “just to be different”.

3.11.2 Procedure for Design and Approval

- The Developer is to engage a suitably qualified Consultant to carry out the road lighting design.
- The Consultant is to request Council to specify the required lighting categories as described in the Australian Standards.
- The Developer is to provide a “Certificate of Street Lighting Compliance” from a Consultant to PowerWater for their approval of the street lighting design drawings.
- Approval will not be given to civil design construction drawings until PowerWater has approved the road lighting design and a copy of that approval provided to Council through the main civil design consultant.

3.11.3 Specific Design Requirements

- Relevant Design Codes: AS/NZS 1158.0:1997, 1.1:1997, 1.3:1997 & 3.1:1997.
- All new or relocated poles are to be located in accordance with AS 1158.1.3:1997. The standard provides guidelines for the placement of rigid and frangible light base poles.
- Where there is an unacceptable risk of collision with a light pole consideration is to be given to the use of frangible slip base poles.
- Street lights are to be placed at each end of a walkway and each bend of a walkway.
- Lights are to be placed on the boundaries of allotments where possible.
- Consideration should be given to minimising the problem of light shining into private properties.
- All cables, fittings, lamps, poles and controls etc are to be of a type and rating approved by PowerWater. Lamps are to be High Pressure Sodium unless approved otherwise.
- For footpaths/cycle ways, lanterns are to be side entry unless otherwise approved. For roads and carparks and parks, bottom entry lamps are preferred.
- In access roads, curved poles 5.5m to 6.5 m high are preferred. 4.5m high poles will only be accepted in special circumstances.
- Bollard style lighting is not acceptable to Council.
- Consideration is to be given to complimenting and integrating proposed lighting into the proposed and existing streetscape / landscape works, particularly the location with respect to the mature development of street trees.

3.12 DRAWINGS AND DOCUMENTATION

3.12.1 Submission of Design Documents for Approval

Prior to commencement of construction of works the following documentation is to be submitted for assessment and approval. Also refer to Section 2 and the Checklist in the Appendices.

Proof of the appointment of a Consultant(s) by the Developer to act on the behalf is required by the Officer prior to commencement of design discussions with the Officer.

The drawings are to be checked and signed by the appropriately qualified person.

3.12.1.1 Documentation

Documents

- 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 to designs from Other Authorities
- Copies of appropriate Public Risk Insurance
- Executed Development Application Form
- Design Report including Drainage Calculations and Pavement Design calculations;
- Geotechnical and Soil Types Report
- Copy of Proposed Subdivision plan;
- Standard DCC Specification and Standard Drawings for Civil and Landscape Works;
- Specification for Stormwater Management and Erosion Control Works;
- Certified Construction Costs for all works with various sections separated out;
- Certifications for any Structural works;
- Any other documentation required.

Plans

- Concept Landscape and Irrigation Drawings if Detail Plans not finalised;
- Copy of Stormwater Management and Erosion Control drawings;
- Copy of Structural Drawings if required, ie, retaining walls, fences, footings;
- Copy of all Civil Design drawings made up as follows:
 - Site works;
 - Services;
 - Roadworks Layout, Footpath layout; Longitudinal Sections; Cross Sections;
 - Drainage Layout; Longitudinal Sections; Sub Soil Drainage layout
 - Intersection and Cul de sac Details;
 - Typical Sections, General Notes, Locality Plan and General Notes;
 - Any other relevant drawings.

3.12.1.2 Numbers of Copies Required

Two copies of all documents only is required if plans are A3 size. If plans are larger than A3 size then three copies minimum of the plans are to be submitted.

If, after perusal and comment significant amendments are necessary, then the amended documentation will need to be resubmitted for further assessment and approval.

3.12.1.3 Time for Assessment of Documentation

The Developer / Consultant should allow a reasonable time for examination of the documentation. The Officer will be able to advise of the approximate time required. A reasonable time for assessing a submission or re-submission of engineering design documents, depending on the size of the submission, is up to ten working days.

3.12.1.4 Fees and Bonds Required

The following Fees and Bonds are to be submitted prior to approval of plans and prior to the signing of the Deed of Agreement:

- Security Bond if deemed necessary;
- External Works Bond if required;
- Development Application Fee;
- Design Approval Fee.

3.12.1.5 Deed of Agreement

The Deed of Agreement is to be signed after the plans have been assessed and prior to formal approval of plans.

The Officer will not approve the design documents until the Deed of Agreement has been executed.

3.12.2 Documentation Standards

All drawings are to be drafted in accordance with Council's mandatory CAD requirements, which are stated in the Appendix K. This is particularly important for As Constructed electronic copies.

The following Australian Standards shall be adhered to:

- AS 1100 Part 101 1992 Technical Drawing – General Principles
- AS 1100 Part 401 1984 Technical Drawing – Engineering Survey and Engineering Survey Design Drawing

The Level **Datum** must be an established Department of Lands Benchmark to Australian Height Datum. The datum and the locations of such datum points are to be clearly marked on the plans.

3.12.2.1 Preferred Drawing Scales

DRAWING		SCALE
Locality Plan		1 : 5000
Site Works, Erosion and Drainage Control Plan		1 : 1000
Overall Layout Plan		1 : 1000
Road Plan	<i>Preferred</i>	1 : 500
	<i>Minimum</i>	1 : 1000
Road Longitudinal Section	<i>Horizontal</i>	1 : 1000
	<i>Vertical</i>	1 : 100
Road Cross Sections		1 : 250
Intersections, Traffic Management Devices, Cul de sacs		1 : 250
Drainage Plans	<i>Preferred</i>	1 : 500
	<i>Minimum</i>	1 : 1000
Drainage Longitudinal Sections	<i>Horizontal</i>	1 : 1000
	<i>Vertical</i>	1 : 100

3.12.3. Information to be shown on Drawings

3.12.3.1 Locality Plan

- Existing Roads;
- New roads;
- All relevant street names;
- Any other significant features.

3.12.3.2 Site Works Plan

- All existing and proposed roads and property boundaries;
- Existing and proposed contours with appropriate contour intervals;
- Detailed areas of cut and fill;
- Levels along existing roads and properties adjacent to recontoured areas;
- Details of existing vegetation and extent of clearing and vegetation protection.

3.12.3.3 Layout Plan

- Existing and new roads with allocated street names (if already approved);
- Pavement widths;
- Lots with lot numbers;
- Existing and proposed street drainage and allotment drains and easements;
- Services and fence lines (where applicable);
- Traffic management devices;
- Footpaths, footways, cycle paths;
- Survey and benchmarks.

3.12.3.4 Road Plans

Plans

Each road shall be drawn in plan and profile and cross sections are to be provided

- Widths of all pavements, verges and medians;
- Distances (chainages) and stations along centre line of road;
- Horizontal curve data;
- Existing and proposed levels;
- Existing and proposed street drainage including drainage structures;
- Lots facing onto streets;
- Proposed traffic management devices;
- Existing and proposed services in the road reserve;
- Footways, footpaths, cycle paths;
- Location of signage;
- Survey and bench marks;
- Street names (if already approved).

Cross Sections

To show the offset from the road reserve centre line and levels of the following points at maximum 20 metre intervals

- Road centre line;
- Toe and top of kerb;
- Any change in cross fall;
- Road reserve boundary;
- Cuts and fills extending into properties.

Longitudinal Sections

- Running distance (chainage) along the centre line of the road;
- Existing surface levels along centre line (optional both property lines);
- Design levels for road centre line and kerbs where applicable. Levels at 20m maximum spacing for straight grades and 10m maximum for vertical curves. Levels to be shown at horizontal curve tangent points and other required locations;
- Lengths of grade lines with grades expressed as percentages;
- Intersection and tangent point changes of grade;
- Length of vertical curves and other information;
- Transition and super elevation details.

Intersections, Culs de sac, Roundabouts, Bends, Traffic Management Devices

- All adjacent lot boundaries;
- Geometric details;
- Design levels at appropriate points;
- Design grades and vertical curve details around kerb and curve radials;
- Drainage and other services;
- Pram crossings and footpaths etc.

3.12.3.5 Drainage Drawings

Where possible, all drainage lines are to show the following detail and are to be drawn in plan and longitudinal section on the same drawing as follows:

Plans

- Existing and proposed drainage line detailing pipe sizes, types, connections, grades, lengths, drainage pits and structures and special backfill requirements;
- Upstream and downstream levels on all existing drainage and outfalls to which connections are being made;
- Sub soil drainage details;
- Existing and proposed sewer lines and any other services which may effect the proposed drainage works;
- Existing and proposed contours / finished levels;
- Streets, street names and lots and lot numbers;
- Existing and proposed drainage easements and other easements including description and widths;
- Stormwater connection points;
- Open drains, table drains, outlet and overflow structures, head walls retardation and siltation basins etc.

Longitudinal Sections

- All pipe sizes, grades, type and class of pipe;
- Existing and finished surface levels on the line of the pipe(s);
- The running distances (chainages) between pits and drainage structures
- Location and level of other services or connections crossing or in close proximity to, including parallel to, the drainage line;
- Details and identification of all pits and drainage structures;

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PART 4

CONSTRUCTION REQUIREMENTS

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4.1 GENERAL

4.1.1 Introduction

This Section of the Guidelines has been prepared as the **Construction Requirements** for subdivision and development works within the Municipality. These requirements are to be read in conjunction with Council's Standard Technical Specification and Standard Drawings.

The Technical Specification or Standard Drawings may be used for inclusion in contracts between Developers and Contractors for subdivision or development work and may also be used for contracts between Council and Contractors.

4.1.2 Control and Supervision of Works

The Developer/Contractor is ultimately responsible for all construction activities carried out during the course of the project.

Inspections by the Officer shall in no way diminish the responsibility of the Developer to adequately supervise the works.

The Developer is to ensure that all works are carried out in accordance with the requirements of the Development Permit, the Deed of Agreement, the approved Inspection and Testing Plan, approved drawings and specifications and the Subdivision Development Guidelines and as agreed at the Pre-commencement Meeting.

The Developer/Contractor is to also ensure that a suitably qualified Superintendent carries out the supervision of the works. The Superintendent is to be responsible for certification of the works in accordance with Section 2.

The Contractor, when not personally present on site, is to be represented by a nominated, competent and experienced Supervisor.

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 and when all the requirements set out hereafter have been complied with.

The Developer/Contractor shall not commence work without providing the Officer with an executed 'Notice to Commence Works' and a Pre-commencement meeting.

For inspections of other areas of works, ie, landscaping and structural works, inspections are to be carried out as specified, required and agreed with the Officer.

4.1.3 Certification of Works

All works will be subject to certification at:

- Bonding prior to being accepted On Maintenance;
- Off maintenance.

The Consultant is to issue a Statement of Compliance certifying that the works have been constructed in accordance with the intent of the design drawings and specifications.

4.1.4 Pre-commencement Meeting

The Developer or Consultant is to initiate a pre-commencement meeting with the Officer. The Developer, Consultant[s], Contractor, Council and Other Authorities (if required) are required to attend to outline all parties' requirements and to discuss the items set out below.

- Engineering, Other plans and Other Authorities approvals;
- Council Inspections and Holdpoints;
- Workplace Health and Safety – Safety Management Scheme and General Risk Management;
- Inspection and Testing Plan;
- Traffic control / traffic;
- Spoil off site / import fill;
- Working Hours;
- Parks / landscaping – Landscape Section;
- Environmental - stormwater management, erosion protection, dust and airborne materials control and management of Acid Sulphate soil;
- Reinstatement works to Council and other property;
- Protection of and permission to enter private property;
- Design alterations during construction;
- Geotechnical and Blasting details;
- Contractor's Insurances and Council indemnities;
- Certifier and Certification of works;
- Other matters.

The meeting is to be minuted by the Officer.

4.1.5 Notice to Commence Works and Notification of Contract

Prior to commencing construction, the Developer is to give the Officer is to be given at least 24 hours notice in writing which is to include the following information:

- Subdivision Estate / Development Name / Stage / Brief description of Works.
- Developer: Name, Address, Contact Person and Contact Number
- Developer's Representative(s): Firm's name, Discipline; Address; Contact Person and Contact Number
- Contractor; Name, Address, Contact Person and Contact Number
- Date of Council Approval of Design
- Proposed Working Hours - All works will be contained between the hours as specified and agreed.

4.1.6 Preferred Construction Program

The following construction program is the program all Contractors shall follow to complete the subdivision or development. Alternative programs would need to be justified and approved by the Officer at the pre-commencement meeting.

- Site works and implementation and maintenance of sediment and erosion controls.
- Bulk earthworks and road excavation to verge level.
- Construction of Drainage and Sewer within the road reserve.
- Subgrade treatment as required.
- Road service crossings.
- Sub Soil Drainage
- Placement of Sub-base coarse if required
- Placement of Base coarse of pavement
- Placement of Extruded Concrete Kerbs and Gutters and Footpath construction.
- Utility Services and Landscape Preliminaries
- Wearing coarse to pavement
- Footpath and Final landscaping
- Final Sediment and Erosion Control

4.1.7 Joint Inspection of Works

With respect to road and drainage and site works, the Officer, Consultant and Contractor are to jointly inspect the site so that agreement is reached on the acceptable standard and method of work. The Consultant (Supervisor) is to be available for that purpose when deemed necessary by the Officer

In the absence of inspection by the Officer, certification in lieu by the Consultant will not necessarily be accepted.

The Consultant is to ensure that any particular section of work to be inspected has been satisfactorily completed before requesting any such scheduled inspection.

A minimum of 24 hours notice is to be given to enable arrangements to be made for an inspection.

Each stage will be inspected prior to the next stage works being commenced.

In circumstances where there is concern about workmanship or materials, works are not to proceed until the Officer is satisfied by the adequacy of the work.

If the Superintendent/Contractor is not Quality Assured, then additional inspections may be required at the Officer's discretion.

The Superintendent shall inform the Officer and the Contractor at all Hold Points as specified in the Technical Specification. The Officer may request additional inspections (Hold Points).

4.1.8 Conformance Testing and Inspections

The Consultant shall comply with the requirements of the accepted Conformance Testing and Inspection criteria or a plan agreed upon or approved as submitted with the plans and specifications and other documentation for the Works.

The Consultant will be responsible for ensuring that all required quality control checks are carried out during construction.

Drawings, specifications and associated documents include the relevant requirements for quality control during construction, including compliance with the accepted Conformance Testing and Inspection **Plan**.

Testing, except for tests carried out by the Superintendent, are to be undertaken by a testing authority registered with the National Association of Testing Authorities (NATA) in accordance with the relative Australian Standards. If requested the Consultant is to progressively submit a copy of test results to the Officer.

The testing authority shall perform tests in accordance with Northern Territory testing methods (NTTNI) and codes of practice (NTCP) for materials testing are given in the Northern Territory Construction Agency (NTCA) materials testing manual. The methods contained in the materials testing manual shall take precedence over all test methods and procedures, and used in conjunction with relevant Australian Standards.

In addition to the normal inspection and testing requirements as detailed elsewhere in the Guidelines, the Officer reserves the right to inspect and require additional samples to be tested to ascertain the quality and quantity of materials being used. The cost of this testing will be met by the Developer. The Consultant will be informed of any works requiring remedial action. In the event that the testing reveals the work to be acceptable, the Council will be responsible for the costs of testing and reimburse the Developer.

The Developer/Contractor should note the following:

- Conduct field density testing using Nuclear Density Gauges in accordance with NTCP 102.1 and AS 1289.5.8.1
- Conduct CBR moulding using a compaction hammer conforming with the requirements of AS 1289.

Where tests are required which are not included in the manual, use the appropriate Australian Standard.

Where testing of a stage of work is requested, no following stage of work will proceed until the preceding stage is approved.

The Officer may make inspections of the works on a random audit basis. Such inspections may include but are not limited to items such as Traffic Control, Occupational Health and Safety Issues and Environmental Protection. These inspections may take place without any prior notice to the Superintendent or Contractor. Inspections by the Officer will not diminish the responsibility of the Developer to adequately supervise the works.

The Officer may request progressive certification from the Consultant indicating correctness of construction in accordance with the approved plans and specifications for all or any of the main stages of construction.

In the absence of inspection by the Officer, certification by the Consultant will not necessarily be accepted. The Officer reserves the right to have the work proven in the field whether by inspection or specific testing.

The type and frequency of testing shall be in accordance with the Technical specification. The following table outlines the Superintendent's and Council's inspection responsibilities at each stage.

4.1.9 Standard Inspection Plan Responsibilities

Elements of Work	Consultant's Responsibility	Council's Responsibility
PRE-START MEETING	<ul style="list-style-type: none"> Outline performance and standard required. Highlight critical aspects of the design. 	Outline performance and standard required. Highlight critical aspects of the design.
IN ROAD RESERVE FILLING Material Quality Compaction Levels	<ul style="list-style-type: none"> Level of supervision to be determined by consulting engineer but minimum Level 2 in accordance with AS 3798 to apply. Examine and assess all test results and levels and report to Officer 	Visit site for random audit inspection if considered warranted.
ROAD EMBANKMENT Material Quality Compaction	<ul style="list-style-type: none"> Make routine visits Examine and assess all test results and levels 	Visit site for random audit inspections if considered warranted.
SUBGRADE Compaction CBR Tests Horizontal Alignment Vertical Alignment Crossfall	<ul style="list-style-type: none"> Make routine visits Attend during proof rolling Examine and assess all test results and cross section geometry Certify adequacy designed pavement/or submit new pavement design for approval 	Visit site for random audit inspections if considered warranted. Inspection and attend proof rolling.
SUBGRADE REPLACEMENT Material Quality Compaction Profile and Depth	<ul style="list-style-type: none"> Make sufficient routine visits to assess quality of materials and that operations will achieve a sound compacted layer. Attend proof rolling Examine and assess all test results. 	Visit site for random audit inspections if considered warranted. Inspection and attend proof rolling.
SUB-BASE LAYER Material Quality AS1289 Compaction Pavement Depth Horizontal Alignment Vertical Alignment	<ul style="list-style-type: none"> Make routine visits. Examine and assess all test results. Attend proof rolling 	Visit site for random inspections if considered warranted. Inspection and attend proof rolling.
BASE COURSE LAYER Material Quality AS1289 By NTTM 216.1 By WA312.1 AS1289 Compaction Pavement Depth Horizontal Alignment Vertical Alignment	<ul style="list-style-type: none"> Make routine visits Attend proof rolling Examine and assess all test results and report to Officer 	Visit site for random inspections if considered warranted. Inspection and attend proof rolling.

Elements of Work	Consultant's Responsibility	Council's Responsibility
<p>SURFACING – ASPHALT</p> <p>Material Quality Aggregate By AS1141 By NSW t239 Bitumen By AS 1141 NTTM 305.1 NTTM 304.1 Compaction Thickness Horizontal Alignments Profile</p>	<ul style="list-style-type: none"> Undertake an inspection prior to commencement of laying operation. Examine and assess all test results and report to Council. 	<p>Visit site for random inspections if considered warranted. Inspect prior to tack coat</p>
<p>SUB-SOIL DRAINS</p> <p>Pipe Filter Material Clean out Points and Markers Geotextile</p>	<ul style="list-style-type: none"> Make random audit inspections of Contractors performance 	<p>Visit site for random inspections if considered warranted. Inspection when placed.</p>
<p>KERB AND GUTTER</p> <p>Concrete - Slump - Strength Horizontal Alignment Vertical Alignment Kerb Transition</p>	<ul style="list-style-type: none"> Inspect prior to kerb placement and completed kerb. Examine and assess all test results and level. Inspect with straight edge. 	<p>Visit site for random inspections if considered warranted. Attend water test.</p>
<p>STORMWATER DRAINAGE</p> <p>Material Quality Culverts By AS1597 Bedding Reinforcement Concrete <ul style="list-style-type: none"> Slump Strength <p>Structures - Location - Surface and Invert Level - Construction</p> <p>Drainage Lines (Underground) - Horizontal Alignment - Vertical Alignment - Backfilling</p> <p>Drainage Lines (Open) - Horizontal Alignment - Vertical Alignment</p> </p>	<ul style="list-style-type: none"> Inspection of person to placement of bedding Make sufficient visits to assess compliance with specification. View progress and works. For structural pours inspect prior to placing concrete. Examine and assess all test results and level. 	<p>Visit site for random inspection if considered warranted.</p>
<p>ROAD CROSSING CONDUITS</p> <p>Location Backfilling Markers</p>	<ul style="list-style-type: none"> Make random audit inspections of Contractors performance prior to backfill 	<p>Visit site for random inspection if considered warranted.</p>

Elements of Work	Consultant's Responsibility	Council's Responsibility
TOPSOILING AND GRASSING	<ul style="list-style-type: none"> Confirm all affected areas are topsoiled, grassed and maintained. 	Visit site for random inspection if considered warranted.
EROSION, SEDIMENTATION AND WATER QUALITY CONTROL MEASURES	<ul style="list-style-type: none"> Ensure continuous maintenance of measures prior to bulk earthworks 	Ensure Council's local laws are complied with throughout construction
ALL WORKS PRIOR TO ON-MAINTENANCE	<ul style="list-style-type: none"> Confirm all works comply with design intent before arranging "On Maintenance" inspection. Complete the "On Maintenance" inspection checklist prior to joint inspection with Council. 	Joint "On Maintenance" inspection with Consulting Engineer and notify requirements, if any.
PRIOR TO ACCEPTANCE "ON-MAINTENANCE"	<ul style="list-style-type: none"> Forward "As Constructed" submission to Council. Ensure Licensed Surveyors certificate is attached and also attach Engineers Certification. Finalise all other Documentation in accordance with Section 1.p 	Council to accept and conduct Audit checks of As Constructed Drawings and advise any requirements. When complete advise in writing of acceptance of "On Maintenance".
DURING MAINTENANCE PERIOD	<ul style="list-style-type: none"> Confirm all minor omissions and defects have received suitable attention. Examine and approve site prior to asking for "Off Maintenance" Inspection. 	Council to advise Consulting Engineer of any defects.
PRIOR TO ACCEPTANCE "OFF MAINTENANCE"	<ul style="list-style-type: none"> Accompany Council Inspector and to note any requirements. 	Council Inspector to accompany Consulting Engineer and Contractor to advise of any requirements. When complete, advise in writing of acceptance of "Off Maintenance".

4.1.10 Subgrade Evaluation and Pavement Design

After subgrade excavation, the Developer is required to submit a geotechnical report, the results of which need to be used for preliminary pavement design.

As early as possible, during the construction period, subgrade evaluation tests carried out by a registered NATA testing company, together with recommended pavement designs, are to be submitted for final approval by Council.

Council will not inspect pavement subgrades, or approve the placement of pavement materials, until a pavement design has been submitted and approved.

4.1.11 Health and Safety Requirements

Incorporation of Health and safety requirements into contract documentation should be considered as early as possible in the specification development stage. In general terms, Tenderers / Contractors are to comply with the following:

- Health and Safety Legislative Requirements;
- Demonstrate evidence of OH&S management and system;
- Complete OH&S Management System Questionnaire;
- Undertake Risk Assessment;
- Develop Health and Safety Plan;
- OH&S Performance Reporting;
- OH&S Incident Notification.

The Contractor must have in place a Policy Document setting out and to be issued to all sub-contractors for on site health and safety requirements.

In the case of contracts between the Developer and Contractor, the Superintendent has the right to suspend or terminate the works, if in the Superintendent's opinion, the Contractor fails to remedy breaches of health and safety.

In the case of contracts between Council and Contractors, the Officer has the right to suspend or terminate the works.

4.1.12 Environmental Considerations

The Developer is to ensure that all reasonable measures are taken in respect of environmental matters as set out in Section 2. In particular the following shall be properly addressed to Council's satisfaction.

- The requirements of the relevant Regulations and Acts are to be accorded with;
- The approved plans and specifications, setting out the environmental requirements and measures, are to be strictly adhered to;
- Dust, air and noise emissions are to be controlled such that nuisance is not caused to surrounding properties. Council reserves the right to direct any and all such measures as deemed necessary to ensure compliance, including cessation of works. The Developer shall be responsible for all such costs;
- Stormwater quality control, including erosion and sediment control, is to be totally implemented in accordance with the approved Stormwater Management and Erosion Control Plan;
- The Environmental Bond lodged with the drawing approval may be drawn on and implemented if necessary.

4.1.13 Construction During Wet Season

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 the Wet.

Under these circumstances, Council will require that a Bond be lodged as security against erosion and siltation of the site and of Council's assets

4.1.14 Protection of Cadastral Reference Marks (CRM's)

The Contractor shall investigate the location of any CRM's in the vicinity of works, prior to the commencement of construction.

A location diagram of all CRM's in the vicinity of works is available at no cost to Contractors by contacting the Department of Lands or the Surveyor General's Office.

Each mark site will be either painted, or the CRM position offset, given five days notice of intention to dig in a particular road reserve.

The Contractor should be aware the destruction of Survey marks is an offence under section 62 of the Licensed Surveyors Act.

4.1.15 Salt Water Environments

The Developer/Contractor shall be diligent in design and construction of all roads, drainage, and associated structures in salt environments.

Consideration should be given to the use of Potable/Salt water in the preparation of all concrete and mortar mixes, spray seals and road pavements.

The Contractor shall ensure the total soluble salts content is less than 3,000 mg/litre (total dissolved salts for use in construction) and shall provide evidence of construction water salt contents.

4.1.16 Major Departures from Design Intent – Non-Compliance Reports

Notwithstanding the most diligent efforts of the Contractor, Consultant and Officer to comply with the intent of the approved drawings and specification, some non-complying construction works may occur.

As well, proposed major departures of design intent may occur during construction. These are to be approved by Council in writing before construction.

Non-compliances are to be reported to Council through submission of **Non-Compliance Reports**.

These reports shall identify the nature and number of non-complying items and state the Consultant's justifications for Council acceptance.

4.2 WORKS ON COUNCIL PROPERTY & REINSTATEMENT WORKS

4.2.1 General

All works carried out on Council property shall not degrade Council's assets.

The works are to be reinstated to the condition of the existing or better as deemed by the Officer.

The Developer, Contractor or Permit Holder (as determined by the Officer prior to works commencing) shall be wholly responsible for all reinstatement to the Officer's requirements.

Any degradation of an asset shall be compensated for in a manner approved by the Officer.

4.2.2 The Works

Works within Council Property include:

- Works carried out within Council's property, ie, road reserves, parks, public spaces or any other place owned by or defined as owned by or maintained by the Council. This includes the installation of cable and other structures for the delivery of cable television services in the municipality.
- Works carried out by Contractors under Contract to Council, by Other Authorities that have a statutory right to carry out works within Council road reserves or by private persons or organisations that wish to carry out works within Council property.
- Works conducted underground, above ground or ground level including aerial cabling.

Works will only be carried out as per the approved design, in the manner and under the terms and conditions specified and at the times agreed to by the Permit Holder and/or approved by the Officer.

Any variations to the design will require the approval of the Officer.

No works may be commenced without the approval of the Officer.

4.2.3 Permits, Approvals and Bonds

All necessary permits to carry out works are to be obtained by the Permit Holder. This includes permits for the installation of cable and other structures for the delivery of cable television services in the Municipality. Permits will be required even if the works form part of proposed internal subdivision construction.

The works may be of such a nature, size or in such a location, that the Officer will require a specific security bond or bond(s) to be lodged prior to the commencement of works

The Permit is issued for a stipulated period and if works are not completed within the stipulated time frame then the Permit must be extended.

The Permit will terminate at the satisfactory completion of the works.

The Officer may revoke the permit if it is deemed that the Permit Holder is not acting within the Conditions of the permit.

4.2.4 Notification to Residents

All residents and owners within the works area and any other area deemed by the Officer to be affected by the works, are to be advised of the proposed works by individual written advice, not less than 14 days prior to the proposed commencement of works.

4.2.5 Notification to relevant Authorities

All relevant authorities as defined by the Officer are to be advised at least 14 days prior to the proposed commencement of works and any statutory requirements of the authorities satisfied. Relevant Authorities may include public or private individuals or bodies, which may have a direct or indirect interest in the proposed works.

4.2.6 Occupational Health and Safety, Public Safety and Insurance

All Occupational Health and Safety requirements must be complied with at all times.

The safety of the public is paramount and Council's exposure to Public Risk also must be considered at all times.

The Permit Holder is to appoint a Safety Officer who is to be totally responsible for all aspects of safety throughout the works site.

The Contractor must have in place all necessary insurances, which are to indemnify Council against any claims arising out of the works. Proof of insurance must be lodged with Council prior to commencement of works.

4.2.7 Working Hours

Working hours are restricted to times that provide minimum disturbance to nearby residents, business, traffic and any other service in the Council land. Dependent upon the location, it may be necessary to carry out the works within restricted working hours. This shall be recognised, determined and specified by the Officer prior to approval of plans and specifications.

If the Officer is required to be present outside normal Council working hours, then the Permit Holder is to be responsible for overtime costs at rates as agreed under the Permit.

The Officer has the ultimate decision in the matter of working hours.

4.2.8 Design of Works

When designs for cabling and/or any other service is being carried out in existing Council road reserves, the following is to apply:

- All roads, pavements, footpaths and vehicular crossings / driveways are to be under-bored;
- The appropriate alignment for cabling for the delivery of cable television services is in the 00-800mm behind the kerb.
- Alignments for other services are to comply with the requirements of the services corridors as set out on the Standard Drawing;
- If a footpath covers the permitted alignment behind the kerb, the permit Holder may choose to demolish the existing footpath, excavate to lay cables and replace the footpath with a new path to Councils standards in lieu of boring;
- Trenching across a road will only be permitted at intersections, (defined as within the tangent points of the intersections to minimise any trenching across the road.
- Any trenching across a road, footpath or driveway is to have saw-cut edges. In the case of footpaths and crossings driveways, whole slabs are to be replaced rather than narrow saw-cut trenches. The Officer is to define the width of the trench to be saw cut.

4.2.9 Excavations

The Permit Holder will be deemed to have made all necessary investigations to judge the nature of materials to be excavated.

All excavations are to be carried out as necessary to line and level to complete the works as shown on the approved drawings and standard drawings and as per the approved works program.

4.2.10 Trenching, Backfilling and Reinstatement

All roads, pavements, footpaths and vehicular crossings / driveways are to be under-bored unless specific approval for open cut trenching is to be obtained from the Officer

No trench is to be over excavated in width and depth without the specific approval of the Officer.

All trenching is to be adequately drained and de-watered.

Where the trenching intercepts coffee rock, cavities and/or crab-holes, the Officer will approve the necessary remedial works to be carried out prior to the laying of services and backfilling. The Officer may recommend:

- Fill cavities with lean mix concrete and/or;
- Prepare and place a lean mix slurry bedding and/or
- Encase the backfill and bedding material in an approved geotextile fabric in accordance with the manufacturer's specification.

The Permit Holder is to open only as much trenching as can be closed again in one day. All works are to be carried out in stages so that no more than an agreed length or 100 metres maximum of trench is open at any one time.

Where the trench base is deemed as unsuitable, additional material is to be removed as necessary and backfilled to the design level with approved material.

All backfill is to achieve the specified degree of compaction as defined in the Technical Specification.

All works are to be reinstated to the condition of the existing or better as deemed appropriate by the Officer.

4.2.10.1 Trenches in the verge / footway

To be backfilled to the established grading from top of kerb to the reserve boundary and flush with the edges of pavement / top of kerb.

Material used for backfilling can be material won on site.

Compact to 85% minimum MMDD ratio in verge areas and 90% minimum MMDD ratio under pathways.

Verges are generally to be turfed where grass existed prior to the works. Adequate provision is to be made for irrigation of the turfing until established.

Grassing as a means of surface re-instatement, is only to be carried out where specifically approved by the Officer. If grassing is approved, it shall be placed as detailed in the Technical Specification.

Approval of the Officer is to be obtained upon completion of works.

Inspections are to be arranged with the Officer prior to commencement and after finalisation of works to test existing irrigation systems.

4.2.10.2 Trenches across and/or adjacent to Roadways and Footpaths

The material used for backfilling under road pavements or adjacent to, or in close proximity or parallel to road pavements and/or existing kerbs, is to be fine crushed rock with 3% (by weight) cement stabilisation. Wearing surface shall be 50mm minimum asphalt surfacing. The Officer may specify that deep lift asphalt be placed in lieu of this.

Trenches to be backfilled in 150mm maximum layers.

4.2.10.3 Trenches across and/or adjacent to roadways and Footpaths

Density tests are required for every trench across a road trafficked area or along the kerb / edge of pavement and / or along the footpath at the rate indicated in the Technical Specification.

The Permit Holder is required to submit a security bond based on Council's current adopted rate for future reinstatement of subsidence of the road trench under traffic.

4.2.10.4 Concrete Surfaces

Reinstate cast in situ concrete surfaces to the requirements of the Officer as detailed or specified.

Finish to the same surface texture, colour and shape as the existing/adjoining concrete work.

4.2.10.5 Paved Surfaces

Reinstatement works are to be carried out to the requirements and standard current practice for the paving material. Finish to the same surface texture, colour and laying patterns as the existing/adjoining work.

4.2.10.6 Pavements and Asphalt Surfacing

Reinstatement works are to be carried out in accordance with the provisions of fine crushed rock pavements and Asphalt Surfacing as specified in the Technical Specification. A 50 mm minimum thick asphalt layer is to be placed in any asphalt paved or sealed areas.

4.2.11 Existing Services and Structures

The Permit Holder is to take whatever measures are necessary (this includes dial before you dig service) to prove the location of existing services and is wholly responsible for any damage and reinstatement to the services. This includes existing irrigation systems.

Any connection or disconnection is to be carried out by or under the direct supervision of the appropriate authority to which appropriate notice will have been given.

The Contractor is to pay all costs and charges to the appropriate authorities for supervision and materials and for any other purpose as is necessary to carry out the works.

Inspections are to be arranged with Council's Parks Manager prior to commencement and after finalisation of works to test existing irrigation systems.

4.2.12 Supervision of Works

Where deemed by the Officer, all works are to be supervised by an appropriately qualified Superintendent.

The degree of supervision will be agreed upon at the Pre-commencement Meeting and will be dependent upon the contract entered into between the Contractor with the Developer and/or Other Authority, the degree of Quality Assurance supporting the Superintendent and/or the Contractor, Public Risk and the Conditions of the Permit.

4.2.13 Inspection Schedule

For the purpose of the Inspection Schedule, any holes and other excavations are to be treated as trenches.

Council will carry out inspections all Hold Points specified in the Technical Specification. Works may not proceed on further stages until the preceding stage has been approved.

These inspections include but are not limited to:

- Prior to the commencement of works;
- At random times during the construction of the works;
- If the excavations for the works are of a significant or substantially deep nature:
 - Prior to laying of services;
 - At agreed times during the laying of services.
- Immediately any trenches have been backfilled;
- Prior to any rectification works;
- Final inspection at the completion of works.

The Permit Holder is to advise Council of the time for inspection.

Inspections are to be arranged with Council's Parks Manager prior to commencement and after finalisation of works to test existing irrigation systems.

4.2.14 Environmental Requirements

The Permit Holder is to be responsible for ensuring that the provisions of the following and any other relevant clauses contained in the Guidelines are complied with and is to submit to the Officer any proposals for traffic movements, temporary structures, clearing, cleaning up (including burning off), erosion and sediment control, demolition and the like for approval prior to the commencement of works.

4.2.14.1 Solid, Liquid and Gaseous Contaminants

The contractor is to be responsible for the proper storage and disposal of all contaminants in accordance with all statutory and contractual obligations.

4.2.14.2 Disposal of Waste

Waste from construction operations, including food scraps and the like, are to be removed from the site.

4.2.14.3 Trucking

All trucks entering and leaving the site of works are to be loaded and the load constrained in such a manner as to prevent the dropping or tracking of materials onto streets. This includes ensuring that all wheels, tracks and body surfaces are free of mud and other contaminants.

4.2.14.4 Dust and Water and Erosion Control

Adjoining owners, residents and the general public are to be protected against dust, dirt and water nuisance. Dust screens and watering are to be used to reduce dust nuisance.

All proper precautions are to be taken by the Contractor to ensure that erosion and sedimentation from any lands or location used, occupied or controlled by the Contractor is kept to an absolute minimum during the course of the works.

4.2.15 Vegetation

During the works, the following conditions apply to existing vegetation:

- Pruning, cutting or removal of vegetation (including roots) will not be permitted without permission of the Officer;
- Vegetation roots or limbs will be bored under or bypassed if so determined by the Officer;
- Works may be required to be redesigned if a tree is determined to be endangered by the works and another solution is achievable;
- Refer to:
 - “Guidelines for Excavations near Roadside Vegetation” and
 - “National Arborists association of Australian Draft Tree Pruning Standards” for guidelines for permitted works around vegetation.
- Valuation of vegetation damaged or proposed to be damaged by the Permit Holder is to be assessed under the Draft Australian Standard, “Trees – Amenity Valuation”. The Permit Holder will be required to reinstate / replace any damaged vegetation to the value determined by the Officer and maintained to the satisfaction of the Officer.

4.2.16 Traffic Control

The Permit Holder is to assume responsibility for the safe conduct of the traffic through or around the work site 24 hours per day from possession of the site to Practical Completion of the Works.

The works are to be organised and carried out in such a way as to minimise obstruction and inconvenience to the public.

4.2.16.1 Traffic Control Plan

A Traffic Control Plan is to be submitted at or prior to the Pre-commencement Meeting detailing proposed temporary road closures, detours and control arrangements, including after hours control, road maintenance and provision of access to and notification of residents. Only experienced traffic controllers are to be used.

Supply, erect and maintain necessary warning devices.

The Permit Holder is to liaise with owners of adjacent properties and ensure access is provided and maintained at all times.

Any road closures and significant detours are to be advertised in the NT News 14 days prior to the proposed closure / detour.

4.2.17 Site Control

The Permit Holder is to observe all rules and regulations in force on site as described in the Permit.

Storage space on site is to be as agreed by the Officer.

Flammable, combustible or hazardous materials are to be stored and maintained in an appropriate manner to Australian Standards.

4.3 ENVIRONMENTAL, EROSION AND STORMWATER MANAGEMENT CONTROLS

4.3.1 Introduction

The work to be executed under this part of the Section is the implementation and construction of measures to control erosion and sedimentation. These works may be temporary or permanent.

This Section is to be read in accordance with Section 2.7 : Environmental, Erosion and Stormwater management Issues, and the Resource management Guidelines - Erosion and Sediment Control Guidelines, released by the Department of Lands – Natural Resources Division.

Degradation of land associated with land development can occur as a result of erosion by water and wind, salinity and Acid Sulphate Soils. All aspects of land degradation are to be addressed by the Developer / Consultant in the preparation of the erosion control and drainage management plan.

The Developer is to plan and carry out the whole works to avoid erosion and sedimentation of the site, surrounding country, watercourses, water bodies and wetlands.

The approved design plan may have to be modified due to site or weather conditions during the construction of the works.

The Developer has a duty of care towards erosion and sedimentation control. Necessary works, even if not specified, are to be carried out.

4.3.2 Principles of Erosion and Sediment Control

Virtually all construction activity requires the disturbance of the soil surface and the existing vegetation, which then predisposes the construction site to erosion resulting in significant soil loss.

Since soil disturbance is a resultant part of the development, it is essential to develop measures that reduce the erosion hazard. Run-off water, which carries the sediment, must be controlled, in such a way as to reduce the amount of sediment leaving the site.

This may be achieved by:

- Ensuring works are not carried out during the wet season;
- If works are carried out during the wet, then controls appropriate to the rainfall and drainage conditions must be put in place;
- Limiting the amount of site disturbance;
- Isolate the site by diverting clean upstream “run-on” water around or separately through the site where possible;
- Provide an effective major stormwater system, economical in terms of operation and maintenance, incorporating water quality controls;
- Retain or import topsoil for effective re-vegetation works;
- Control run-off and sediment at the point source rather than at the downstream point;
- Progressive re-vegetation of the site where possible during on-going construction to reduce the area contributing to sediment volumes.

- Construction of sediment trapping systems of a size relevant to the catchment of the site and climatic and seasonal conditions;
- Filtering of the sediment in the trapped water, prior to its release to the drainage system.

4.3.3 Developer's Responsibilities

The Developer is to adhere to the requirements set out in the approved Sediment and Erosion Control Plan, unless the Officer considers such measures are to be amended. Continual reappraisal of the site is absolutely necessary and the Developer must ensure that effective erosion and sediment control is provided at all times.

The Developer is not to commence any clearing or excavation without implementing the appropriate soil and water/dust management controls.

Transport of soils, earth, sand, loose debris etc to or from the development site will be in a manner that prevents the dropping of such material on surrounding streets. The Developer must ensure that the wheels, tracks and body surfaces of all plant and vehicles leaving the site are free of mud etc.

The Developer is to provide and maintain slopes, crowns and drains on all excavations and embankments to ensure satisfactory drainage at all times. Water is not to pond on the works unless such ponding is part of the approved Sediment and Erosion Control Plan, or if directed.

The cost of installation, maintenance, inspection, removal and restoration of affected areas must be borne by the Developer.

The Developer is to restore any damage caused directly or indirectly by the development of the works to the original condition at no cost to Council. Such works will also include the clearing of material from roads, pipes, drains and gutters. Any material removed from drains, gutters and the like will be disposed of to an approved site.

The development is to be staged as shown on the approved plans so that re-vegetation of land can commence quickly.

The Developer is to maintain all sediment and erosion control structures throughout the whole development period, including the maintenance period. All works to be as required to maintain efficient operation or as directed by the Consultant/Officer.

4.4 PRELIMINARY WORKS

4.4.1 Survey and Set Out

Materials, workmanship, construction procedures and testing shall conform with the relevant Australian Standards and Codes and the provisions of these Guidelines.

The works are to be set out and constructed in accordance with the line and levels as shown on the approved drawings. The location of all services within the work area are to be confirmed prior to the commencement of construction.

Any permanent survey mark affected by the works is to be identified and reported to the Department of Lands and the Surveyor Generals Office for replacement or relocation.

Where it is necessary to cover any survey peg, survey recovery peg or survey mark, a stake extending a minimum of 75mm above the finish surface is to be driven beside it.

Levels of subgrade and intermediate layers of road pavement are to be checked at 20m intervals at the centreline and edges of pavement. Checks shall also be made at intersections and parking areas at appropriate intervals.

4.4.2 Clearing

The Developer shall not remove any tree or shrub without prior approval of the Officer. The natural vegetation is to be retained where possible.

The developer is responsible for consulting the Tree Preservation and Historic Tree Registers and providing evidence that no trees are affected.

All tree roots, boulders and other deleterious material are to be removed to a depth of 600 mm below the natural surface or finished levels of the road reserve which ever is greater. Stumps are to be completely removed.

All holes and depressions resulting from clearing are to be backfilled with specified and approved material and compacted to at least the compaction of the surrounding material.

The Developer is to be responsible for implementation and maintenance of soil erosion, water quality and dust suppression in accordance with the Section 2.7 of the Guidelines.

4.4.3 Topsoil

Upon completion of the clearing operations, natural topsoil shall be stripped from the road reserve areas of cut and fill and proposed utility service locations to a depth of 100mm. The topsoil shall then be stockpiled for re-spreading.

When earthworks have been completed, the topsoil shall be re-spread to a maximum compacted depth of 100mm on all exposed areas of earthworks as required, to match approved finish surface levels. Note, in the absence of adequate topsoil quantities being available, it will be the Developers responsibility to import approved topsoil to the satisfaction of the Officer.

4.5 EARTHWORKS

4.5.1 General

Earthworks are to be completed to the requirements detailed in the Technical Specification, the approved drawings and to tolerances as set out herein.

4.5.2 Filling In Road Reserve

All fill is to be clean, granular material and shall not be contaminated with roots or other impurities (refer 'standard fill', Section 5.1). The fill shall be placed in even layers not greater than 250mm in thickness and each layer shall be compacted to 95% of modified maximum dry density when tested in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes.

4.5.3 Lot Filling

Where the filling of lots is required as part of a development, the fill area shall be cleared and stripped of organic material and debris, and the filling placed and compacted to the approved design levels. The tolerances on lot filling shall be ± 50 mm. Fill material for lot filling shall conform to the specification set out in Section 2.7: Appropriate Fill.

It is Council's recommendation that areas of lot filling be controlled to provide 95% of the modified maximum dry density when tested in accordance with AS 1289: Methods of Testing Soils of Engineering Purposes. In the absence of testing results, a restriction is to be placed on the title of the lot denoting that the lot has been filled in an uncontrolled manner.

4.5.4 Rock Excavation

All cuttings through rock are to be excavated to a depth of 400mm below subgrade level and 400mm below the level of verges.

Excavated rock shall be placed at the bottom of fill areas. No stone larger than 300mm maximum dimension shall be placed in a fill area.

4.5.5 Blasting

When it is deemed that excavation in rock or hard soil may be carried out by blasting, a blasting permit is to be obtained from the appropriate authority.

All explosives are to be stored and handled in accordance with the requirements of the Mines Regulation Act 1946, the Explosives and Dangerous Goods Act 1961, AS 2187: Explosives – Storage, Transport and Use and AS 2188: Explosives – Relocatable Magazines for Storage.

Blasting shall only be carried out by a suitably experienced and qualified person. The shot firer shall be responsible for the repair of damage, legal liability or anything that may arise from the blasting operations. Appropriate screens, shields and matting necessary to prevent rock, stones, earth, debris or other material from scattering or blowing from the immediate site of blasting shall be provided as necessary.

4.5.6 Soil Stabilisation

The Developer shall be responsible for the satisfactory control of soil erosion, water quality and dust from the development site. Stabilisation of topsoil, sand or other material or matter subject to movement over or near the works, shall generally be carried out in accordance with the Erosion and Sediment Control Guidelines prepared by the Department of Lands, Planning and Environment - Natural Resources Division.

The Developer is to ensure compliance with the approved Soil and Water Management Plan.

4.6 SUBGRADE

4.6.1 General

The formation is to be excavated in accordance with the alignment, dimensions slopes and depths shown on the approved drawings. The formation must extend from back of kerb to back of the kerb, with a tolerance of width being +100mm –0mm. The finished levels of subgrade shall be within +0mm –20mm of the design levels.

The subgrade shall be compacted to not less than 95% MDD when tested in accordance with AS 1289: Methods of Testing Soil for Engineering Purposes.

Subject to the approved design, the subgrade is to be tined and mixed to a minimum depth of 150mm and re-compacted to 95% of the maximum dry density when tested in accordance with AS 1284: Methods of Testing Soil for Engineering Purposes.

The subgrade shall be jointly inspected by the Officer, Contractor, and Superintendent and approved before any subsequent pavement layer is placed.

4.6.2 Unsuitable Subgrade

If, in the event of an unsuitable subgrade, stabilisation of the subgrade may be proposed. Stabilisation shall be carried out to best practice and as recommended by the Consultant and approved by the Officer.

4.6.3 Level Control

Levels of subgrade shall be checked at 20 m intervals or less if required and directed, at the centre-line and edges of pavement. Checks shall also be made at intersections and parking areas at appropriate intervals.

4.6.4 Service Conduits

Service conduits under road pavements are to be placed as required and at a depth to be protected from damage due to pavement subgrade preparation.

The backfill material for conduits and services is to be Class 3 gravel or better compacted to 95% MMDD.

All conduit and service trenches are to drain to a sub soil or stormwater drainage trench with a positive outlet to the underground drainage system.

4.6.5 Acceptance

The subgrade is to be visually free from all cracks, irregularities and layering.

The subgrade is to be jointly inspected by the Officer, Superintendent and Contractor.

The subgrade is not to be covered with any further pavement material until approved and is to be consistently maintained at sufficient moisture content to prevent drying out and cracking.

4.7 SUB BASE

4.7.1 Materials

The sub base if specified shall be constructed of crushed rock or Class 2 or better gravel and comply with the Technical Specification.

The sub base pavement shall extend from back of kerb to back of kerb for the full extent of road construction.

4.7.2 Spreading

Prior to placement of the sub base course, all utility service crossings and conduits within the roadway are to be constructed and backfilled in accordance with the compaction requirements for subgrade.

The backfill material for conduits and services is to be Class 3 gravel or better.

All conduit and service trenches are to drain to a sub soil or stormwater drainage trench with a positive outlet to the underground drainage system.

The sub base shall be placed so that the compacted subgrade is not disturbed or broken up and the even thickness specified is achieved.

The levels of the sub base coarse shall be checked at 20m minimum intervals at the centre-line and edges of the pavement. Checks shall also be made at intersections and parking areas at appropriate intervals.

The sub base material shall not be spread upon a waterlogged, cracked or deteriorated subgrade.

4.7.3 Compaction

The sub base shall be placed at optimum moisture content and compacted to not less than 98% MMDD when tested in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes.

The sub base finished depth shall be constructed to a tolerance of +20mm, -0mm.

4.7.4 Acceptance

The sub base construction is to be jointly inspected by the Officer, Superintendent and Contractor and approved prior to the placement of the base course.

The surface is to be visually free from all cracks, irregularities and layering. Any irregularities in the level of the sub base or imperfections in the surface shall be corrected such that the sub base is a uniformly compacted, smooth and even surface.

The pavement course is to be consistently maintained at sufficient moisture content to prevent drying out and cracking. Any cracked pavement course will be required to be tined up to a minimum depth of 100 mm and re-compacted as specified.

4.8 BASE COURSE

4.8.1 Materials

Fine crushed rock is the specified pavement base course material. If Class 2 gravel or a blended product is proposed, then the use must be justified in writing by the Developer and approved in writing by the Officer.

The material is to comply with the Technical Specification.

4.8.2 Spreading

Prior to laying the base course material, all utility service crossings within the roadway shall be constructed and backfilled in accordance with the compaction requirements for subgrade and sub base.

The backfill material for conduits and services is to be Class 3 gravel or better.

All conduit and service trenches are to drain to a sub soil or stormwater drainage trench with a positive outlet to the underground drainage system.

The sub base/sub grade material is not to be disturbed during placement of the base course.

The base course shall be placed by means of an approved mechanical spreader or by grading from continuous stacks deposited on the sub base.

The base course is not to be placed on any material that has become waterlogged, cracked or otherwise deteriorated. All segregated and contaminated material is to be removed.

The base course material shall be watered and mixed to achieve a moisture content within 2% of the optimum for the specified conforming density ratio.

4.8.3 Water

The water is to be clean and free from oil, alkali, organic or any other deleterious substances, and the total soluble salts content is to be less than 3,000mg/litre (total dissolved salts). The Contractor shall provide Evidence of construction water salt contents is to be provided as part of the testing regime.

4.8.4 Compaction

The base course material shall be placed, compacted and cut to grade and crossfalls specified on the approved drawings. It shall be compacted in uniform layers not less than 100mm nor greater than 200mm compacted thickness.

The base course shall be compacted to not less than 100% MMDD when tested in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes.

The compacted thickness of the base course shall be as specified on the approved drawing with a tolerance of +10mm –0mm.

4.8.5 Acceptance

The base course construction shall be jointly inspected by the Officer, Superintendent and Contractor and approved prior to the application of priming/primer seal

The surface of the course is to be tested for shape and level. Any irregularities greater than 10mm, when tested with a straight edge 3m long, are to be rectified in an approved manner. Where the specified finish is not achieved and pavement thickness is outside tolerance, the pavement course is to be scarified to not less than 100mm depth and re-compacted.

The surface is to be visually free from all cracks and layering.

The pavement course is to be consistently maintained at sufficient moisture content to prevent drying out and cracking. Any cracked pavement course will be required to be tined up to a minimum depth of 100 mm and re-compacted as specified.

4.9 PRIME COAT AND PRIMER SEAL

4.9.1 General

The surface of the base course shall be primed and/or primer sealed prior to the application of the wearing course in accordance with the Technical Specification.

Primer sealing will not be accepted unless followed by a final treatment. The whole treatment is to be discussed with and approved by the Officer.

Prime coats may be used in certain circumstances subject to approval by the Officer.

The pavement is to dry back to 60% of Optimum Moisture Content before priming/primer seal.

4.9.2 Preparation

The surface of the base course is to be swept free of loose stones, dust, dirt and foreign matter immediately prior to spraying. The base course surface is to be maintained, the sweeping to be extended well beyond the area to be sealed and any adherent patches of foreign material removed with a steel scraper.

The surface is to be inspected for any cracking that may have occurred during the drying period.

Kerbs and other structures are to be protected from bitumen over spraying at all times by shielding or covering kerbs with polythene sheeting or similar approved material. Covering with sand will not be approved. Any kerb marked or damaged by overspray will be made good.

4.9.3 Binder

Binder (Primer) can be cutback bitumen or bitumen emulsion.

Prime Coats shall be AMC00 and Primer Seals AMC2 to AMC4 as approved by the Officer.

4.9.3.1 Bitumen Emulsion

Bitumen Emulsion shall be manufactured from Class 320 Bitumen and in accordance with AS 1160: Bituminous Emulsions for Construction and Maintenance of Pavements.

Bitumen emulsion shall be uniformly and evenly sprayed onto the existing surface at a rate determined by design and approved by the Officer, but shall not be less than 1.3 litres per square metre measured at 15°C.

4.9.3.2 Cutback Bitumen

Cutback bitumen is to be manufactured from a medium curing cut-back bitumen in accordance with AS 2157: Cut Back Bitumen.

It shall be applied at a rate determined by design and approved by the Officer, but shall not be less than 1.2 litres per square metre, measured at 15°C. The temperature of the cut back bitumen binder is to be in the range between 70°C to 120°C.

The proportion of medium curing cutting oil and application rate shall be dependent on the condition of the base surface and the traffic density.

4.9.4 Spraying, Sprayer & Personnel

Spraying shall only commence when pavement temperature is in excess of 20°C or has been in excess of 15°C for more than one hour.

At least three days should be allowed to elapse after priming before applying a binder coat or asphalt. Traffic is to be kept off the primed surface for this time.

The sprayer is to be calibrated with a current copy of the calibration certificate on the vehicle.

Sprayer calibration is to be Northern Territory Test Method 500.1. A current calibration certificate issued by an Australian State Road Authority will be accepted as an alternative.

Where the direct use of a sprayer is impracticable, the binder may be sprayed using a hand lance supplied from the mechanical sprayer.

The primed surface should be checked regularly and pot holes and worn out areas repaired before applying binder or asphalt.

4.9.4 Aggregate

Immediately after spraying, the primed surface shall be covered with the aggregate. Spray areas shall be completely covered within a period of 10 minutes. 14mm aggregate shall be used for primer seals unless otherwise approved by the Officer.

Aggregates shall conform with the properties specified in the Technical Specification.

The rate of application shall be determined by design, but shall not exceed 150 square metres per cubic metre of aggregate, controlled so that only sufficient is applied to give a uniform dense mat one stone thick. Additional aggregate may be spread by hand to ensure a uniform cover.

Rolling shall commence within 5 minutes of application of the aggregate, with self propelled rubber tyred rollers with a minimum pressure of 600kPa and a minimum wheel load of 1 tonne.

4.10 SPRAY SEAL

4.10.1 General

This section covers the application of a single or two coat aggregate wearing course seal, applied to either a prime coat or a primer seal in accordance with the Technical Specification.

Single or two coat aggregate wearing seal shall not be used for roadways but may be considered / approved by the Officer in other trafficked areas.

Geotextile fabric seal may be considered for poor quality pavements if approved by the Officer.

4.10.2 Surface Preparation

The surface shall be lightly swept to remove any loose stones, dust, dirt and foreign material. Any sections of the surface which are loose or damaged are to be repaired and finished to the approved level

4.10.3 Binder

The binder and medium curing cutting oil shall comply with the Technical Specification.

First coat seal shall be straight run to AMC6.

Second coat seal shall be straight run or AMC7 to AMC5.

Reseal coat shall be AMC7 to AMC5 as approved by the Officer.

Pre-coat and adhesion agents are to be discussed with the Officer prior to use.

Bitumen laminated paper or other suitable material sufficient in width and strength to prevent overspray and spillage shall be used at start, finish and taper operations.

4.10.3.1 Straight Run Binder

Bitumen used to be straight run Class 320.

Binder should be stored/held at temperature below spraying minimum, then heated to spraying temperature not exceeding the maximum allowable. Bitumen is to be heated to within a range of 150°C to 180°C for straight run bitumen.

4.10.3.2 Polymer Modified Binders

Polymer modified binders shall conform to the Technical Specification. Binder is to be mixed, heated and sprayed in accordance with polymer manufacturers specification. The binder shall incorporate 1% adhesion agent or alternative quantity as recommended by the polymer manufacturer.

In the event of a two coat seal using polymer modified binder, both seals shall contain the polymer.

4.10.4 Spraying

The Contractor shall apply 48 hours in advance to the Officer to commence spraying and shall not proceed until approval is given.

The adhesion agent is to be mixed to the binder and circulated for 20 minutes before spraying.

Binders are to be stored/held below spraying temperatures and shall be heated to spraying temperature whilst not exceeding the maximum. Any binder held at spraying temperature for

above two hours or exceeding 20°C for more than 48 hours or heated to above 190°C for straight run bitumen or above the maximum recommended for polymer modified binders is to be removed from site.

Spraying shall only commence when the temperature is above 20°C, or has been in excess of 15°C for at least 1 hour.

Spraying shall not commence if the surface to be sealed is wet or if adverse weather conditions may prevail at any time of work.

A current calibration certificate and calibration chart for overall rates of application in accordance with Testing of Mechanical Sprayers of Bituminous Material (Austroads) is to be provided to the Superintendent prior to spraying. Subject to approval, areas not accessible to the mechanical sprayer, may be sprayed by hand.

Immediately prior to spraying, the finished surface is to be swept with suitable power blowers or power brooms, (or by hand methods where inaccessible to the power equipment) to remove loose and foreign material and until a mosaic of well embedded stone shows on the surface.

The binder application rates shall be determined by design and approved by the Officer, but generally should fall within the range of 1.2 to 2.0 litres residual bitumen per square metre, measured at 15°C for 14mm aggregate.

The binder shall be sprayed at the design/approved application rate for the full length of each run, including the start and finish lines. The Contractor shall ensure sufficient protection has been placed to protect all road fixtures. Protective paper and any spilt bitumen is to be removed and disposed of in an approved manner.

4.10.5 Aggregate

The aggregate shall be coated with precoating material at the approved rate before spreading.

The aggregate shall be uniformly spread over the work area by means of an approved mechanical spreader.

Aggregate shall be applied to the binder within: 10 minutes where the pavement is 20°C or greater, or 5 minutes where the pavement is between 15°C and 20°C. If a polymer modified binder is used, the aggregate shall be applied within 5 minutes regardless of temperature.

Aggregate is to be applied to the emulsion coat before the emulsion breaks. Spread the aggregate evenly and uniformly over the sprayed surface and apply hand coverage to any insufficiently covered areas after the first spreading.

4.10.6 Rolling

The aggregate is to be rolled with self propelled rubber tyred rollers with a minimum tyre pressure of 600kPa and a minimum wheel load of 1 tonne. After an initial slow pass, the roller speed should be maintained between 10 and 25km/hr.

A minimum rolling rate of 1 roller hour per 2,000 litres of binder, is to be provided conforming to the following:

- Entire area to receive one roller pass immediately after covering
- 25% of rolling within 2 hours of covering (prohibit traffic until complete)
- 50% of rolling within 6 hours of covering
- 100% of rolling within 12 hours of covering

The surface should be swept after rolling. The drag broom should be adjusted to distribute surplus aggregate. Aggregate on the final surface is to be uniformly distributed and firmly held by the binder. The surface is to be re-rolled after sweeping to ensure uniform bedding of the aggregate within the binder.

4.10.7 Measurement & Recording of Binder Application Rates

All loads of bitumen are to be sampled in accordance with the following Australian Standards:

- AS 1160: Bitumen Emulsion for Construction and Maintenance of Pavements
- AS 2008: Residual Bitumen for Pavements
- AS 2157: Cut Back Bitumen

The following records shall be kept for all spray runs:

- Spray width
- Start distance – Finish distance
- Side of Road (left of right)
- Road Temperature
- Bitumen Temperature
- Volume of bitumen used
- Average bitumen application rate

4.10.8 Acceptance

The Officer has the option to reject any spray seal that does not conform to the following:

- Level - 0mm to +10mm
- Straight Edge Deviation – Maximum 5mm in 3m
- Width – Not less than specified
- Surface Roughness @ 80km/hr – Maximum of 50 counts
- Skid Resistance (by NTTM 304.1) – Not less than specified in NTTM 304.1 Table 2

Skid resistance testing will be carried out at the Officer's/Consultant's request. Non-conforming skid resistance will be rejected.

Non-conforming work is to be rectified by approved methods, at the Developer's expense, including the cost of testing

4.11 ASPHALT SURFACING

4.11.1 General

Asphaltic Concrete shall be in accordance with the Technical Specification. Asphalt paths shall be constructed in accordance with the Standard Drawings.

Surface preparation, which includes sweeping, chipping and burning off all rich fat areas, shall be carried out immediately before applying the tack coat. No asphalt shall be placed upon any area that contains an excess of binder in such quantity that there is any possibility of the binder coming to the surface of the new work.

The tack coat shall be laid in accordance with AS 2734: Asphalt (Hot Mixed) Paving – A Guide to Good Practice, for the full width of road pavement. The bituminous emulsion shall comply with the requirements of AS 1160: Bituminous Emulsions for Construction and Maintenance of Pavements.

The application rate shall generally be sufficient to fully coat the surface with a residual binder content in the range of 0.3 to 0.6 litres per square metre. Hand spray only in areas where it is impractical to use a spray bar.

No asphalt shall be laid on the tack coat until the emulsion has broken and the water has substantially evaporated. Any pools of tack coat which may have formed in surface depressions shall be brushed out. No traffic other than that delivering asphalt shall be permitted to travel over the tack coat.

4.11.2 Laying The Asphalt

The asphalt shall be laid upon a clean and dry base. Spreading will only take place in dry weather conditions. The spreading shall be in a single layer, to such line, level and camber detailed in the approved drawings and compacted to give the average thickness specified.

Spreading of the asphalt shall be by an approved self-propelled paver unless otherwise approved. Hand spreading will only be approved in areas inaccessible to the mechanical spreader.

The asphalt temperature is not to be below 135°C. The initial rolling shall commence before the mix temperature falls below 105°C and uniform compaction shall be achieved prior to the mix temperature falling below 80°C. The Contractor shall ensure that the complete operation from mixing to final compaction is maintained within the specified temperature ranges.

A transverse joint shall be placed whenever the operation ceases.

The Contractor shall spread asphalt in such a manner as to minimise the number of longitudinal and transverse joints required. In multiple layer work, the Contractor shall offset joints by a minimum of 100mm.

4.11.3 Acceptance

Compact by using at least two rollers, one pneumatic tyred and one tandem steel wheeled.

The surface of the finished course shall be free from depressions exceeding 5mm as measured with a 3m straight edge.

The prepared asphalt shall conform to the following:

- The surface shall be smooth, dense and true to shape.
- Thickness: Not less than specified.
- Surface levels: 0 to +10mm deviation from design level.
- Straight edge deviation: 5mm maximum in 3 metres.
- Surface roughness: 60 counts/km – maximum.
- Skid resistance: Not less than specified in NTTM 304.1, Table 2.
- Job mix: Within the following variation limits:

ASPHALT JOB MIX VARIATION LIMITS

AS SIEVE (mm)	% PASSING (by mass)
4.75 or larger	+ or – 7
2.36	+ or – 5
0.60 and 0.30	+ or – 4
0.15	+ or – 3
0.075	+ or – 2

Conformance of compaction on lots shall be derived from subdivision of all items of work.

Lots will be numbered logically and the number and location of each lot recorded on a lot register.

Lots selected will be based upon:

- Lot will present no more than one shift’s production.
- Lot will be continuous and have been brought to completion at the same time.
- Lot will be composed of homogenous material with no distinct variation in attribute value.

Each lot will be subject to conformance testing, checking of level tolerance and tested by proof rolling.

Defective sections will be excluded from the lot to be tested, and identified as a new lot, which shall be subject to conformance testing.

Test locations will be selected by the laboratory on a stratified random basis in accordance with NTCP 103.1. Supply copies of the completed stratified random selection with each compaction report.

The Characteristic Mean Dry Density Ratio (Rc) is calculated as follows:

$$RC = R - ks$$

- Where R = the mean dry density ratio for the lot
- k = the multiplier in the table MULTIPLIER VALUES
- S = the standard deviation.

The Standard Deviation (s) is calculated as follows:

$$S = (\text{sum of } (xi - R)^2 \text{ divided by } (n - 1))^{0.5}$$

- where xi = an individual test result
- R = the mean of n results
- n = the number of test results in the lot.

The multiplier values are specified in the Technical Specification.

Conform to the following Marshall compaction limits as specified in the Technical Specification.

Surface roughness testing will be carried out by the Superintendent at the discretion of the Superintendent or as directed by the Officer.

4.12 CONCRETE WORKS

4.12.1 General

Concrete paving and structures shall be constructed using appropriate formwork and laid to the alignment and cross-falls detailed on the approved drawings and conform to the Technical Specification.

If not specified the minimum concrete strength for any works shall be 25 MPa (at 28 days). Concrete to be finished as specified in the Technical Specification.

Concrete paving shall be as per approved design, laid and bedded on an appropriately prepared subbase / subgrade layer.

All concrete pavements shall have appropriate jointing detailed on the approved drawings. All concrete pavements shall have a suitable joint at the interface of the pavement and the kerb.

4.12.2 Preparation and Placement of Pathways

The excavation, fill, backfill and trimming shall be carried out in accordance with approved design alignments, grades and levels. Surplus material shall be removed and disposed of in an approved manner.

The subgrade shall be evenly graded, free of rocks, organic matter or any other deleterious matter. The subgrade shall be compacted to not less than 95% of modified maximum dry density when measured in accordance with AS 1289: Methods of Testing Soils for Engineering Purposes. The concrete shall be laid on not less than 50mm sand bedding over the compacted subgrade.

The concrete paving shall be consolidated using a mechanical vibrating screed spanning the width of the path and supported by rigid side forms.

After consolidation, the concrete shall be screeded perpendicular to the side forms to provide a straight surface between forms and a smooth, even surface profile along the path alignment.

To prevent premature drying of the surface of screeded concrete, the addition of water to the surface of the screeded concrete using a fog spray may be permitted. Approval of the addition of water in this manner is conditional upon the integrity of the mix being maintained in accordance with its specification.

The finished concrete pavement shall have a non-slip, broomed surface. The broomed grooving (approximately 2mm deep) shall be aligned at 90° to the edge of the pavement.

For dual use paths, transverse lips or ridges of concrete, such as may be formed during jointing works, are not permitted and the broomed finish surface shall be maintained at joints.

Dry cement shall not be added to the surface of the pavement.

The edges of the footpath shall be polished smooth and rounded using an edger of radius 10mm. They shall be free from irregularities of alignment and/or level.

The edges of the dual use path shall retain the non slip broom finish surface and shall not be rounded.

4.12.3 Stencilled Concrete

The Officer shall approve any footpaths, concrete thresholds, access ways etc proposed to be finished with stencilled concrete. The Developer shall furnish the Officer with details of the pattern, colour and location of all areas to be stencilled.

All stencilled concrete works are to be carried out in accordance with the manufacturer's specifications. Concrete is to be of an approved mix designated by design, or in accordance with Section 5.5 Miscellaneous Concrete Works.

Two coats of colour hardener are to be applied and a suitable concrete sealer, as recommended by the manufacturer, is to be applied to the new surface.

4.12.4 Fibre Reinforced Concrete

Fibre reinforced concrete, may be used for concrete works, subject to approval by the Officer.

The Contractor shall ensure that fibres are of high strength, durability, and elastic modules.

The use of steel fibre reinforced concrete in marine environments will only be approved where the consultant has shown detailed consideration of aspects of marine environment on the strength and aesthetic characteristics of the concrete.

4.12.5 Joints

Transverse expansion joints shall be placed at 5m intervals for both footpaths and dual use paths along the full length of the pavement. The joints shall be 10mm wide and extend the full depth and width of the pavement. The joints shall not exude bituminous material in hot weather when compressed.

The following expansion joint materials are approved:

- Non-Porite - Bitumen impregnated by cold solvent process
- Expandite - Flexicell
- Meljoint - Melcann

Other expansion joint fillers may be approved.

Expansion joints shall be installed where the pathway abuts utility service structures, drainage pits and/or existing crossovers or as indicated on the approved drawings.

Transverse contraction joints shall be placed at 1.25m intervals for footpaths and 2.5m intervals for dual use paths, equally spaced between expansion joints. The contraction joint shall be aligned at 90° to the pavement alignment and shall be a minimum of 20mm deep and shall provide a vertical plane of weakness through the pavement. The joint shall be made in plastic concrete by depressing an approved grooving tool into the surface of the pavement.

4.12.6 Protection

The Contractor shall provide and maintain protection of pavement against damage of every kind during the period of setting and curing of the concrete.

The Contractor shall be responsible for appropriate signage and the safety of the public

4.13 INTERLOCKING SEGMENTAL PAVEMENTS

4.13.1 General

This section covers the construction of brick or segmental pavement surfaces. The use of brick or segmental pavers shall be subject to approval by the Officer. The specification has been based on Cement and Concrete Association of Australia (CCAA) publications:

- Concrete Segmental Pavements – Guide to Specifying (T44)
- Concrete Segmental Pavements – Design Guide for Residential Accessways and Roads (T45)
- Concrete Segmental Pavements – Detailing Guide (T46)

These publications are recommended for use for all design and construction applications associated with both Concrete and Brick pavers.

The preparation of the subgrade, sub-base, and base courses shall be as specified in the appropriate Sections of the Technical Specification.

Concrete Paving Units shall comply with the Cement and Concrete Association of Australia publications.

Clay paving Units if approved by the Officer, shall be high temperature fired with exposed faces of an extruded, wire-cut or pressed finish, and shall comply with the appropriate specification.

All interlocking segmental pavements shall be constrained on all edges by the construction of an extruded concrete kerb, laid in accordance with Section 4.14 - Concrete Kerbing.

4.13.2 Paving Unit Shape, Thickness and Laying Pattern

The following shape, thickness and laying patterns shall be adhered to and approved by the Officer prior to installation.

Estimated traffic † (commercial vehicles exceeding 3t gross)	Recommended Surface Layer		
	Shape Type	Thickness (mm)	Laying Pattern
Up to 10 ³	A, B, or C	60	H, B, or S
10 ³ to 10 ⁴	A	60	H only
	A, B, or C	80	H, B or S
Over 10 ⁴	A only	80	H only

† including building construction traffic, H = Herringbone; B = Basketweave, S = Stretcher

Notes

1. If 80-mm shape Type A paving units, laid in herringbone bond only, are selected for a pavement subject to traffic loads up to 10⁴ commercial vehicles, base-course thickness may be reduced by 20 mm.
2. For parking areas catering for family cars and station wagons only, the recommendations for traffic 10⁴ commercial vehicles are suitable. For access driveways or loading docks incorporated in a parking area and which may be regularly used by commercial vehicles exceeding 3t gross, the surfacing should be appropriate for the estimated traffic load.
3. For pedestrian-mall pavements likely to be subject to occasional heavy construction service-vehicle usage, the recommendations for traffic loads up to 10⁴ commercial vehicles should be used.

4.13.3 Bedding Sand

The bedding sand shall be non plastic and contain no deleterious materials or any contaminants which can cause or contribute to efflorescence. When placed on the base course, the material should have uniform moisture content. Saturated material should not be used. Material contents in the range of 4 – 8 % are recommended.

The sand used shall comply with the following table:

GRADING ENVELOPE FOR BEDDING MATERIAL

Sieve Size	% Passing
9.52 mm	100
4.75 mm	95 – 100
2.36 mm	80 – 100
1.18 mm	50 – 85
600 microns	25 – 60
300 microns	10 – 30
150 microns	5 – 15
75 microns	0 - 10

The bedding is to be well drained in accordance with the details shown in the Approved Drawings.

4.13.4 Joint Filling Material

The small gaps or joints between pavers, nominally 2 to 5 mm wide, are filled with a fine joint filling material.

The Joint filling material shall comply with the following table:

GRADING ENVELOPE FOR JOINT FILLING MATERIAL

Sieve Size	% Passing
2.36 mm	100
1.18 mm	90 – 100
600 microns	60 – 90
300 microns	30 – 60
150 microns	15 – 30
75 microns	5 - 10

4.13.5 Acceptance

The completed pavement shall comply with the following acceptance criteria:

- The pavement surface shall be constructed in accordance with the design profiles and patterns and drain freely.
- The subgrade, sub base and base course layers shall comply with Criteria outlined in the relevant Sections of the Technical Specification.
- The pavers shall not be cracked, damaged or distorted. No spoiled pavers will be accepted.
- The surface texture shall be free from abrasion or wear.
- The colour of the pavement shall be uniform and batch mixing shall eliminate any colour variations in batches of pavers.

4.14 CONCRETE KERBING

4.14.1 General

Road kerbing shall be constructed from extruded concrete kerbing and shall be formed using an approved extrusion machine equipped with automatic leveling device and conform to the Technical Specification.

Concrete to be finish type S3 (steel trowel without polish).

Kerbing for small radii may be cast in-situ using appropriate formwork with the same profile as the extruded kerb.

The profile of extruded kerb shall comply with the Standard Drawings.

All concrete used for kerbing shall be in a ready mix state, complying with the requirements of AS 1379: Specification and Supply of Concrete.

Concrete used shall have a minimum compressive strength of 25MPa at 28 days with a maximum slump of 90mm.

4.14.2 Preparation and Placement

The surface of the road shall be swept clean of all loose material prior to the kerb being placed. The finish alignment shall conform with the requirements of the approved drawings.

The extruded kerb shall not be placed on the subgrade. The kerb is to be placed on a specified thickness of the base course material for the full width of the kerb.

The first 150mm of any new pour shall be cut away and removed. Any gap between the old and the new work shall be filled by hand placing, rodding and shaping of concrete until a uniform shape and finish has been obtained.

4.14.3 Joints

Expansion joints 10mm wide shall be formed not less than 24 hours after placement, within the extruded kerb at 5m intervals, at sides of drainage gullies, at tangent points of all small radius horizontal curves and at junctions of existing kerbing.

Expansion Joints are to be cut with a suitable cutting wheel with each joint filled with an approved butyl mastic compound filler and foam or polyurethane backing or approved equivalent. Refer to the Technical Specification and Standard Drawings.

Contraction joints 5mm wide shall be constructed at 2.5m intervals along the new kerb line. Joints shall be cut through the kerb above the road surface level with an approved tool immediately after extrusion. Any defects caused to the edge of the joint shall be made good immediately.

4.14.4 Curing

Within two hours of surface finishing, all exposed faces of kerb shall be protected from moisture loss by covering with plastic sheeting or spraying with approved curing compound for a period of not less than 4 days after extrusion

The kerb shall be backfilled in accordance with the Technical Specification and Standard Drawings.

4.14.5 Key Type Kerbing

Where key type kerbing is specified on the approved drawings, the excavation of the base shall be by an approved method. The primed road surface beyond the line of the face of kerb shall not be disturbed.

Provision shall be made in the base key for extension of the expansion joint through the complete kerb section.

For details of key type kerbing refer to the Standard Drawings.

4.14.6 Acceptance

The finish kerb shall conform to the dimensions specified with a consistent smooth finish. The tolerances of kerbing shall be as follows:

- The top of kerb shall be parallel to the grade of the pavement and shall be free from depressions exceeding 5mm when measured with a 3m straight edge.
- Level $\pm 5\text{mm}$
- Line $\pm 10\text{mm}$
- Cross section width $\pm 5\text{mm}$

4.15 LIGHTING IN PUBLIC SPACES

4.15.1 General

Council is the authority responsible for providing and maintaining streetlights throughout the Municipality. PowerWater contracts to Council to physically provide power to and maintain the lights.

The Developer is to provide street and other lighting in public areas of the proposed subdivision / development in accordance with current Australian Standards for illumination level, materials and installation and the requirements of Council and PAWA.

Council will be responsible for the operating costs of street and other areas lighting, only after the works have been placed On Maintenance by Council.

In the case of parks etc, the lighting is to be separately metered.

4.15.2 Handover of Lighting to Council

The Developer is to arrange to have the works transferred to Council's name as soon as possible after the works have been placed On Maintenance.

In the case of lighting being located on Council property or land to be transferred to Council, i.e., a park created under the subdivision, the meter is to be registered in Council's name as soon as the works are placed On Maintenance. The Developer is responsible for initiating this.

4.16 STREET NAMEPLATES

4.16.1 General

Street name plates shall be erected at all road junctions and intersections as indicated on the approved drawings and in accordance with the Standard Drawings and as per AS1742.5 Street Name and Community Facility Name Signs.

Street numbers shall only be required on signs where nominated on contract drawings or when nominated by the Officer.

Special decorative, heritage, or other variations to the standard will be considered for approval by the Officer.

4.17 TRAFFIC SIGNAGE AND OTHER ROAD FURNITURE

4.17.1 General

All traffic signage and pavement markings shall conform to the Technical Specification and AS1742.

Other furniture such as guide posts, guardrails, fencing, special signs, etc. shall be installed in accordance with the Technical Specification and Approved Drawings. If not so documented then any such furniture or structures shall be constructed in accordance with the relevant standards and to the approval of the Officer.

4.18 STORMWATER DRAINAGE

4.18.1 General

Stormwater drainage shall be setout and constructed as specified, in the Technical Specification and Standard Drawings.

Access to all drainage structures and pits shall be in accordance with Occupational Health and Safety requirements.

Drainage pipes are to be Reinforced Concrete (RCP) or Fibre Reinforced Cement (FRC).

RCP or FRC drainage pipes only are to be used in road reserves, drainage easements and Council owned or controlled public spaces.

Corrugated steel, plastic, or locally manufactured un-reinforced concrete pipes may only be used with approval by the Officer.

Subsoil drainage pipes shall conform to the above, except in the case of reinforced concrete pipes, and shall have 250mmx5mm slots cut through the pipe on alternate sides at 100° so that the total length of slots is approximately half the total length of pipe.

4.18.2 Reinforced Concrete and Fibre Reinforced Cement Pipes

Reinforced concrete and Fibre Reinforced Cement pipes shall be flush jointed type with external rubber bands or spigot and socket with rubber ring type joint, unless otherwise approved.

Pipes laid on filled ground with questionable bearing characteristics shall be rubber ring jointed only.

Strength class for RCP's and FRC's shall be class 2 or better, unless otherwise approved.

All concrete pipes shall be clearly stamped as to their class. Any pipes not clearly stamped may be rejected.

The Consultant shall make adequate allowances for concrete pipes laid in salt water environments or at levels below RL 3.95 AHD.

4.18.3 Reinforced Concrete Box Culverts

Box culverts shall be U type suitable for installation on a cast insitu concrete slab. Precast culverts up to a size of 120mm x 900mm shall be in accordance with AS1597. All others shall conform to AS1597.2.

4.18.4 Corrugated Steel Pipes

Corrugated steel pipes shall be supplied and installed in accordance with the manufacturers specification.

4.18.5 Locally Manufactured Un-reinforced Concrete Pipes

Locally manufactured Un-reinforced Concrete Pipes shall only be used where appropriate testing and certification to Australian standards has been provided to and approved by the Officer. Such pipes will be spigot and socket with rubber ring.

4.18.6 Junction and Side Entry Pits

Junction pits shall be constructed from either precast concrete or cast insitu as determined by the Technical Specification and in accordance with the Approved or Standard Drawings, Alternatives will be considered by the Officer. No alternatives may be constructed without approval of the Officer.

All junction pit covers shall be flush with either the pavement level or the finish ground level and set at the appropriate crossfalls where necessary.

Access to all Junction pits and Gully pits is to comply with the requirements of Occupational Health and Safety requirements.

All pits to have sub soil drainage holes cast into the bottoms on the upstream sides at the lowest level.

4.18.7 Headwalls

Where a piped drain interfaces with an open drain, a suitable headwall structure shall be constructed in accordance with the Standard Drawings. The type of structure shall be approved by the Officer.

In the case of pipes exceeding 600mm diameter, suitable structures shall be fitted to the inlet of the pipe drainage system to prevent access.

The foundation of all headwall structures shall have a compaction to 95% MMDD to a depth of 150mm.

4.18.8 Excavation

Trenches shall be excavated to the line, depth and gradient required and as detailed and specified.

If any pipe trench is over excavated, the extra depth shall be filled with approved material and compacted to a density of not less than that of the surrounding ground.

The width of the trench shall be a minimum of 150 mm each side of the extremities of the pipe and in accordance with the Standard Drawings.

Excavation in rock or hard soil that may be carried out by blasting shall be in accordance with the Technical Specification.

Any excavations which are carried out on existing public or private roads shall be arranged so that pedestrian and vehicular access is maintained at all times. If the work requires the closure of a road, the written approval of the Officer shall be obtained.

The excavation of trenches with irregular shaped sides shall be avoided, and where there is any danger of a trench collapse, then approved shoring shall be placed. If a trench is located within 2 m of a building or load bearing structure, then approved shoring shall be placed.

All Shoring shall be in accordance with Occupational Health and Safety requirements.

Free water in excavations shall be controlled sufficiently to not interfere with construction operations.

No bedding material shall be placed until the trench excavation has been inspected and approved in accordance with the agreed inspection program.

4.18.9 Sub Soil Drainage

Subsoil drainage will be required to all road pavement and drainage structures unless the Consultant can provide sufficient evidence that it is not required. Sub soil drainage shall be placed generally in accordance with the Standard Drawings.

Sub soil drainage shall be slotted pipe, strip drain or other approved subsoil drainage pipe with non-woven polypropylene or polyester geotextile fabric.

All drainage trenches to drain to drainage pits via sub grade drainage holes placed on the upstream face of the drainage pits at the lowest possible level.

4.18.10 Trench Backfilling & Reinstatement

No backfilling of pipelines shall occur until they have been jointly inspected and approved by the Officer, Superintendent and the Contractor.

All backfilling shall be placed in such a way that no pipes or joints or other works are displaced or damaged. The backfilled material in the pipe trench shall be thoroughly rammed and compacted in layers of specified thickness using appropriate equipment. The required compaction is to be as specified or if not specified, that of the adjacent in-situ material.

Where cavities are found in the base or walls of trenches, the Superintendent shall inform the Officer, who will approve the remedial measures to be taken as stated in Section 4.2.10.

Backfill material for trenches located under roads and parallel to and close to kerbs and other structures shall be Class 3 minimum gravel or FCR. Backfill is to be placed from the top of the filter layer to the pavement level in layers not exceeding 200mm and compacted to not less than 95% MDD when tested in accordance with AS 1289.

4.18.12 Open Drains

Open drains shall be installed to the lines and levels shown on the approved drawings.

Excavated material from open drains shall be disposed of in an approved manner.

Where over-excavation occurs, this shall be corrected by filling with best excavated material and compacting to a density exceeding that of the natural surrounding material or with stabilised material as directed by the Officer.

4.18.13 Stone Pitching

Where indicated on the drawings, surfaces shall be protected by hand placed pitching stones. Stones shall be hard, sound and durable and generally weigh in excess of 10kg each. The greatest dimension of any stone shall not exceed 1.5 times its least dimension.

Stones shall be set on a sand bed in a close fitting pattern, watered and rammed into position. Where specified as mortared stone pitching, the joints between stones shall be raked for their full depth and grouted with 3 parts sand to one part Portland Cement mortar.

4.19 LANDSCAPING WORKS

4.19.1 General

All landscaping works shall be carried out in accordance with the Technical Specifications, Approved Drawings and Standard Drawings.

4.19.2 Trees, Shrubs and Ground Covers

Trees, shrubs and ground covers used in subdivision work, shall be a minimum of three months in their container, have sturdy and well hardened trunks/stems, a vigorous and well developed root system and have been maintained by early training / pruning to aid sound structural development.

All plants are to be healthy and free from insect pests, plant diseases, sun scalds or other disfigurements.

4.19.3 Grass Seeding

Seed shall comply with the following characteristics:

- Clean seed, minimum 94% by weight
- Weed seed, maximum 0.2% by weight
- Other crop seed, maximum 0.8% by weight
- Inert matter, maximum 0.8% by weight
- Shall not contain any Hyptis Sauveolens, Sida Acuta, Sida Cordifolia

Grass seed used shall be covered by an appropriately numbered seed analysis report or certificate, which is cross referenced to an appropriate number on the seed sack. No seed shall be used if such report is older than six months.

Seed used shall be true to label and have a minimum germination of 80%.

Approved grass types are:

- Couch Grass – Cyndon Dactylon
- Cenipedo Grass – Paspalum Compressus or Axinopus species
- Paspalum Notatum
- Manilla Grass – Zoysia Matrella
- Sweet Mother or Durban Grass – Dactyloctenium Australe
- Love Grass – Chrysopogon Aciculatus
- Seaside Grass – Paspalum Vaginatatu

Seed mixes used shall conform to the Technical Specification and approved by the Officer prior to ordering.

4.19.4 Turfing

Turf shall be supplied and laid in continuous rolls of the species nominated in the approved landscape plan. All turf shall be weed free. Turf plugs may be used in the event that sufficient quantities of rolls are not available. Plugs shall be 50mm in diameter.

4.19.5 Fertiliser

Fertiliser shall be stored in waterproof sealed bags under shelter, away from water and direct sunlight. Fertilisers used shall comply with the standard specification. Fertilisers shall not be used on Grevillea or Banksia plant varieties.

4.19.6 Imported Topsoil

Any imported topsoil shall consist of a sandy loam mix with a minimum organic matter of 5% by dry weight, and shall comply with AS 3334.

4.19.7 Insecticides

Any insecticide shall be used strictly in accordance with the manufacturer's specification. Use only Chlorpyrifos for termite control unless approval to use another product is obtained from the Officer.

4.19.8 Mulch

Any organic mulch shall be free from any impurity, and be sufficiently heavy as not to be dispersed by wind and resistant to transportation by stormwater flow.

Approved organic mulches may be bark, woodchip, hay or similar. Any woodchip used shall be a maximum of 50mm in size, free from any resinous toxins and termites and should only be used in a mixture with other mulches.

Inorganic mulch used shall be washed and screened laterite gravel or brick chips with particle sizes in the range of 6mm minimum to 25mm maximum.

Gravel is not to be used in locations adjacent to roadways and footpaths.

4.19.9 Site Preparation

The work is to be set out in accordance with approved plans and as follows:

- Trees shall not be planted within 30m of the end of a controlled median, within 5m of a road or lightpole, within 1.5m of a fire hydrant, or where their location will ultimately obscure traffic signals, signs or essential services.

Measures are to be taken to ensure that all trees, shrubs and other vegetation to be retained within the limit of works are not damaged, and are appropriately marked and protected prior to the commencement of works.

No chemical type materials including oil, paint, bituminous products, fuels and cement/concrete are to be placed, dumped or stored near the vegetation. Products that are easily transported by wind such as cement, are to be stored in such a manner as to protect the product from wind borne pollution.

Works carried out within the dripline (canopy area) of vegetation, should be kept to an absolute minimum using excavation techniques that will preserve the root system of the plant. Where the root system has to be cut a method of cutting the root, while not disturbing the rest of the root system, shall be employed.

Backfilling should be undertaken with a comparable material to that excavated. Backfilling is to be consolidated, and thoroughly watered.

4.19.10 Tree Planting

4.19.10.1 Set Out

The location of street trees/shrubs is to be accurately set out in accordance with the approved drawings and the alignment and depth of all services confirmed prior to the excavation of holes for planting. See Standard Drawing.

4.19.10.2 Planting Pits

Planting pits are to be constructed in accordance with the Standard drawings.

Root barriers are to be for all street trees and where otherwise required and directed.

The excavated holes for tree planting are to be at least twice the diameter and twice the depth of the plant container. Minimum hole size is 1.0 cubic metres overall with a minimum depth of 0.6m deep

Excavated holes may need to be elongated to allow suitable planting adjacent to existing services.

Holes that have glazed sides shall be broken up, In the event of excavation of hard dense ground, 1kg of Gypsum or Claybreaker shall be placed around the sides and bottom of the hole, the hole filled with water and allowed to drain.

Prior to planting, the holes shall be treated with Chlorpyrifos.

4.19.10.3 Root Guides (Barriers)

Root guides are to be installed according to the Standard Drawings for all street trees and where otherwise required and directed.

Nylex or equivalent root guides are to be used and installed and jointed in accordance with the Manufacturer's instructions and to the satisfaction of the Officer.

The guides are to be completely sealed so that no root penetration can occur and so that the roots are forced downwards in growth pattern.

4.19.10.4 Log Bollards for Street Trees

Log bollards are to be provided and installed at the rate of two per tree as per the Standard Drawing.

Bollards are to be radiata posts, preservative treated to AS 1608.1.

The bollards are to be set plumb in the ground and surrounded with cement stabilised earth and firmly tamped into the ground.

4.19.10.5 Drip Irrigation to Trees

The Contractor shall install 20mm high density poly pipe irrigation line at a minimum depth of 300mm below the finished surface level.

Where irrigation lines cross footpaths, the line is to be installed in 40mm class 6 uPVC conduit. Steel conduits of 32mm diameter shall be used under roadways.

The irrigation line is to connect to all planting pits. Adjustable 8 litre per hour turbo flow drippers are to be connected to the line via barb take offs and 6mm capillary tubing provided to each planting.

4.19.10.6 Supply of Trees

Street trees are to conform to the selection choice on the Tree List appended to the Guidelines.

The Developer is to supply all plants from an approved nursery. Trees used are to be a minimum of three months in their container, have sturdy and well hardened trunks and have a well developed root system.

They are to be available in sufficient quantities for placement and maintenance replacement, and in a healthy and vibrant state prior to commencement of work.

Any diseased or dying plants are to be removed immediately and replaced at the Contractor's expense.

4.19.10.7 Tree Planting

Planting is not to be undertaken when the temperature is in excess of 34°C.

During planting the integrity of the plants root zone and surrounding earth is to be maintained.

Fertiliser is to be placed adjacent to, but not in direct contact with root zone of the plant.”

The contractor shall ensure root directional guides are supplied and installed.

The hole is to be backfilled in accordance with the Standard Drawing. Backfill should be placed to ensure the plant is firmly contained within the ground and in a vertical position.

4.19.10.8 Backfilling, Fertilisation, Watering In and Mulching

Surface fertiliser shall be placed and backfill watered thoroughly immediately after placement to ensure no air voids or loss material surround the plant root zone.

Organic mulch is to be provided where specified in a 100mm min. thick compacted layer for a radius of 500mm around the plant stem, but ensuring a 50mm gap is retained between the stem and the mulch. Alternative mineral mulch with crushed laterite of particle size less than 15mm may be used to a minimum depth of 100mm. All mulch beds are to have a final grade consistent with the level of pavement. Any sinkage of the mulch bed shall be made good.

4.19.10.9 Maintenance

The planting area is to be maintained in a moist condition to promote healthy growth. Weeding and pruning shall be undertaken as required to maintain the plants in a healthy condition.

The Developer shall be responsible for the replacement of any damaged trees throughout the course of the project. Any trees that are dying or dead, due to inadequate care or watering by the contractor shall be replaced at the Developer's expense

4.19.11 Grassing

4.19.11.1 Finished Levels and Topsoil

The prescribed finished levels are to be achieved prior to the placement of the grass seed.

The planting area shall be treated so as to provide a minimum topsoil depth of 100mm after natural settlement. The topsoil shall be free from stones greater than 50mm diameter, debris and deleterious material. The topsoil layer is to be protected by lightly compacting the topsoil layer to minimise subsidence.

No topsoil shall be spread in periods of heavy rain. Preventative measures are to be taken to control erosion and siltation.

4.19.11.2 Maintenance of Grass

Seeded areas are to be maintained in a moist condition, by regular watering, and the grass is free from all weeds and insects. Established grass shall initially be mown when the grass reaches a height of 150mm, then maintained at a height between 50-100mm.

4.19.11.3 Seeding and Re-seeding

Grass seed and fertilizer are to be spread by mechanical means. Hand spreading will only be used in areas inaccessible by machinery.

Areas that fail to germinate and propagate after 28 days are to be re-seeded. Areas requiring reseeded shall be brought to a fine tilth by hand raking only.

No grass seeding or topsoiling shall take place within the wet season, without consultation with the Officer. Any seeding carried out in the wet season shall require a strip of turf placed adjacent to the kerb or downstream point, and intermediate strips perpendicular to the kerb.

4.20 IRRIGATION FOR LANDSCAPING

4.20.1 General

The alignment and level of existing services are to be confirmed prior to the commencement of irrigation works. Any damage to existing services or fixtures shall be rectified at the Developer's expense. All works shall be in accordance with the NT Plumbing Code and AS 3500.1, unless specified otherwise. Approval from the PowerWater, shall be obtained prior to connection of water supply.

Sufficient water pressure and volume is to be made available to operate the system prior to commencement of works.

It is the Developers responsibility to ensure all work by Contractors and subcontractors is fully supervised, and that the Officer is notified of progress. Non-compliance with Darwin City Council specifications may prevent or delay certification. Council is to be notified if problems arise. At no stage are specifications to be compromised.

4.20.2 Inspections

24 hours notice is to be given to the Officer for inspection of Irrigation works. The works to be inspected by the Officer are as follows:

- The site prior to commencement of works
- Pipe work and valves prior to commencement of works
- Hydrostatic testing
- Practical completion / Handover

The works shall be prepared for testing by securely anchoring all pipe work and fittings to ensure no movement during testing and any items not designed to withstand test pressures are sealed off. The pipe work is to be tested with water at 960 KPa for 2 hours. All pipe joints, valve seats, strainers and other elements are to be tested for leaks.

4.20.3 Meter Installation, Payment of Costs and Handover to Council

The Developer is to be responsible for all costs associated with the installation of tappings, water meters and irrigation over the establishment and maintenance periods.

When then the works are accepted Off Maintenance by Council, the developer is to organise the transfer of the meter from the developer's name to Council's and also provide to Council the particular meter identification number, service location, water meter number and meter size.

4.20.4 Installation

All tubes and pipes are to be installed having grade of class identification marking so that the marking is visible for inspection, and all pipe work under paths, paving or slabs are laid in conduits:

- All pipe work is to be installed in straight lines and uniform grades.
- Provide unions, flanges and isolating valves for the satisfactory removal of piping and fittings for maintenance or replacement of plant.
- Arrange and support pipe work so that it remains free from vibrations whilst permitting necessary movements such as thermal expansion and contraction.
- Keep the number of joints to a minimum.

4.20.5 Excavation

All fixtures shown on the design drawings are to be excavated for, installed and connected in a neat, waterproof manner in accordance with the manufacturer's specification and the standard drawings as issued in the NT Plumbing code.

Tree roots encountered in excess of 75mm are to be bored under. No root in excess of 75mm shall be cut without prior approval of the Officer. Roots smaller than 75mm shall be clean cut not less than 600mm from the pipeline. All obstructions such as stumps, boulders and the like which may in the opinion of the Officer/Consultant interfere with the pipe-work are to be removed.

Where required by relevant authorities, provide under road boring, by an approved specialist, in lieu of trenches.

All pipelines beneath roadways shall be heavy duty conduit, crossing at right angles to the road centreline.

The bore is to be tightly backfilled / grouted around the conduit. Any damage sustained as a result of excavation / boring work is to be made good by the Developer.

4.20.6 Access

All fixtures that are to be located to enable the removal of pipes or maintenance of fittings in accessible positions, with adequate clearance and in a position that does not interfere with any adjacent or associated services.

4.20.7 Trench Details

Provide trench widths and depths in accordance with the following tables.

TRENCH WIDTH

UPVC PIPE SIZE	TRENCH WIDTH
40 mm	190 mm
50 mm	200 mm
80 mm	230 mm
100 mm	250 mm

MINIMUM COVER (from finished soil level to top of pipe)

PIPE WORK	MINIMUM COVER
Mainline	400 mm
Sub-mains	300 mm
Lateral Paved	300 mm
Lateral Unpaved	300 mm
In Rock	As advised

4.20.8 Backfilling of Trenches

- Backfill to all trenches within the road shall comply with Standard Fill.
- Backfill outside the road shall comply with Appropriate Fill
- All backfill shall be free from builder's waste, bricks, rocks or similar material that would be retained on a 25 mm sieve.
- Backfill trenches as soon as possible after approval of laid and bedded service. Compact to the density that applies to the location of the trench. Minimum density to be 85% MMDD
- Compact so that the pipe is buttressed by the walls of the trench.
- When occurring, subsidence of backfill is responsibility of the Developer for the 12 month minimum maintenance period.
- Provide a minimum of 75 mm sand bedding to the top of pipe work. Sand is to be free from stone and other debris over total width of all excavations.
- Indigenous soil is preferred providing it contains no rock larger than 25 mm.

- Where irrigation trenches occur in topsoil areas, complete the back filling with 100mm minimum topsoil to the same depth as adjoining areas. Final grade should be consistent with surrounding levels.

4.20.9 Thrust Blocks

Thrust blocks are to be constructed of concrete with one side bearing against a firm vertical face of the excavation and designed so that the full hydrostatic force in the pipe work is transmitted to surrounding soil without the maximum bearing pressure of soil and pipe work being exceeded.

Pipe work shall not be charged with water until such time as all thrust blocks have fully cured.

4.20.10 Irrigation System

Fully automatic irrigation systems are to be supplied and installed in accordance with the specification and relevant drawings.

The works shall include but not necessarily be limited to the following:

- Fully automatic pop-up irrigation system to areas of irrigated grass as indicated on the drawings.
- Filtration and back-flow prevention.
- All irrigation system connections to potable water supplies are to be in accordance with AS 3500.1
- Where possible unless otherwise stated materials should be Australian made.

4.20.11 Mainline Pipe Work

- All pipe work upstream of control valves to be minimum class 12 to AS 1477
- Fittings to be class 18.

The Officer reserves the right to change location of laterals to suit plants.

4.20.12 Lateral Pipe Work.

Requirements:

- Sprinkler operating pressure below 200 kPa – Low Density Polyethylene
- Sprinkler operating pressure above 200 kPa – UPVC minimum class 9
- Trickle laterals high density metric-sized accordingly.

4.20.13 Monitoring Equipment

The Officer (Parks Manager) is to be consulted as to the nature and specification of monitoring equipment required at individual sites. A typical site shall require a Rainswitch and Flow Transducer, however, additional equipment may be required.

4.20.14 Controllers

All Controllers are to be in accordance with Darwin City Council's Telemetric Central Control systems specifications and in accordance with the approved drawings (i.e. Rainman – A/C, D/C control unit or Rainman – Solarman remote valve control unit to be controlled from an existing Rainman Controller).

All Control Boxes shall be fixed to powder coated pole or pedestal appropriate to the location. (Pole to be 75mm x 4.0m [3.4m above ground level] for Controller and/or radio antenna, Pedestal to be 75mm x 1.8m, powder coat colour – Heritage Green).

All Solar Control sites to have approved Rainman solar panel and mounting (details available from Rainman local distributor).

4.20.15 Automatic Control Valves and Control Wires

Automatic control valves shall be 24V solenoid actuated hydraulic valves with flow control and a maximum operating pressure rating of at least 1 MPa. Valves used shall be able to be serviced without removal from the line. Install; of the same diameter, a ball valve (Philmac/Turnflo) upstream from the solenoid and a barrel union or quick fix coupling downstream.

Valves used shall be Richdel (or equivalent) model valves with bleeding valves and flow control. A master valve shall be fitted to all systems.

All valves shall be housed in Hardie Jumbo Lockable valve boxes, or similar, immediately upstream from each automatic control valve. House both valves in a rectangular valve box with high impact plastic cover at the finish ground level. The floor of all boxes should be gravelled to an appropriate depth to prevent slit incursion whilst still allowing the contents to be inspected / serviced without need for excavation.

Connect the automatic valves to the controller with building wire laid in sealed conduits, within the mainline. Lay intertwined for their full length without joints except within valve boxes. Use waterproof connection. Provide expansion loops at each solenoid lead joint. Backfill trenches only after inspection and approval of wiring. Minimum size active 1.5 sq.mm laid in closed loop. Maximum allowable voltage drop over total wiring route length shall be 4 volts.

Where appropriate wiring installation should allow for spare capacity.

4.20.16 Sprinkler Risers, Drippers and Dripper Locations

All in-ground heads shall be mounted on PVC pipe based laterals on polypropylene articulated risers.

Drippers must have flush valves and be of the turbulent flow type, easily dismantled for cleaning.

The drippers are to connect directly to the pipework or by micro tubes.

When used for tree planting, a minimum of two drippers per tree are to be installed.

LOCATION	ITEM	REQUIREMENT
As on approved drawings	Sprinkler Type	Gear driven – Hunter
As on approved drawings	Automatic valve Type Size	Solenoid operated Maximum pressure loss 40Kpa
At each plant as specified	Drippers Type	Turbulent flow, P/c

4.20.17 Maintenance / Warranty

A minimum maintenance period of 12 months from the date of completion on all parts and workmanship applies except where repairs are due to theft, vandalism and existing equipment failure operator and/or misuse.

4.21 STREET AND PARK FURNITURE

4.21.1 General

Council has adopted the following furniture as its standards:

Seats Manufacturer Inwell
 NT Supplier Top End Signs
 Alloy Seat Catalogue No 88133
 Silver satin finish with Dulux clear coat seal

Bubblers Disabled Access Bubbler
 Manufacturer Quality Plumbing Darwin

All furniture is to be approved by the Officer prior to ordering or installation.

APPENDICES

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APPENDICES

- Appendix A Guidelines Amendment Request Form**

- Appendix B Development Application Form**

- Appendix C Design Approval Checklist**

- Appendix D Deed of Agreement (Example)**

- Appendix E On Maintenance Procedure Checklist**

- Appendix F On Maintenance Site Inspection Checklist**

- Appendix G Certificate of Acceptance (Example)**

- Appendix H Off Maintenance Procedure Checklist**

- Appendix I Off Maintenance Site Inspection Checklist**

- Appendix J Asset Register Forms**

- Appendix K CAD Drawing Requirements**

APPENDIX A – GUIDELINES AMENDMENT REQUEST FORM

Attention The Development Officer
 Subdivision and Development Guidelines
 Planning and Design Section
 Darwin City Council
 GPO Box 84
 Darwin NT 0801

This form may be reproduced for the purposes of submission of a proposed amendment without breaching copyright.

REQUESTOR'S DETAILS

Name

Firm

Address

PROPOSED AMENDMENT DETAILS

Please use separate forms for each amendment requested.

Part

Section

Details

Please attach further details if required

REVIEW

Comments

Approved / Not Approved **Date**.....

Returned to Applicant **Date**

APPENDIX C – DESIGN APPROVAL CHECKLIST

For Internal Council Use as well as Consultant / Developer Use

PROJECT **SUBMISSION** 1, 2, 3, 4, 5

CONSULTANT **DATE SUBMITTED** / /

- Initial Design Discussions with Council
- Design Submission to Council for Comment / Approval. The following items are to be submitted:

DOCUMENTS

- Proof of Appointment to Act for the Developer
- Copy of relevant Agreements and supporting documentation if development is to be carried out on Crown Land
- Copy of current Development Permit(s)
- Copy of Permission to Carry out Works on Other's Land
- Executed Development Application Form (together with Application Fee – see below)
- Design Report(s)
- Drainage calculations and plans
- Pavement design calculations
- Geotechnical and Soil Types Report
- Proposed Subdivision Plan
- Approvals from Other Authorities
- Estimate of Cost for Construction of Works
- Specification and Standard Drawings for Civil and Landscape Works
- Specification and Details for Stormwater Management and Erosion Control Works
- Necessary certifications
- Any other items required, ie, Structural drawings and computations, etc.
- Copy of appropriate Public Risk Insurance

PLANS

All plans must be signed as **Checked** and **Approved** by the appropriately qualified person.

Two copies of all drawings are required, if plans are A3 size. If plans are larger, ie, A2+, then 3 copies minimum are required.

- Concept Landscape and Irrigation Drawings if Detail Drawings not finalised
- Stormwater Management and Erosion Control Drawings
- Structural Drawings if required, ie, retaining walls, fences, footings, etc
- Civil Drawings made up as follows:
 - Site Works
 - Services
 - Roadwork & Drainage & Subsoil Drainage Layout
 - Roadworks Longitudinal Sections
 - Roadworks Cross Sections
 - Drainage Longitudinal Sections
 - Intersection, Bends, and Court Details
 - Typical Sections, General Notes, Locality Plan
 - Footpath Layout
 - Any other relevant drawings

PAYMENTS

- Design Approval Fee (0.5% Estimated Cost for Construction of Works)
- Development Application Fee (together with executed Application Form – see above)

CHECKED **DATE CHECKED** / /

COMMENTS

APPENDIX F – ON MAINTENANCE SITE INSPECTION CHECKLIST

All test results, inspections, certifications, as constructed drawings and clearances in place. The Works have been visually inspected and the following constructed to approved drawings and satisfactory standards:

ALLOTMENTS

- Pegged;
- Lots graded to minimum design levels;
- Lots grassed;
- Soil and stormwater management in place.

ALLOTMENT DRAINAGE

- Catch drains – location, profile, line, level, outlet with erosion control;
- Field inlets – location and property drain and sub soil drain connection provided;
- Overland flow path including Q100 open drains – profile, line, level, grassing established, erosion control, concrete lining;
- Pipework – size, line, level;
- Soil and stormwater management in place.

STORMWATER DRAINAGE SYSTEM

- Pipe/Drainage layout – size, line, level, location;
- Gully pits and manholes to correct standards – transitions;
- Covers – good order, level, grade;
- Endwalls, headwalls and outlet structures – erosion control, free from scour and siltation;
- All connections to pits mortared flush, all walls smooth mortared flush, no reinforcement projections;
- All stepirons, rungs, ladders, cages in position;
- Open cut channels – profile, line, level, grassing, erosion control measures;
- Overland flow – clear of obstruction, profile, line, level, grassing established, concrete lining, erosion control;
- Sub soil drainage connections to pits, flush points, discharges to gullies or other approved outlet;
- Grassing to swales, outlets, inlets, allotments, batters;
- Soil and stormwater management in place.

EARTHWORKS

- Retaining walls located clear of road reserves;
- Batter slopes stabilised, free from erosion;
- All disturbed areas grassed, free from erosion;
- Soil and stormwater management in place;
- Compaction test results, inspection records, certifications.

ROAD SURFACING

- Hot mix wearing course sound in appearance and showing no signs of cracking, blemishes, erosion and oxidation;
- Bitumen seal sound in appearance, no blemishes, adequate aggregate cover, no bitumen bleeding through surface, excess aggregate removed from site.
- Joints are flush;
- Kerbs and pavements free of overspray, splashes and marks;
- Final profile is regular, crowns correctly located, no obvious high points, hollows, low points and ponding of water;
- Joints with concrete works are sound and to the correct level. No gaps for water intrusion.

APPENDIX F - ON MAINTENANCE SITE INSPECTION CHECKLIST (Continued)

CONCRETE KERBS, KERB & CHANNEL, MEDIANS AND ISLANDS

- Correct type and profile;
- Laid to true line and level;
- Finish is smooth, hard, sound and durable in appearance, free from bumps, rain damage, erosion, irregularities, surface blemishes, cracking, equipment grazes and marks and chipped and broken joints;
- Ponding of stormwater does not occur;
- Transitions to existing work and gully pits are smooth, regular, correct length;
- Service markers have been placed to the kerb face;
- Lip and back of kerb are flush with road surface, footpaths and verges;
- All channelisation works and medians completed – signage, markers, pavement marking and traffic measures;
- Subsoil drains and flushing points to medians and islands;

FOOTPATHS, BIKEWAYS AND PAVING INCLUDING INTERLOCKING AND OTHER

- Finish is appropriate to use, hard, sound and durable in appearance, free from bumps, rain damage, erosion, irregularities, surface blemishes, cracking, marks, chipping and broken joints;
- True to line and level width;
- Jointing as required, expansion joints provided;
- Concrete appropriately cured;
- Pram ramps as per access requirements and plans;
- Safety rails, hardware, pavement marking and signs installed.

STREETScape, LANDSCAPE, PARKS, FENCING AND FEATURES

- All turfing, grassing, weed control, tree planting, bollards, drainage, irrigation and other works as necessary to approval of Council's Parks section.
- Erosion and stormwater management in place;
- All fences other than approved entrance structures have been constructed within allotments;
- Entrance features have planning and building approvals and certifications;
- Approvals from manufacturers and submission of guarantees, warrantees.
- Approvals from Council's Parks section;
- Appropriate undersurface to playgrounds;
- Structural certifications;
- Childproof fencing;
- Approvals from other authorities and other trades and disciplines.

OTHER SERVICES

- All approvals as constructed received and submitted;
- All pit and manhole covers constructed to correct levels and slopes;
- All services, road crossings permanently marked as required on kerbs or by approved markers;

OTHER

- Street names signs with house numbers;
- Traffic signs and markers and pavement marking.

APPENDIX G – CERTIFICATE OF ACCEPTANCE (Example)

CERTIFICATE OF ACCEPTANCE AND ON MAINTENANCE OF WORKS

DEVELOPER: ABC Industries (NT) Pty Ltd

PROPOSED LOT NOS: 6623, 6624, 6666 to 6671 and 6692

SURVEY PLAN: S2000/999

INSTRUMENT OF DETERMINATION NO: DP99/0876B

CONDITIONS: 2, 6, 7 & 10

WORKS: Roads, stormwater drainage, kerb crossovers, driveways, street lighting, landscaping in road verges and footpaths. Easement requirements for these works

Darwin City Council confirms that the above works as prescribed by the plans and specifications previously submitted have been satisfactorily constructed and are hereby accepted for maintenance purposes subject to a Maintenance Period (Defects Liability Period) as follows.

1. Roads, Stormwater Drainage, Kerb Crossovers, Driveways and Footpaths

Commences 3 May 2000 Finishes 3 May 2001

1. Landscape Street trees, Verges and associated Irrigation

Commences 3 May 2000 Finishes 3 Jan 2001

2. Landscape Hardworks for Park

Commences 3 May 2000 Finishes 3 May 2001

Notes The Developer is required to contact the Darwin City Council thirty (30) days prior to the expiry of the Defects Liability Period and arrange an inspection of the site. The Developer acknowledges that final Handover of Works to Council for ongoing care and maintenance and the release of the Security (Maintenance Bond), will not occur until such notification has been given and such an inspection has taken place and all outstanding defects are remedied.

The Darwin City Council has the right to retain any such portion of the Security as it deems necessary to cover the defects corrected during the Defects Liability Period. This shall be returned to the Developer progressively upon the expiry of the relevant individual Defect Liability Periods of each defect.

Defects The following listed items are exceptions to the above and must be completed by the date agreed below. The Developer agrees to rectify the defects in accordance with Council 's minimum requirements. The Defects Liability Period for these particular items shall commence on the date they are completed.

ITEM	DATE OF COMPLETION
1. Erosion Control Works	31 May 2000
2. Street name signs	31 May 2000
3. Rectification of damaged kerb and channel	31 May 2000

.....
DIRECTOR TECHNICAL SERVICES

.....
DEVELOPER'S REPRESENTATIVE

Date.....

Date.....

APPENDIX H – OFF MAINTENANCE PROCEDURE CHECKLIST

For Internal Council Use as well as Consultant / Developer Use

PROJECT

DATE REQUEST SUBMITTED / /

CONSULTANT

- Request from Developer for Off Maintenance Inspection and Return of Security(s)
- Off Maintenance Inspection
- Issue of Off Maintenance Certificate by Council - Works Taken Over by Council

INSPECTION DATE / /

DATE MAINTENANCE CERTIFICATE ISSUED / /

COMMENTS

.....

APPENDIX I – OFF MAINTENANCE SITE INSPECTION CHECKLIST

All further test results, inspections, certifications, as constructed drawings and clearances in place. The works have been visually inspected and are satisfactory allowing for normal wear and tear. The requirements are as follows but not limited to:

EARTHWORKS, SITEWORKS & ALLOTMENTS: Those still in the title of the developer.

- Lots grassed, batter slopes established;
- Soil and stormwater management still in place.

STORMWATER DRAINAGE SYSTEM

- All pits, manholes and drainage structures in good condition;
- All covers, lintels and frames free from damage;
- Erosion control at outlets and open drains free from erosion, siltation and scour;
- All pits, pipes and culverts free from obstruction, siltation;
- Erosion and stormwater management still in place and adequately maintained.

ROAD PAVEMENTS AND SURFACING

- Hot mix wearing course / bitumen seal, sound in appearance, no cracking, blemishes, erosion and oxidation;
- Joints are flush, no signs of cracking, rutting or other types of failures;
- Surfaces are still straight and true to line and level, no low points and ponding of water.

CONCRETE AND INTERLOCKING PAVING, KERBS, KERB & CHANNEL, MEDIANS AND ISLANDS

- Finish is still hard, sound, durable, smooth, unblemished, no cracking, chipping of joints and pavers, free from erosion and rain damage;
- Surfaces are still straight and true to line and level, drain well, no ponding of water;
- Lip of kerb is still flush with road surface, no gap between kerb and pavement;
- All siltation cleaned out of kerb and channel etc.

STREETScape, PARKS, LANDSCAPE, FENCING AND OTHER FEATURES

- Inspections have been carried out with Council's Parks section;
- All plants, shrubs, trees, grassed areas well maintained and in good healthy condition;
- All grassed areas, verges, undersurfaces to playgrounds, etc draining well;
- All structures and equipment well maintained, free from rust and blemishes, structurally sound;
- All undersurfaces to playgrounds in good order;
- All irrigation systems in full working order and where necessary, controllers on line and functioning.

OTHER

- All clearances from Other Authorities and Others received;
- All pit, valve, manhole, service boxes to correct levels and slopes, no obstructions in verges, grassed areas, etc;
- Line marking re-marked where necessary.
- Street name and other signs still in place

APPENDIX J -ASSET REGISTER FORMS

Copy of Council's current Asset Register Forms are to be attached.

APPENDIX K – CAD DRAWING REQUIREMENTS

Copy of Design Section current External CAD requirements are to be attached.