Miriam Vale Shire Council

Planning Scheme Policy No. 1

Engineering Standards for Development Works

Commencement Date 27 February 2009

CONTENTS

1 INTRODUCTION

1.1 PURPOSE OF THE POLICY

Codes contained within the Miriam Vale Shire Planning Scheme guide development, the design and construction of works within Miriam Vale Shire.. This policy is intended to provide applicants with the detailed standards that represent acceptable measures to meet the relevant performance criteria nominated in the codes.

This policy is to be used in conjunction with Miriam Vale Planning Scheme, QUDM, Queensland Streets, Austroads Guides and relevant Australian Standards.

In some instances the Miriam Vale Planning Scheme uses acceptable measures that differ from the above manuals, guides and standards. Consultants are advised to use the Miriam Vale Planning Scheme data in their designs.

The policy also:

- Provides guidance on the likely information that applicants will be requested to provide; and
- Identifies various checking and follow on procedures relating to the construction of approved works.

1.1.1 Purpose of the Relevant Codes

The purpose of the Planning Scheme Codes are reiterated below. The purpose statements identify the outcomes to be achieved by the standards contained within this policy.

If any doubt exists in respect of the interpretation of any part of this policy, the most appropriate interpretation will be that which is most consistent with the stated purpose of the codes.

1.1.1.1 Works Services and Infrastructure Code

The purpose of this code is to achieve the following outcomes:

a) Users are provided with an appropriate level of water, waste water treatment and disposal, drainage, energy, communications and other services information;

b) Access, streets, roads and pedestrian and cycle paths are provided to standards that ensure safe, convenient and efficient operation of movement networks;

c) Infrastructure is provided in a manner which maximises resource efficiency and minimises whole of life cycle costs and maintenance considerations;

d) Infrastructure is integrated with surrounding networks;

e) The integrity of existing infrastructure is maintained and effectively interfaced;

f) Development undertaken in accordance with best environmental management practice to support the achievement of ecological sustainability;

g) Development does not detract from the character and amenity of the locality.

h) The efficiency of all elements of the water cycle is optimised, including reduction in potable demand, no increase in stormwater or flood damages at all locations due to increases in stormwater volumes and/or peak discharges and the maximisation of reuse opportunities;

i) Water cycle infrastructure is provided in a manner which maximises resource efficiency and minimises whole of life cycle costs;

j) Water cycle infrastructure is integrated with surrounding networks;

k) Development is undertaken in accordance with best environmental management practice to support the achievement of ecological sustainability;

l) Development does not result in the deterioration of waterway environmental values and water quality;

m) Adverse impacts, including cumulative impacts, on flood storage and conveyance capacity are minimised and unacceptable risk[1] to people and property is not created;

n) Certification regarding compliance with the Queensland Urban Drainage Manual (QUDM) for drainage design.

[1] "Unacceptable risk" is defined in State Planning Policy 1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide

1.1.2 Code Elements Pertaining to the Policy

Codes associated with sections of this policy extracted from the Planning Scheme, shall be defined under each relevant section.

1.2 STRUCTURE OF THE POLICY

SECTION	CONTENT
Section 1: **Introduction**	Contains preliminary information regarding: the policy, including its: • purpose and scope; • structure; • definitions of terms used; • funding strategy; • service levels; • plan presentation.
Section 2: **General Information Requirements**	Contains guidance on: • the general level and standard of information Council will seek to have submitted with applications.
Section 3: **Utilities**	Contains: • relevant standards and specifications that constitute acceptable measures for the relevant code and performance criteria; and • the specific type of information Council is likely to seek with regard to particular works or issues.
Section 4: **Movement Networks**	
Section 5: **Public Parks Infrastructure**	
Section 6: **Construction Management**	
Section 7: **Integrated Water Management**	
Section 8: **Quality Control & Audit Inspections**	Contains guidance on obligations of supervising engineers, and procedures for the construction, checking and hand over of works that are outside the IDAS process. Details matters that require Council's approval with regard to its construction, compliance, inspection and acceptance.
APPENDICES **Appendix A** **Appendix B** **Appendix C** **Appendix D** **Appendix E** **Appendix F**	 Compliance Certificate Plan Presentation On Maintenance Check List Stencilled Asphalt Specification Bonding Agreement Asset Register

1.3 DEFINITIONS & ABBREVIATIONS

ABBREVIATION	DESCRIPTION
MVSC	Miriam Vale Shire Council
MCU	Material Change of Use
ROL	Reconfiguration of Lot
AASHTO	American Association of State Highway & Transportation Officials
AC	Asphaltic Concrete
ADWF	Average Dry Weather Flow
AHD	Australian Hight Datum
AMCORD	Australian Model Code for Residential Development
ARI	Average Recurrence Interval
ASD	Approach Sight Distance
ASS	Acid Sulphate Soils
AV	Air Values
BBQ	Bar-Be-Que
CBR	California Bearing Ratio
CD	Compact Disk
CPESC	Certified Professional in Erosion & Sediment Control
CPTED	Crime Prevention through Environmental Design
DICL	Ductile Iron Cement Lined
EP	Equivalent Persons
ESA	Equivalent Standard Axles
ESC	Erosion Sediment Control
ESCP	Erosion & Sediment Control Plan
ESCS	Erosion & Sediment Control Strategy
ESD	Entering Sight Distance
FRC	Fibre Reinforced Pipe
HDPE	High Density Polyethelyne
IDF	Intensity Frequency Duration
IEAust	Institute Engineering Australia
IPWEA	Institute of Public Works Engineering Australia
ITP	Inspection & Test Plan
K	Potassium
LATM	Local Area Traffic Management
MUTCD	Manual of Uniform Traffic Control Devices
N	Nitrogen
NATA	National Association of Testing Authorities
P	Phosphorus
PASS	Possible Acid Sulphate Soils
PE	Polyethylene
PVC-M	PVC Modified
QDMR	Queensland Department of Main Roads
Qld	Queensland
QUDM	Queensland Urban Drainage Manual
RM	Rising Mains
RPEQ	Registered Professional Engineer Queensland
RPZD	Reduced Pressure Zone Device
SCADA	Supervisory Control and Data Acquisition
SISD	Safe Intersection Sight Distance
SQUIDs	Stormwater Quality Interception Devices
SV	Stop Valves
PVCU	Unplasticised PVC
vpd	Vehicles per day
PVC – M	PVC Modified
WSAA	Water Services Association Australia

1.4 LEVELS OF SERVICE

Consideration is to be given to what services the assets deliver, and the expectations of the customer. Levels of service are to be based on:

- Customer expectations; and
- Legislative / regulatory requirements

Key service criteria to be addressed include:

- Quality;
- Quantity;
- Reliability;
- Responsiveness;
- Environmental / safety;
- Lifecycle cost; and
- Legislative compliance

2 GENERAL INFORMATION REQUIREMENTS

2.1 INFORMATION SUPPORTING DEVELOPMENT APPLICATIONS

This section contains guidance on the type of information that Council will generally seek to have submitted with an application that relates to any aspect dealt with in this policy. More specific information requirements in relation to particular matters are identified in the subsequent sections of this document.

It is preferable that such information is submitted with an application; however, if not initially provided by an applicant, Council is likely to issue an information request that seeks its subsequent provision.

2.1.1 Material Change of Use & Lot Reconfiguration

The Planning Scheme Codes are generally applicable at the material change of use or reconfiguration of lots stage, in addition to the operational works/detailed design stage (refer to the tables of assessment to determine the applicability of these codes).

Compliance with these codes at the initial material change of use or reconfiguration application stage should generally be demonstrated by:

- Identifying the locations of services and utilities and the relevant connection points for the services and utilities;
- Identifying stormwater management devices for the purpose of stormwater quality and quantity control, with sufficient calculations undertaken to demonstrate that appropriate space allocations for such devices have been allocated; and
- Providing a conceptual design for the required operational works.
- Detailed traffic studies;
- Detail environmental investigations required in conjunction with governmental authorities. All supporting details and explanation of the impacts to be outlined. Covers fauna, flora, air, acid sulphate soils, noise matters associated with the site or adjoining site impacts;
- Detail concept roads and civil layout;
- Identifying sewerage management system and devices for the purpose of stormwater quality and quantity control, with sufficient calculations undertaken to demonstrate that appropriate space allocations for such devices have been allocated;
- Compliance with any approved structure plan;
- Any native title and cultural heritage issues

2.1.2 Operational Works Application

An operational works application must be accompanied by detailed engineering design and calculations for all relevant works. Specifically, applications should be accompanied by the following:

1. Completed IDAS application forms and the required application fee;
2. Three certified copies of engineering plans for the proposed works, (1 set to be A1 size and 2 sets to be A3 size); plus:
3. For staged development, two (2) complete sets of plans showing the overall design concept for water, sewer, stormwater, roadworks, earthworks, soil and water management plans;
4. An electronic copy of all design drawings in DWG format will be required; including water, sewer, stormwater, roadworks, earthworks, street lighting, landscape, soil and water management plans;
5. An assessment of the compliance of the designs with the Planning Scheme Codes. Where alternative solutions are proposed to the acceptable measures set out in those codes or in this policy, applicants should demonstrate the basis for the alternative design and how the relevant performance criteria in the codes are met;
6. Compliance Certificate of design by RPEQ certifying that the design is in accordance with all relevant engineering standards, Council's requirements and standards, Development Approval conditions and sound engineering practice (Refer to **Appendix A** for example).
7. Sufficient supporting calculations to enable the design parameters to be audited; eg Sidra, Stormwater, Vehicle turning paths, Lighting isolux diagrams etc;
8. One copy of the Council's conditions of any earlier relevant development approval and concept plan on which the design was based;

9. A copy of records of any pre-submission discussions with Council and correspondence with other authorities;
10. A copy of the Construction Management Plan prepared for the proposed work;
11. A copy of the proposed Inspection and Testing Plan for the works and method of tracking;
12. The job specification to be used for the construction of the works shall be noted on the design plans;
13. Advice about the engineer engaged to supervise the proposed work;
14. Structural and geotechnical certification of design of miscellaneous structures including retaining walls over 1m in height, non-standard headwalls, drainage structures, reservoirs etc;
15. Where large quantities of fill are to be exported or imported, advice will be sought regarding the destination or source and nature of the proposed fill materials. A report from a recognised consulting engineer experienced in soil mechanics showing compaction requirements and settlement characteristics may also be sought;
16. Design parameters and operating regimes for water supply and sewerage pump stations;
17. Stormwater drainage calculations including a catchment plan fully detailing external catchments and internal sub-catchments, or tabulation in spreadsheet format in accordance with QUDM requirements including bypass flow width at all pits and full design calculations for detention basins, dissipaters, scour protection and gross pollutant traps;
18. Landscape and streetscape layout with all supporting information defining water control and automatic systems. Details to include lifecycle costs and proposed maintenance program details;
19. Electrical, including streetlighting and telecommunications layout and details;
20. Hydraulic report;
21. Geotechnical report;
22. Staged Erosion and Sediment Control Plan;
23. Public Park and Open Space details;
24. Written approval from adjoining property owners for any works on or affecting their properties; and
25. Proof of legal right to drain.

In preparing a design, the applicant should have regard to the following:

1. The requirements of any existing approvals affecting the land;
2. The need to comply with relevant provisions of the planning scheme or local laws;
3. The need for approval from adjoining property owners for any engineering works proposed on their property;
4. The requirements of any other authorities having jurisdiction over any part of the works, including the Department of Main Roads where development may impact on a State-controlled road, Ergon, Telstra and Queensland Transport for public transport;
5. Environmental considerations in accordance with legislation have been clearly evaluated; and
6. Lifecycle of design components and on going maintenance details are clearly considered and disclosed for each asset type.
7. Aboriginal native title and cultural heritage requirements;
8. Contaminated land issues have been clearly assessed.

   As a minimum the following elements need to be clearly addressed to determine the need for further investigation:

   - Environmental Management Register (EMR) and Contaminated Land Register (CLR) assessment
   - Review of site to determine potential presence of contamination, including acid sulphate soils
   - Limited assessment of land use history
9. Footpath access throughout and connecting to existing systems has been applied;
10. Bikeway allowance has been applied;
11. Proof of Q Leave payment;
12. Access requirements for people with disabilities in accordance with relevant Australian standards.

2.2 LIFE CYCLE MANAGEMENT PLANS

2.2.1 When a Life Cycle Management Plan May Be Required

Ultimately, the service provided by contributed assets becomes the responsibility of the Council. Council requires that during the design, a lifecycle approach be adopted that considers the ongoing asset management.

Accordingly, the preparation of a lifecycle management plan and funding options may be requested for those proposed contributed assets that are considered over and above the standard level of service represented by the standards contained in the Planning Scheme Codes and this policy.

2.2.2 What a Life Cycle Management Plan Should Address

For these assets to be acceptable to Council, the lifecycle costing of the proposed asset needs to be evaluated to determine:

- Maintenance requirements for the ongoing management of the asset; and
- Whether the costs associated can be adequately funded.

The management, maintenance and replacement costs are to be evaluated over a minimum 30 years lifecycle.

Applicants should provide:

- A detailed assessment of the relevant infrastructure network and how it operates
- A detailed management system
- Forecast on going maintenance costs associated with the operating life of the asset.

A lifecycle management plan should consider all management options and strategies as part of the asset lifecycle, from planning to disposal. The objective is to look at lowest life cycle cost (rather than short term savings) when making asset management decisions.

Strategies are to be defined for each stage in the lifecycle:

- Recurrent
  - Operations
  - Maintenance
- Capital
  - Renewal / rehabilitation / replacement
  - Upgrade / augmentation
  - Enhancement (new assets)
  - Disposal

2.2.3 Lifecycle Expenditure Category Definitions

CATEGORY	DEFINITION	TYPICAL EXAMPLES
Maintenance	Expenditure related to the ongoing up keep of assets	Mowing, Painting, Inspections
Operations	Expenditure on day to day activity of business operations	Power costs, Utility costs
Renewals / Rehabilitation / Replacement	Expenditure in maintaining the current level of service by reinstating the original life of the asset	Reseal, replace works
Upgrade / augmentation	Expenditure on upgrading the level of service by investment in an existing infrastructure or service	Widening or sealing of roads, traffic calming, Urban improvement program
Expansion	Expenditure on increasing the level of service by investment in new assets	New assets or services as part of a new subdivision
Disposal	Any costs associated with the disposal or decommissioning of assets	Sale of material or plant, road closure, removal of assets

3 UTILITIES

3.1 PURPOSE OF THIS SECTION

This section is relevant to the assessment of compliance with Specific Outcomes in the following codes, relating to the provision of utilities.

Reference shall also be made to the locality and zone codes to reflect the specific location of concern.

DIVISION 34 TELECOMMUNICATION FACILITIES CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
SO2	Telecommunication Facilities must be sited and designed such that they are visually integrated with the landscape or townscape so as not to be visually obtrusive.	**AS2.2**	Underground telecommunication Facilities are constructed of materials in accordance with Engineering Standards for Development Works.

DIVISION 39 WORKS SERVICES AND INFRASTRUCTURE CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
Infrastructure Services			
SO1	An adequate, safe and reliable supply of potable and general use water is provided	**AS1.1**	In the Agnes Water Locality, the site is connected to Council's reticulated water supply system, in accordance with Planning Scheme Policy No 1, Engineering Standards for Development Works. **OR** Where not located in the Agnes Water Locality, premises are provided with a reliable supply of potable water, in accordance with Planning Scheme Policy No 1, Engineering Standards for Development Works.
SO2	Provision is made for the treatment and disposal of effluent to ensure there are no adverse impacts on water quality and no adverse ecological impacts as a result of the system or as a result of increasing the cumulative effect of systems in the locality.	**AS2.1**	The development is connected to a reticulated sewer network, where identified in Planning Scheme Policy No 1, Engineering Standards for Development Works. **OR** Where not included in the reticulated sewer network as identified in Planning Scheme Policy No 1, Engineering Standards for Development Works, the development is provided with on-site sewage treatment.
		AS2.2	All necessary extensions and connections to the sewerage system is designed and constructed in accordance with Planning Scheme Policy No 1, Engineering Standards for Development Works.

DIVISION 10 RURAL CHARACTER ZONE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
Waste Management			
SO2	Effluent treatment and disposal systems can be accommodated on site.	**AS2.1**	For Assessable Development The site has a suitable soil type to accommodate the treatment and disposal of all effluent on site.

The following subsections set out the standards referred to in these acceptable solutions, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to these matters. These information requirements apply in addition to those general requirements identified in Section 2 of this policy.

3.2 WATER SUPPLY

3.2.1 Relevant Code Requirements

This section relates to acceptable measures for performance criterion of the Code. It sets out standards and potential information requirements for the provision of a reticulated water supply system and, in the provision of an on site water supply.

In applying the following standards, applicants should also have regard to requirements set out in section 7 (Integrated Water Management) of this policy.

3.2.2 Standards

In defined water supply areas, the standards to be applied is "Miriam Vale Shire Council – Water Supply Standards". A copy of this standard is given in Appendix G. This manual lists amendments to the Water Services Association of Australia (WSAA) National Code that Council requires for its water supply schemes.

In other areas, the standard "Miriam Vale Shire Council – Water Supply and Sewerage Requirements for Non-Defined Water and Sewerage Areas". See Appendix H. This references the Australian Drinking Water Guidelines, AS/NZ 1547, the Queensland Plumbing and Wastewater Code and the Guidelines for the Use and Disposal of Greywater and Unsewered Areas.

3.2.3 Design and Construction of Reticulated Water Supply

Miriam Vale Shire Council supports the Water Services Association of Australia (WSAA) National Codes initiative to develop national codes for water supply, sewerage and sewage pumping stations. Benefits of the national codes include the development of best practices, the encouragement of innovation and minimisation of capital costs through standardisation of components used in water supply and sewage collection systems.

This supplementary manual is one of three manuals that have been developed to define the particular requirements of Miriam Vale Shire Council in relation to the WSAA National Codes. Only details that differ from that of the WSAA National Codes are provided. The other manuals are:

- Supplementary Manual to the Sewerage Code of Australia – WSAA 02-2002; and
- Supplementary Manual to the Sewage Pumping Station Code of Australia – WSAA 04-2002.

3.2.4 Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Water Supply Code of Australia – WSAA 03-2002 to define the technical requirement of Miriam Vale Shire Council and Miriam Vale Water Services (the "Water Agency") in relation to the planning, design and construction of water supply systems.

3.3 SEWERAGE

3.3.1 Relevant Code Requirements

This section relates to acceptable measures for performance criterion of the Code. It sets out standards and potential information requirements for the provision of a reticulated sewerage system and, in Rural and Rural Residential precincts, the provision of an on site waste water treatment and disposal system.

In applying the following standards, applicants should also have regard to requirements set out in section 7 (Integrated Water Management) of this policy.

3.3.2 Standards

In defined sewerage areas, the standard to be applied is the "Miriam Vale Shire Council – Sewerage Standards" A copy of this manual is given in Attachment G. This manual lists amendments to the Water Services Association of Australia (WSAA) National Code that Council require for its sewerage schemes.

In other areas, the required standard is the "Miriam Vale Shire Council – Water Supply and Sewerage Requirements for Non-Defined Water Supply and Sewerage Areas..

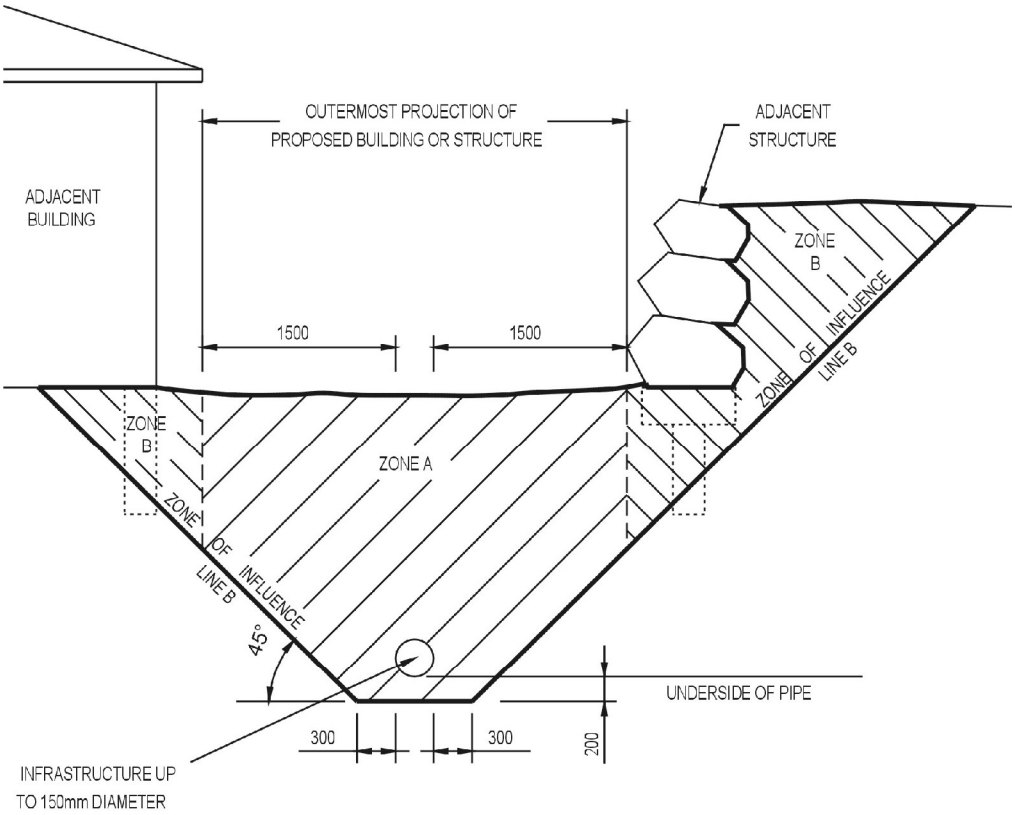


FIGURE 1

3.3.3 Other Considerations

No excavation or filling shall be undertaken over or adjacent to water supply or sewerage infrastructure without the consent of the Water Agency. Where consent is obtained, any affected maintenance accesses or fittings shall be adjusted as required.

Ground surface levels must not be altered in a way causing ponding of water over any maintenance hole.

A sewer connection point must have:

- A clear area of at least 2m x 2m maintained around the sewer connection
- A minimum horizontal clearance of 1m from any building
- A minimum unobstructed vertical clearance of 2.4m

Unrestricted access must be maintained to water supply and sewerage infrastructure at all times.

3.4 STREET LIGHTING

3.4.1 Standards

All works are to be designed and constructed in accordance with relevant codes of practice set out in the Australian and Electricity Service Provider Standards.

Lighting on declared roads is to be provided in accordance with the requirements and approval of the relevant State Government Department.

"Code of Practice" means the current Australian Standard Code of Practice AS1158.1, AS1158.2 and AS1158.4 .

3.4.2 Specifications

Specifications applicable in accordance with the relevant electricity service provider.

3.4.3 Standard Drawings

Standard drawings applicable in accordance with relevant electricity service provider standard lighting requirements.

Updating of drawings shall remain with the document owner and it shall be the responsibility of the user to maintain current versions. Relevant drawings are not maintained with Council list of standard drawings.

3.4.4 Specific Information Requirements

The developer shall provide to Council all required approvals and certification applicable from the relevant electricity service provider.

4 MOVEMENT NETWORKS

4.1 PURPOSE OF THIS SECTION

This section is relevant to the assessment of compliance with Specific Outcomes in the following codes, relating to road networks.

Reference shall also be made to the locality and zone codes to reflect the specific location of concern.

The following subsections set out the standards referred to in these acceptable measures, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to these matters. These information requirements apply in addition to those general requirements identified in section 2 of this policy.

DIVISION 39 WORKS SERVICES AND INFRASTRUCTURE CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
SO4	The road to the frontage of the site must be constructed to provide for: a) safe and efficient movement of vehicles on the road adjacent to the site; b) the safe and efficient movement of vehicles to and from the site; c) the safe and efficient movement of pedestrians and cyclists adjacent to the site; and d) the safe and efficient movement of pedestrians and cyclists to and from the site.	**AS4.1**	The road to the frontage of the site is constructed in accordance with relevant specifications in Planning Scheme Policy No 1: Engineering Standards for Development Works.
		AS4.2	Vehicle crossover/s are constructed to provide access to the site in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
SO9	Filling and excavation is carried out so that the visual amenity of the area and the privacy of the adjoining properties are not compromised.	No acceptable solution specified.	
Flood management			
SO10	An acceptable level of flood immunity is provided for new development and access to new development.	**AS10.1**	Development does not occur in areas known to be flood prone. Note: Insufficient data is available to accurately map the extent of 1 in 100 year and 1 in 50 year flood events. Please contact Council's Technical Services Branch to determine the extent of local information available regarding flooding.
Stormwater Management			
SO11	Development prevents or minimises adverse social and environmental impacts on the Shire's waterways, overland flowpaths, and constructed drainage network from stormwater run–off originating from or passing through development.	**AS11.1**	Development is undertaken in accordance with the stormwater management specifications in Planning Scheme Policy No 1, Engineering Standards for Development Works.
SO12	Stormwater run–off originating from development is of such quality that environmental values of receiving waters are protected or enhanced.	**AS12.1**	Development is undertaken in accordance with the stormwater management specifications in Scheme Policy No 1, Engineering Standards for Development Works.

DIVISION 38 - RECONFIGURATION OF A LOT CODE

SPECIFIC OUTCOMES	ACCEPTABLE SOLUTIONS
Road Layout & Access	
SO8 New roads and accesses are designed to a standard capable of supporting all future uses.	**AS8.1** Roads are designed and constructed in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works
SO9 Road layout must not compromise the safety and efficiency of the existing road network.	**AS9.1** Road Network intersections are provided in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works
SO11 The road network design must address: a) the streetscape; b) the topography and vegetation; c) views and vistas; and d) protection of natural drainage and open space systems	**AS11.1** The road network is designed and constructed in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works
SO12 Development in the Industrial Zone, the road network provides for the movement and access of heavy vehicles.	**AS12.1** The road network is designed and constructed in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works
Pedestrian and Cyclist Facilities	
SO13 The streets, roads and paths: a) provide a network of pedestrian and cycle routes that connect open spaces, neighbouring residential areas and activity centres; and b) address: (i) potential impacts on vehicular traffic; (ii) potential impacts on other infrastructure and public utilities; (iii) the safety of cyclists and pedestrians; (iv) cost effectiveness; and (v) topography	**AS13.1** Bicycle and Pedestrian paths are designed and located in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works
SO14 The alignment and construction of cycle/pedestrian paths: a) allows safe and convenient use by pedestrians and cyclists; b) conserves trees and other significant natural features; and c) address vistas and landmarks.	No acceptable solution specified.

DIVISION 37 PARKING AND ACCESS CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
Car parking requirements			
SO1	Sufficient car parking spaces are provided on the site to accommodate the amount and type of vehicle traffic likely to be generated by the proposed use.	**AS1.1**	Car parking is provided as per Schedule 1 to this Code, and constructed in accordance with specifications in the Planning Scheme Policy No 1: Engineering Standards for Development Works.
SO2	Cycle parking shall be provided, where appropriate, within the site.	**AS2.1**	For commercial and community uses, one cycle rack is provided for every 15 car parking spaces.
Car parking location			
SO3	On-site car parking areas are conveniently located, easily accessible, attractive and safe to use.	**AS3.1** **AS3.2**	Short-term visitor parking is provided at the front or on the main approach side of the site, with access to the building entry within 20 metres. Car parking areas are located directly adjacent and within 10m of the building entry (refer to Figure 1 for example).
Access			
SO4	Access points are located to operate efficiently and safely and to minimise conflicts. Consideration should be given to: a) the amount and type of vehicular traffic; b) the type of use and road traffic conditions; c) the nature and extent of future street or intersection improvements; d) current and future on street parking; and e) available sight distances.	**AS4.1**	The location of the access points is in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
Design & Layout			
SO5	Car parking spaces are of a suitable size and dimension to meet user requirements.	**AS5.1**	Car parking spaces are designed in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
SO6	Service vehicle and loading areas are of a suitable size and dimension to meet user requirements.	**AS6.1**	Service vehicle loading areas are designed in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
SO7	Parking spaces are available and easily accessible for persons with disabilities and/or mobility difficulties[2].	**AS7.1** **AS7.2** **AS7.3** **AS7.4**	
SO8	Car parking layout, manoeuvring and service areas are designed to ensure they are safe, convenient and functional.	**AS8.1**	The design and layout of car parking areas, including car park widths, aisle widths and circulation areas are in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
SO9	Car parking areas do not detract from the amenity of the surrounding locality.	**AS9.1** **AS9.2**	

[2] The BCA has requirements for disabled car parking which must be complied with for all buildings in Classes 3 to 7.

Service Vehicles			
SO10	Adequate provision shall be made for servicing of premises.	**AS10.1**	Development incorporates: a) the provision of loading zones and loading bays; b) rear service access; and c) limited street access.
		AS10.2	Service access and location for commercial or industrial uses is not provided within 10m of a lot zoned Low Density Residential or Medium Density Residential.
On-site Vehicle Movement			
SO11	On-site driveways, manoeuvring areas and vehicle parking/standing areas must be designed, constructed and maintained such that they: a) are at gradients suitable for intended vehicle use; b) consider the shared movements of pedestrians and cyclists; c) are effectively drained and sealed; and d) are available at all times they are required.	**AS11.1**	Parking areas are kept and used exclusively for parking.
		AS11.2	Crossovers and on-site driveways, car parks and vehicle manoeuvring areas are sealed with a hard stand surface, ie. Bitumen, asphalt, concrete other than within the Rural zone, except where the standard is specifically specified within another Code.
		AS11.3	On-site driveways, car parks and vehicle manoeuvring areas have gradients and other design features in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
		AS11.4	On site driveways, car parks and vehicle manoeuvring areas are adequately drained in such a way that adjoining and downstream land is not adversely affected.
SO12	Suitable access and on-site manoeuvring is provided for the use.	**AS12.1**	Circulation and/or turning areas comply with the provisions of Planning Scheme Policy No 1: Engineering Standards for Development Works.

DIVISION 10 RURAL CHARACTER ZONE CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
Access			
SO8	Suitable access is provided to meet the needs of the use.	**AS7.1**	New roads opened as part of a development or existing dedicated roads fronting the development are constructed in accordance with relevant specification in Planning Scheme Policy No 1: Engineering Standards for Development Works.

DIVISION 14 COMMERCIAL SERVICES ZONE CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
Access			
SO6	Access suitable for the use is provided.	**AS6.1**	A maximum of 2 access points are provided per site to minimise conflict between pedestrians and vehicles, in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
		AS6.2	Reinforced industrial crossings are provided in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.
		AS6.3	Kerb and channelling is provided along the full length of the road frontage(s), in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works.

SPECIFIC OUTCOMES	ACCEPTABLE SOLUTIONS	
	AS6.4	Where the road adjoining the development is paved but not for its full width, the road is constructed and paved with asphalt between the existing pavement and the channelling referred to in AS6.3, in accordance with Planning Scheme Policy No 1: Engineering Standards for Development Works. OR Where the road is not paved it is constructed and paved with asphalt for a width of 6 metres.

4.2 ROADWORKS, DESIGN & CONSTRUCTION

4.2.1 Standards

4.2.1.1 Austroads Publications

Rural Road Design Manual
Part 1 Traffic Flow
Part 2 Roadway Capacity
Part 3 Traffic Studies
Part 4 Road Crashes
Part 5 Intersections at grade
Part 6 Roundabouts
Part 7 Traffic Signals
Part 8 Traffic Control Devices
Part 9 Arterial Road Traffic Management
Part 10 Local Area Traffic Management
Part 11 Parking
Part 12 Roadway Lighting
Part 13 Pedestrians
Part 14 Bicycles
Part 15 Motorcycles

4.2.1.2 Australian Rainfall and Runoff

Soil Erosion and Sediment Control for Queensland
EPP Water Policy

4.2.1.3 Cement and Concrete Association

Concrete Pavement Design for Residential Streets
Road Note 62 - Skid Resistance of Decorative Paving
Interlocking Concrete Road Pavements - A Guide to Design and Construction

4.2.1.4 Queensland Urban Drainage Manual

4.2.1.5 Queensland Department of Main Roads Manuals (State Controlled Roads)

Road Planning and Design Manual
Pavement Design Manual
Pavement Rehabilitation Manual
Road Drainage Design Manual
Manual of Uniform Traffic Control Devices
Guide to Pavement Markings
Road Landscape Manual

4.2.1.6 Queensland Streets

4.2.1.7 Australia Standards Publication

4.2.2 Specifications

4.2.2.1 Main Roads

Specifications are applicable in accordance with relevant Queensland Department of Main Roads standards.

Table - Queensland Department Main Roads Standard Specifications List

Identification Number	Title	Version	Interim Version
MRS11.02	Introduction to Standard Specifications	12/93	11/98
MRS11.02	Control of Vehicular Traffic at Roadworks	12/93	
MRS11.03	Drainage, Retaining Structures and Protective Treatments	12/93	9/97
SET-MRS11.04	General Earthworks	12/93	9/97
MRS11.05	Unbound Pavements	12/93	9/98
MRS11.06	Reinforced Soil Structures	12/93	5/99
MRS11.07	In Situ Stabilised Pavements	12/93	
MRS11.08	Plant-Mixed Stabilised Pavements	12/93	11/98
MRS11.11	Sprayed Bituminous Surfacing (Excluding Emulsions)	12/93	8/97
MRS11.12	Sprayed Bitumen Emulsion Surfacing	12/93	
MRS11.13	Bituminous Slurry Surfacing	12/93	
MRS11.14	Road Furniture	12/93	12/97
MRS11.15	Noise Barriers		
PM-MRS11.16	Landscaping	12/93	
MRS11.19	Bitumen Cutter Cutback Bitumen	12/93	
MRS11.20	Medium Curing Cutback Bitumen	12/93	
MRS11.21	Bitumen Emulsion	12/93	
MRS11.23	Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation	12/93	
MRS11.24	Manufacture of Precast Concrete Culverts	12/93	
MRS11.25	Manufacture of Precast Concrete Pipes	12/93	8/97
MRS11.27	Manufacture of Fibre Reinforced Concrete	12/93	
MRS11.28	Contractor's Site Facilities and Camp	12/93	8/97
MRS11.30	Dense Graded Asphalt Pavements	12/93	9/97
MRS11.31	Low Rut Dense Graded Asphalt Pavements		
MRS11.33	Stone Mastic Asphalt Pavements		8/97
MRS11.34	Open Graded Asphalt Pavements	12/93	
MRS11.39	Lean Mix Concrete Sub-base for Pavement		9/98
MRS11.40	Concrete Pavements		9/98
MRS11.41	Specification for Performed Joint Fillers for Concrete Road Pavements and Structures		4/98
MRS11.45	Pavement Marking		8/97
MRS11.50	Specific Quality System Requirements	12/93	8/97
MRS11.51	Environmental Management		
MRS11.55	Use of Explosives in Roadworks		
MRS11.63	Cast-In-Place Piles	12/93	
MRS11.65	Precast Prestressed Concrete Piles	12/93	
MRS11.66	Driven Steel Piles	12/93	
MRS11.67	Bitumen Slip Layer On Piles	12/93	
MRS11.70	Concrete	12/93	8/97
MRS11.71	Reinforced Steel	12/93	8/97
MRS11.73	Manufacture of Prestressed Concrete Members and Stressing Bars	12/93	
MRS11.74	Supply and Erection of Prestressed Concrete Girders and Kerb Units	12/93	
MRS11.75	Supply and Erection of Prestressed Concrete Girders and Reinforced Concrete Deck	12/93	
MRS11.77	Supply and Erection of Steel Girders and Reinforced Concrete Deck	12/93	
MRS11.78	Fabrication of Structural Steelwork	12/93	3/98

Identification Number	Title	Version	Interim Version
MRS11.79	Fabrication of Aluminium Bridge Barriers	12/93	
MRS11.80	Supply and Erection of Bridge Barrier	12/93	
MRS11.82	Bearings, Joints, Fillers and Built-In Items for Bridges	12/93	
MRS11.83	Anti-Graffiti Protection	12/93	
MRS11.84	Painting of Steel Bridges		
MRS11.86	Preparation for Bridge Widening	12/93	
MRS11.91	Ducts and Pits	12/93	8/87
MRS11.92	Traffic Signal and Road Lighting Footings	12/93	11/97
MRS11.93	Traffic Signals		1/98
MRS11.94	Road Lighting		9/97
MRS11.95	Switchboards and Cables		8/97

4.2.2.2 Standard Drawings

Table – Standard Drawings List

Drawing Number	Addendum	Description
Fencing and Gates		
IPWEAQ G-0045		Weldmesh Fencing & Control Fence
MR 938		3700mm Steel Gate – installation of Gate and Posts
MR 1351		Motor Grid
Legends		
IPWEAQ G-0080		Legends – Sheet 1
IPWEAQ G-0081		Legends – Sheet 2
Sediment and Erosion		
IPWEAQ D-0040		Sediment Fence, Entry/Exit Sediment Trap
IPWEAQ D-0041		Kerb and Field Inlets, Check Dams & Straw Bale Bank
Floodways		
MR 165M		Flood Gauge Post
MR 725M		Stone Work of Floodways Downstream Side – Gravel Fill
MR 726M		Stone Work at Floodways Downstream Side – Rock Fill
Roads/streets		
The following drawings can be located on the MainRoads website		
MR1338		Installation of guardrail
MR1339		Installation on bridge approaches and departures
MR1341		Installation for back to back guardrail
MR1342		Fabrication detail for bolts, nuts and washers
MR1343		Fabrication details for guardrail panels and panel components
MR1346		Fabrication details for steel posts
MR1347		Fabrication details for anchor cable assembly and supporting plates
MR1348		Fabrication details for guardrail delineator bracket
MR1349		Concrete barriers, extruded and precast barriers
Kerb and Channel		
IPWEAQ R-0080	Yes	Kerb and Channel Profiles, incl. Edges, Median & Invert
IPWEAQ R-0081		Kerb and Channel Drainage Connections
IPWEAQ R-0086	Yes	Type 2 Kerb Ramp to Grass Verges
IPWEAQ R-0087	Yes	Type 3 Kerb Ramp to Concrete/Paved Verges
Driveways		
Purpose of this Section	Purpose of this Section	Purpose of this Section
MVSC R-01a		Rural Property Access – Type a – Piped Tabledrain
MVSC R-01b		Rural Property Access – Type b – Non Piped Tabledrain
IPWEAQ R-0051		Commercial Driveway Type A
IPWEAQ R-0052		Commercial Driveway Type B
Drainage		

IPWEAQ R-0140		Subsurface Drainage
IPWEAQ R-0141		Subsurface Drainage Details at Medians/Islands
Access Chambers		
IPWEAQ D-0010		Access Chamber – Details 1050mm to 2100mm
IPWEAQ D-0011		Access Chamber – Roof Slabs 1050mm to 2100mm
IPWEAQ D-0012		Access Chamber – Roof Slabs 1500 Extended 600 x 900
IPWEAQ D-0013		Access Chamber – Rectangular, Standard Reinforcement
IPWEAQ D-0014		Access Chamber – Cast Iron Cover and Frame, C.I. Conc. Filled Cover
IPWEAQ D-0015		Cast Iron Cover and Frame, Bolt Down
IPWEAQ D-0017		Roof Slab, Rectangular, Fabric Reinforcement
Backfill and Bedding		
IPWEAQ D-0030		Excavation, Bedding & Backfill of Concrete/Fibre Reinforced Pipes
IPWEAQ D-0031		Excavation, Bedding & Backfill of Precast Box Culverts
IPWEAQ D-0041		Kerb and Field Inlets
IPWEAQ D-0050		Field Inlet- Field Inlet and Overflow Gully, Type 1 and 2
IPWEAQ D-0061		Gully – Precast Lintel Details
IPWEAQ D-0062		Grate and Frame Details
IPWEAQ D-0063		General Arrangement – Channel and Lip in Line
IPWEAQ D-0069		Precast Units Sag and Anti Pond – Lip in Line Only
The following are located on Main Roads website.		
MR1132		Construction of RC Deck and Kerbs
MR1179		Construction of base, aprons, walls and wings
MR1303		Construction of RC wingwalls and headwalls
MR1304		RC pipeculverts – construction of RC wingwalls and aprons for pipe dia up to 2400
MR1305		General arrangement and installation of wingwalls, headwalls and aprons
MR1306		Construction of un-reinforced wingwalls, headwalls and aprons
MR1316		General arrangement and installation of precast units
MR1317		Construction of nibs and aprons
MR1318		Construction of bases and recesses and aprons
MR1319		Construction of un-reinforced wingwalls and RC headwalls H=750 to 2400
MR1320		Crown unit hold down anchors
MR1359		Culverts – Installation, bedding and filling/backfilling against/over culverts
IPWEAQ R-0130		Signs - Street Name Signs
		Road Verge Layout (may be the need for an additional drawing from IPWEAQ
IPWEAQ R-0131		

4.2.3 Linemarking

Line marking shall be in accordance with the Queensland Department of Main Roads, Manual of Uniform Traffic Control Devices (MUTCD) and Queensland Department of Main Roads, Guide to Pavement Markings. Retro Reflective Pavement Markers (RRPM's) shall be applied in accordance with the MUTCD to augment line marking, chevrons and islands. RRPM's shall be used to augment painted lines markings in accordance with Table 4.5 of MUTCD

4.2.4 Signage

Signs shall be in accordance with the Manual of Uniform Traffic Control Devices. Retro reflective material shall be in accordance with Main Roads Specification, ES126-Road Signs

Signposts to be installed set in concrete slab with sleeve and bolted. Vandal proof bolts and fittings are to be used on all permanent signing in accordance with drawing R-0131.

Street naming signs shall be in accordance with drawing R-0130.

4.2.5 Subsurface Drainage

Subsurface drainage on roads shall be in accordance with IPWEA, Standard drawings R-0140 and R-0141. Cleaning points shall generally be provided at the end of each line and at each stormwater pit.

4.2.6 Road Design Requirements

All roads within Urban areas and roads bounded by kerbs shall be AC sealed surfaces.

All rural roads with a grade greater than 16% shall be surfaced with an AC seal in accordance with the prepared design.

A minimum of 0.4% longitudinal grade for roads which have kerb and channel.

4.2.7 Specific Information Requirements

4.2.7.1 Surfacing other than Bitumen for entry treatments

Details on what types of materials are accepted by Council are detailed below.

The pattern of any surfacing (or pattern formed by the joints of any surfacing) shall not cause confusion or be contradictory to the intended or allowable traffic flow. This should be addressed during design planning.

Miriam Vale Shire Council wish to avoid materials which may cause maintenance and operational work complications. It provides for developers and contractors a list of preferred applications which Council consider suitable for whole of life maintenance and appearance considerations.

Should consideration be applied to an alternative treatment, then it is required that associated whole of life and maintenance costs be provided to Miriam Vale Shire Council in conjunction with the submission.

The methods provided below are detailed as methods Council wish to incorporate.

- Asphalt
- Stencilled Asphalt
- Concrete / Stencilled Concrete
- Exposed Aggregate

(a) Asphalt.

Refer to Section 4.2.2 and 4.2.3 for standards and specifications allowable for asphalt surfacing on Council roads. For improved maintenance applications and long term surface management, asphalt surfacing is the preferred surfacing method considered by Council.

(b) Stencilled Asphalt

Council shall consider stencilled asphalt to the details outlined in **Appendix D.**

(c) Concrete / Stencilled Concrete

Concrete shall have a non skid finish, colour and texture appropriate to its purpose.

White/light coloured cements that would not allow white pavement markings to be easily distinguished are not permitted. Concretes shall be coloured with oxides only. Carbon blacks and organic dyes are not permitted.

(d) Exposed aggregates shall have an appropriate skid resistance. Smooth rounded pebbles will not be permitted. Density and inherit properties of the stone shall be such that for the design traffic and speed, significant polishing of the stone will not occur over the design life of the surface. Skid resistance shall be in accordance with the Concrete Association Publication, Road Note 62 - Skid Resistance of Decorative Paving.

Other methods which are not considered as maintenance friendly methods:

(e) Pavers

Pavers or paving tiles shall have a non-skid finish, colour and texture appropriate to their application. Only interlocking concrete pavers (minimum thickness 80mm) shall be used within Council road reserves. For any relaxation of this requirement and why pavers are a more suitable surface over Council preferred options, the developer would need to establish to Council's satisfaction the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed paving system to be used.

Pavers shall generally be installed in accordance with the Cement and Concrete Association Publication, Interlocking Concrete Road Pavements - A Guide to Design and Construction.

Clay pavers are permitted on private driveways not maintained by Council.

A cement treated base (CTB) or concrete pavement shall be provided as a base to all pavers. Where a CTB is used, the pavement shall be sealed with a bitumen Prime sealant at 1.0 l/m^2. At low points, the sand bedding layer for the pavers shall be drained back to the subsoil drain or the underground drainage system.

4.3 ROAD PAVEMENT DESIGN

4.3.1 Standards

- Pavement Design Manual (ARRB)
- Pavement Rehabilitation Manual (Mainroads)
- Road Drainage Design Manual (Mainroads)
- Manual of Uniform Traffic Control Devices
- Guide to Pavement Markings (Mainroads)

4.3.2 Specifications

Flexible pavements, sprayed bituminous surfacing, asphaltic concrete or bituminous microsurfacing shall have the following applied.

- Queensland Department of Main Roads - Standard Specification Roads:Flexible Pavements - MRS 11.05 (12/99)
- Sprayed Bituminous Surfacing - MRS 11.11 (12/99)
- Asphaltic Concrete - MRS 11.30 (12/99), MRS 11.33 (12/99), MRS 11.34 (12/99), MRS 11.36 (12/99)

Other approved specifications shall also been applied where relevant;

- Bituminous Microsurfacing - MRS 11.13 (12/99)

4.3.3 Design Parameters

The following design traffic shall be used. For any relaxation of the requirements specified below, the developer would need to establish to Council's satisfaction the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed system to be used.

Estimated standard axles (ESA) for various road classifications as shown below shall be used in the design of the pavement.

Flexible pavement thickness for roadways shall be based on the following:

- Up to 5 x 10^5 Equivalent Standard Axles (ESA's) - AUSTROADS - A Guide to the Design of New Pavements for Light Traffic (APRG Report 21) In excess of 5 x 10^6 ESA's - Queensland Department of Transport Pavement Design Manual.

4.3.4 Traffic Generation

In some instances it will be necessary to undertake independent assessment of ESA's. The following information is tendered in relation to the above

Residential Traffic generation shall be assessed at 10 trips per allotment/ day.

- Lane distribution of 1 for W<5.5m, as the traffic expected to traverse the same section of pavement in both directions
- 0.5 for W>5.5m

Pavement thicknesses shall be as determined using Austroads DNPLT Manual.

Industrial and Commercial Development design traffic loading shall be calculated by determining traffic generation from the proposed land uses within the development. Full details of these calculations are to be provided with the pavement design. These details are to include sources of traffic generation rates, allotment coverage and vehicle classification distributions. For any variance to this standard, e.g. the traffic generation standards noted in Queensland Streets, the developer will need to submit the appropriate information (calculations) to Council for approval.

4.3.5 Specific Information Requirements

The general design of pavements shall be based on the provisions of the Austroads publication, "A guide to the design of new pavements for light traffic (DNPLT) and the Pavement Design Manual". Additional to this will be the Queensland Department of Transport Pavement Design Manual.

The area to be sealed shall comprise a gravel depth in accordance with the pavement design. Full pavement depth shall be used on road shoulders.

Temporary turnarounds, such as at a development stage boundary, shall comprise a minimum 150mm deep compacted gravel.

Gravel pavement design depth shall be determined by insitu subgrade testing and design CBR testing. This is to be defined on the operational works drawing in addition to the submission of all design calculations outlined.

The design traffic loading shall be shown on the drawings represented by the design CBR (Californian Bearing Ratio) and design ESA's (Equivalent Standard Axles). Pavement calculations and subgrade testing results shall be submitted for approval. Design life shall be 20 years for granular pavements.

Where pavement design is subject to subgrade testing during construction (following excavation or embankment works), the final pavement thickness shall be based on laboratory testing of the soaked CBR of the insitu material. The determined thickness shall be shown on the As Constructed Drawings.

The applicant shall submit all certified design details and calculations as part of the road design requirements for operational works.

The design traffic loading (ESA) and road classification shall be shown on design drawings.

Pavement design calculations and subgrade/CBR test results shall be submitted for endorsement prior to placement of gravel.

The testing is to be carried out by a NATA registered testing company. A period of one working week should be allowed for Council processing and approval of the proposed pavement design.

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

The 'as constructed' drawings shall reflect the actual pavement depths adopted during construction.

4.4 SUMMARY OF URBAN ROAD AND STREET HIERARCHY CHARACTERISTICS

Table 4.4 – Urban Roads and Urban Residential Streets

CRITERION	ROADS						STREETS			
	Arterial Roads			Sub Arterial Roads			Collector Streets		Local Streets	
	Highway / Motorway	Arterial Road	Main Street	Distributor	Controlled Distributor	Main Street	District Collector	Neighbourhood Collector	Access Street	Access Place
FUNCTIONAL CHARACTERISTICS										
Dominant Linkage	Regional	Urban City or Town	Urban City or Town	Suburban or District	Suburban or District	Town or Village Centre	District Cell	Neighbourhood Cell	Individual Sites	Individual Sites
Traffic Carrying Function	Longer distance traffic travelling through the region	Major Access route through large Cities and Towns	Major Access route through large Cities and Towns with direct access to adjacent commercial uses	Main Suburban Access Route through new Communities	Main Suburban Access Route through existing areas	Main Suburban Access Route through towns or villages with direct access to adjacent commercial uses	District access and frontage access with special management characteristics	Neighbourhood access and frontage access up to 300 lots	Frontage access up to 75 lots	Frontage access up to 15 lots
Traffic Volume	No limit	15000 to 65000 vpd	15000 to 35000 vpd	3000 to 35000 vpd	3000 to 20000 vpd	3000 to 15000 vpd	3000 to 7000 vpd	1000 to 3000 vpd	0 to 1000 vpd	0 to 150 vpd
Frontage Access	Nil	Restricted, major developments only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	Restricted, access to commercial uses only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	Restricted, only major developments.	Restricted, no new access. Apply frontage access techniques to existing accesses (see Section 4.5.4)	Restricted, commercial access only. Apply frontage access techniques to existing accesses (see Section 4.5.4)	In accordance with frontage access techniques (see Section 4.5.3)	Yes	Yes	Yes
Speed Environment	100 km/hr	70 to 80 km/hr	50 or 60km/hr	60 or 70 km/hr	50 or 60 km/hr	40 or 50 km/hr	60 km/hour	50 km/hr	30 or 40 km/hr	< 30 km/hr
Intersects with:	Arterials, sub-arterials	Highways, arterials, sub-arterials, collectors	Arterials, sub-arterials, collectors	Highways, arterials, sub-arterials, collectors	Highways, arterials, sub-arterials, collectors	Arterials, sub-arterials, collectors, access streets	Arterials, sub-arterials, collectors, access streets	Arterials, sub-arterials, collectors, access streets	Collectors, access streets, access places	Access streets
Truck Route?	Yes	Yes	Inappropriate except for access	Yes	Yes	Inappropriate except for access	Inappropriate except for access	No	No	No
Dangerous	Yes	Yes	Inappropriate	Selected	Selected	Inappropriate	No	No	No	No

CRITERION	ROADS						STREETS			
	Arterial Roads			Sub Arterial Roads			Collector Streets		Local Streets	
	Highway / Motorway	Arterial Road	Main Street	Distributor	Controlled Distributor	Main Street	District Collector	Neighbourhood Collector	Access Street	Access Place
Goods Route?			except for access	Routes only	Routes only	except for access				
Public Transport	Routes, not stops	Routes and stops	Routes and stops	Routes and stops	Routes and stops	Routes and stops	Routes and stops	Routes and stops	Nil	Nil
Cycle Facilities	Regional, off-road only	Off-road and on-road	Off- road and on-road	Off-road and on-road	Off-road and on-road	Off-road and on-road	Off-road and on-road	On-road (shared)	On-road (shared)	On-road (shared)
Pedestrian Facilities	Grade separated, separate from Road	Shared paths both sides	Footpaths both sides	Shared paths both sides	Shared paths both sides	Footpaths both sides	Shared path one side, footpath one side	Footpaths both sides if bus route, one side otherwise	Nil, unless part of a specific network route	Nil, unless part of a specific network route
FRICTIONAL CHARACTERISTICS										
Intersection treatments	Grade separated	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Signal, Roundabout, Priority T	Roundabout, Priority T, Signal	Roundabout, Priority T	Priority T	Priority T
Pedestrian Crossings	Grade separated	Grade separated, signalised or refuge	Signalised or refuge	Signalised or refuge	Signalised or refuge	Signalised or refuge	Signalised or refuge	Refuge	No specific provision	No specific provision
Desirable Intersection spacing	> 2km	>500m	>150m	300m	150m	150m	80-100m	40-60m	40m	15m
Reserve Width	40 - 100m	30 - 65m	37-45m	25-35m	20 - 30m	20 - 30m	20 - 25m	16 - 20m (20m required for bus routes)	16.5m	14m
Number of Moving Lanes	Two-way, 2 to 6 lane	Two-way, 2 to 6 lane	Two-way, 2 or 4 lane	Two-way, 2 or 4 lane	Two-way, 2 or 4 lane	Two-way, 2 lane	2	1 or 2 (2 required on bus routes)	1 or 2	1 or 2
Parking Lanes	Breakdown only	Breakdown only	Parking lane or indented parking both sides	Breakdown only	Parking lane with restrictions or indented parking both sides	Parking lane or indented parking both sides	Parking lane or indented parking both sides	2 or 1 (2 required on bus routes)	Parking unmarked or indented on one side	Parking unmarked or indented on one side
Typical Longitudinal Drainage	Swale drain	Kerb & Channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel	Kerb & channel
Verge Width (min)	N/A	5m	4.5m	5m	4m	4m	3.5-4.25m	4.25m	4.25m	4.25m

CRITERION	ROADS						STREETS			
	Arterial Roads			Sub Arterial Roads			Collector Streets		Local Streets	
	Highway / Motorway	Arterial Road	Main Street	Distributor	Controlled Distributor	Main Street	District Collector	Neighbourhood Collector	Access Street	Access Place
Carriageway cross-section	Volume Driven, specific advice must be sought	Volume Driven, specific advice must be sought	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	See Section 4.5 for Acceptable solutions	5.5 – 6m

Notes to Table

a) There will be existing routes that do not have all of the characteristics expected for their role in the hierarchy, which is primarily dependent on function of the route in the network, rather than its design or construction characteristics. However, newly proposed roads will be expected to have all the listed characteristics.

b) .

c) It is desirable to retain frontage residential access to district collector routes. However, this will necessitate other measures to maintain appropriate safety and amenity standards.

d) In the planning of streets where high density residential development is likely, particular attention will be necessary to the provision of on-street parking, usually requiring wider pavements and reservations. Assuming that the off-street parking requirements described are achieved, on-street parking must be provided at a minimum rate of one space per two detached houses (desirable rate is 2 spaces per 3 detached houses), plus one space per three 3 or 4 bedroom attached dwelling units, plus one space per four 1 or 2 bedroom attached dwelling units.

e) Frontage access, which is described as restricted, will be carefully controlled to minimise the number, location and external impact of access points, particularly if site access is also available to other roads. This may necessitate shared site access driveways, or the construction of controlled site access intersections. Site access will only be permitted where it can be demonstrated that the access proposed will not have an unreasonable impact on the safety and operation of the traffic, transport, pedestrian and cyclist networks.

f) Where access is described as restricted, median widths will depend on signage or traffic control requirements, and the need for the incorporation of turn lanes.

g) To achieve the speed environments described in Table for urban residential streets, speed management techniques, possibly including speed control devices, will be necessary, in a fully integrated design.

h) Verges are measured from the kerb invert (outside edge of shoulder in the case of swale drains) to the reserve boundary, excluding cut / embankment batter slopes. Verge widths will depend on the needs for off-road cyclist facilities, pedestrian paths and service corridors.

i) Reserve widths will need to be increased accordingly where cut / embankment batter slopes are required to achieve the road formation.

j) Footpaths wider than 1.5 metres and shared paths wider than 2.5 metres will be required where high pedestrian and/or cyclist volumes are expected. Verge and reserve widths are to be increased accordingly. In commercial and high activity areas, verges should be fully paved.

4.5 RURAL RESIDENTIAL STREETS

Rural residential streets shall be designed and constructed with the characteristics described in Table 4.5.

Table 4.5

CRITERION	RURAL ROADS				RURAL RESIDENTIAL STREETS			
	Arterial Roads		Sub Arterial Roads		Collector Streets		Local Streets	
	Highway/ Motorway	Rural Arterial	Distributor	Controlled Distributor	District Collector	Neighbourhood Collector	Access Street	Access Place
FUNCTIONAL CHARACTERISTICS								
Dominant linkage	Refer to Rural Areas Table for details of the Arterial / Sub-Arterial Network				District cell	Neighbourhood cell	Sites	Sites
Traffic carrying function					3000 - 5000 vpd	800 - 3,000 vpd	0 - 800 vpd	0 - 300 vpd
Residential access function					In accordance with frontage access techniques (see Section 4.5.3)	Individual	Individual	Individual
Traffic speed environment					Terrain dependant, =< 100 km/ h	60 km/h (speed control by alignment)	45 km/h with speed control devices	45 km/h with speed control devices
Heavy traffic movement					Access only	Access only	Access only	Access only
Dangerous goods movement					Inappropriate except for access	Inappropriate except for access	Inappropriate except for access	Inappropriate except for access
Public transport facilities					Bus route	School Bus route	N/A	N/A
Cycle facilities					On-road – sealed shoulders	On-road - shared	On-road - shared	On-road shared
Pedestrian facilities					No specific provision	No specific provision	No specific provision	No specific provision
FRICTIONAL CHARACTERISTICS								
Intersection treatments	Refer to Rural Areas Table for details of the Arterial / Sub-Arterial Network				Roundabout/ priority	Priority	Priority	Priority
Typ. Intersection spacing					>100m	>100m	>100m	Nil
Reserve width (not including embankments)					30m	25m	20m	20m
Parking provision					No specific provision	No specific provision	No specific provision	No specific provision
Bus stopping provision					Off carriageway	Off carriageway	N/A	N/A
Max travel distance to the road system					N/A	800m (2000m in total)	1200m	1200m
Verge width					10m	8m	5.0m min. (7.0m typical)	5.0m min. (7.0m typical)

Sealed pavement width		10 m sealed 10 m formation	8.0 m sealed Driveover kerb & channel	6.0 m sealed Driveover kerb & channel	6.0 m sealed Driveover kerb & channel

Notes to Table

1. Urban residential subdivisions must not gain access via rural residential local roads.
2. The major traffic design issue in rural residential subdivisions is the control of vehicle speed which is made more difficult (if not impossible) if travel distances on local roads are excessive. Even with travel distances constrained in accordance with the requirements of Table 4.9.1, horizontal and vertical alignments and intersection design will need to be closely coordinated to avoid areas of excessive speed. The horizontal geometric design and intersection designs of rural residential streets must be integrated to achieve the speed environments described without the use of specific speed control devices.
3. Higher order rural roads must be designed in accordance with the requirements for major roads described in the rural road and streets hierarchy Table 4.4.
4. Where rural district collector streets or Sub-arterial roads pass through rural residential areas, and frontage access is permitted, kerb and channel must be placed on an alignment abutting the nominated 10m width.
5. Where the building envelope in Rural Residential areas is proposed within 15m of a road or street, additional widening is required to accommodate on-street parking at the desirable rate of one space per each lot.

4.6 INTERSECTIONS

Intersections are generally designed in accordance with the requirements of the DMR Road Planning and Design Manual and the Austroads Guide to Traffic Engineering Practice.

Intersection treatments are generally selected as a result of traffic analysis along with safety and operational considerations, undertaken in a traffic impact assessment report as detailed in Section 2 of this policy.

Typically accepted intersection treatments for various types of Urban Roads and Streets are outlined in Table 4.5.

On Urban District Collector Streets all priority controlled intersections must have separate right turn lanes. As a minimum, flaring for left turns must also be provided, with separate left turn lanes installed where high left turn movements are anticipated. (typically where left turning volumes greater than 20 veh/hr are expected). The geometry of left and right turn lanes must be based on the DMR Road Planning and Design Manual, Chapter 13 Intersections at Grade.

Provision for U-turns must be made at intersections on streets that include a centre median in the cross section.

Where permitted, site access for larger commercial, residential, retail or mixed use developments onto Urban District Collector Streets or Sub Arterial Roads should address the requirements of intersection design.

4.7 SPEED CONTROL

Speed Control must be introduced to Urban Residential Streets and Rural Residential Streets to achieve the speed environment listed in Table 4.4 and listed in the notes for the urban residential street cross sections in section 4.5.2. Speed control is required on these streets to achieve a low speed environment that is safe for pedestrians and cyclists and is compatible with the amenity of the residential area.

It is preferable that speed control devices are avoided wherever possible and that the maximum target design speeds are achieved by tight bends (greater than 60^{o}) and by roundabouts at intersections.

Speed Control devices are not accepted on Bus Routes unless they are designed to enable safe and comfortable movement by buses, ie without mounting kerbs or causing buses to swerve.

The guidelines in Queensland Streets for control of traffic speed must be followed when planning and designing street alignments and speed control devices on new residential streets.

In circumstances where speed control devices can't be avoided in order to achieve the maximum target speeds specified in Table 4.4.1 the type of devices specified in Queensland Streets must be used.

Speed control is generally achieved by reducing the length of straight sections of street to:

- 75m or less where the target speed is 30km/h,
- 120m or less where the target speed is 40km/h,
- 140m or less where the target speed is 50km/h

These target lengths are based on the assumption that design speeds of 20km/h or less are achieved on bends, or roundabouts, or at speed control devices.

4.8 ON STREET PARKING

In the planning of streets where high density residential development is likely, particular attention will be necessary to the provision of on-street parking, usually requiring wider pavements and reservations.

Assuming that the off-street parking requirements described in Schedule 2 to the Transport, Traffic and Parking Code are achieved, on-street parking must be provided at a desirable rate of 2 spaces per 3 detached houses, or at an absolute minimum rate of one space per two detached houses, plus one space per three 3 or 4 bedroom attached dwelling units, plus one space per four 1 or 2 bedroom attached dwelling units.

At least 75% of the on street spaces required must be located within 25m, and 100% of the spaces required must be located within 40m of the closest lot boundary.

Cul-de-sac and small lot (less than 15m frontage) locations require, in addition, indented bays or other special provision for parking. Additional on-street parking space is also required near parks and other community facilities.

4.9 SITE ACCESS

4.9.1 General

Site access driveways will generally be configured as concrete crossings, but may in special circumstances be configured as roadway approaches to traffic signal, roundabout or priority controlled intersections.

Generally, only one site access driveway will provide access to an individual site. Additional driveways shall only be approved for major developments where it can be demonstrated that the purpose of the code is best met with additional driveways.

Generally, site access driveways will be to the more minor road where a development site has frontage to two or more roads, except where the generated traffic would impact adversely in respect of amenity or safety.

Site access driveways will generally be required to satisfactorily accommodate light vehicles and service vehicles. In some major developments, separate driveways for heavy vehicles may be appropriate where it can be demonstrated that this leads to safer traffic operations or reduced impact on the external road network.

4.9.2 Access and Driveways

Development	Minimum Access Strip Width (m)	Minimum Driveway Width (m)	Passing Bay Requirement	Maximum Grade (%)	Seal	Stormwater Drainage
Residential (1 Lot only)	6	3.0	Yes (5.0m) (No)	20 (20)	Yes (Yes)	ARI 2 underground
Commercial and Industrial	8	6.0	N/A	8	Yes (Concrete)	ARI 10 underground
Rural Residential	10	3.0 (5.0 formation)	Yes (5.5m on a 7.5m formation)	20	Yes	ARI 2 Culverts and Table Drains

Construction of accesses and driveways will be required on lots with steep slopes to building sites, on lot frontages with visibility constraints and on access strips or access easements serving allotments.

Site access driveways and their splays at the kerb line should not extend beyond the frontage of the site (normal to the frontage) unless a joint access driveway is proposed.

Access to lots should be in accordance with AS2890, MVSC-R01a, MVSC-R01b or MVSC-R02 with driveways meeting the natural surface level at the front property boundary. The cross section of the verge should conform to Queensland Streets.

Details are to be provided of available clearances for sight distance regarding location of residential and industrial property accesses.

In addition to the other driveway location requirements of this Policy, site access driveways shall be located consistent with the requirements of Table - Driveway Locations as well as satisfying the requirements of the rural property access and residential property access standards detailed below.

4.9.3 Driveway Location

Site access driveways and their splays at the kerb line should not extend beyond the frontage of the site (normal to the frontage) unless a joint access driveway is proposed.

In addition to the other driveway location requirements of this Policy, site access driveways shall be located consistent with the requirements of Table 4.9.3.

Table 4.9.3

Type of Frontage Road	Adjacent Feature	Minimum Separation of Proposed Minor Driveway from Adjacent Feature (TP to TP along kerb)
Urban Street	Minor intersection Major intersection Other driveway Controlled intersection	10 metres 20 metres 3 metres between extent of splays Clear of 95th percentile queue areas and turn lanes
Rural Road	Minor intersection Major intersection Median break Other driveway Controlled intersection	20 metres 30 metres 15 metres (or twice one-way carriageway width, whichever is greater) 15 metres Clear of 95th percentile queue areas and turn lanes

Notes to Table 4.9.3:

1. TP is tangent point of curve at intersection or driveway.
2. A major intersection is defined as an intersection controlled by traffic signals or a roundabout, or where a median break is provided on the major road at a priority-controlled intersection of a minor road and a major road.

4.9.4 Driveway Type Selection

Driveways should be constructed generally as shown in Figure 4.9.4, with the driveway type and width defined by Table 4.9.4. For Type "C" driveways, the first width nominated is the width of the entry driveway, followed by the width of the exit driveway.

Figure 4.9.4

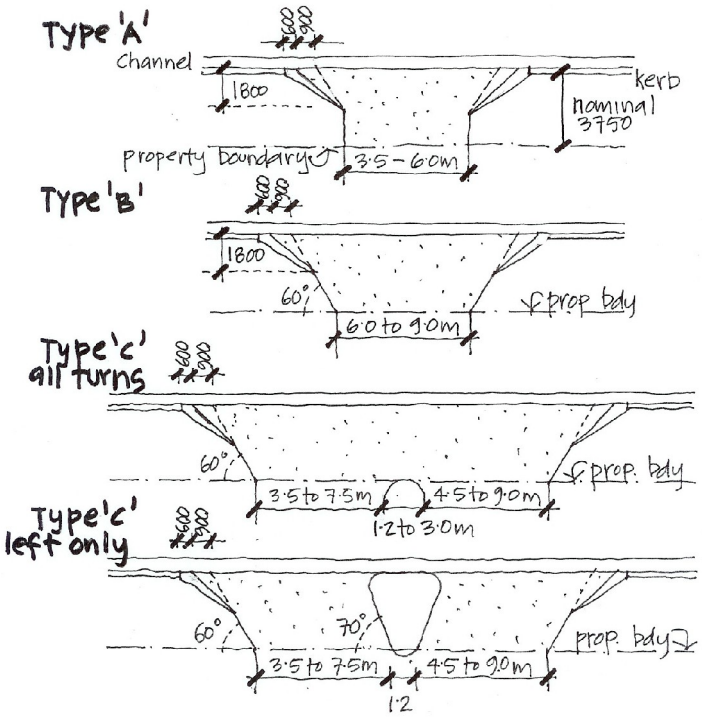


Table 4.9.4

Type of Frontage Road	Driveway Traffic Volume	Driveway Type for Vehicle:					
		Van / Car Only	SRV	MRV	LRV	WCV	AV
Street	< 25 vph	A6.0	B6.0	B7.0	B7.5	B7.5	B9.0
	> 25 vph	B6.0	B7.0	B7.5	B9.0	B9.0	B9.0
Road	< 25 vph	B7.0	B7.5	C6.0/4.5	C7.5/6.0	C7.5/6.0	C9.0/7.5
	> 25 vph	C4.5/3.5	C5.5/4.0	C6.0/4.5	C7.5/6.0	C7.5/6.0	C9.0/7.5

Note to Table4.8.4:

3. Traffic volumes described are during design peak period.
4. Where traffic volumes are low (typically less than 25 vehicles per hour two-way), it may be appropriate for the driveway width and type adopted to be based on the premise that the largest service vehicles expected to visit the driveway infrequently will use the full width of the driveway.

4.10 ROAD PLANNING CONSIDERATIONS

Where permitted, access to Arterial or Sub-arterial roads will generally be restricted to left-turns only, except where it can be demonstrated that the impact of the development on the community is reduced through the provision of right turn or U-turn access, and that the development with right turn access is more consistent with the purpose of the code.

Where access is restricted to left turns, such turns shall be controlled by existing medians or through the construction of a raised concrete or appropriately landscaped median. Where it is impossible to provide a median, turns will be restricted by a combination of driveway geometry, turn prohibition signs and pavement markings.

Intersection spacing on major roads must be in accordance with Section 4 of this policy and the requirements of Austroads Guide to Traffic Engineering Practice Part 5.

Where right turn ingress is proposed from Arterial and Sub-arterial roads, a separate right turn lane will normally be required. Turn lanes must be designed in accordance with the DMR Road Planning & Design Manual. The minimum dimensions of a left turn or right turn lane in constrained circumstances should be a 20 metre taper plus a 30 metre parallel storage lane.

Constructed road widening and dedication of land may be necessary as a result of median construction or widening, or the provision of right or left turn lanes associated with the proposed driveway.

Even where construction of a median break or a right turn lane is required as a condition of development, Council always retains the right to close a median break at any time in the future to improve safety or network traffic operations.

4.11 SIGHT DISTANCE REQUIREMENTS

Sight distances at driveways must comply with the requirements of the DMR Road Planning & Design Manual. Reduced sight distances will only be considered where there is no practical alternative, and where specific traffic design or control measures have been taken to minimise hazards.

Sight distance requirements may require the tapered set-back of buildings or landscaping from the property boundary.

Further, the opening in a building constructed on the front alignment should be set back at least 2.0 metres from each side of the driveway to allow drivers to have minimum visibility of pedestrians on the footpath.

Service vehicles, particularly large trucks require substantially longer gaps in traffic to complete turning, crossing and merging manoeuvres. Where truck volumes are significant, sight distance requirements should be increased to take account of site-specific circumstances.

4.12 PROVISIONS FOR QUEUES

4.12.1 Queues at Driveways

Queue lengths are to be measured along the driveway from the property boundary to the first parking space or internal intersection. Queues may be permitted adjacent to low turnover parking spaces in some circumstances. Each queued vehicle will be assumed to occupy a space 6.0 metres long.

The length of a design queue is dependent on a number of factors, including:

- The form of control at the driveway intersection,
- The nature of the external road and the traffic volumes carried,
- The size of the car park and the turnover rate,
- The design of the internal traffic and parking system.

When queue lengths can reasonably be calculated using conventional intersection analysis techniques, the design queue shall be the peak design period 95th percentile queue. In the absence of appropriate queue length calculations, the minimum queue provision on entry and exit shall be as set out in Table 4.12.1. Greater queue provisions may be required in some cases.

Table 4.12.1

Nominal Car Park Capacity	Design Queue Length
5 - 20	1
21 - 50	2
51 - 100	3
101 - 150	4
151 - 200	5
201 - 250	6
251 - 300	7
Over 300	2.25 percent of nominal capacity (rounded upwards)

The minimum queue provision for any driveway shall be one vehicle at entry and one vehicle at exit.

If a site has more than one driveway, the queue provisions should be calculated on the basis of the proportion of the site served by each driveway.

4.12.2 Gated and Controlled Driveways

The above requirements are based on uncontrolled entry and exit with no gates. At sites with security gates, the design queue is to be accommodated between the property boundary and the gate, and with provision for a light vehicle to turn on the site if declined entry.

4.12.3 Internal Queue Provisions

Queuing lanes shall be not less than 3.0 metres wide (when straight) with separate provision for pedestrian service where necessary, and geometry must facilitate easy ingress and egress. Where queue areas are curved, the queue lanes shall be widened based on the turning paths of 99th percentile cars.

4.13 TRAFFIC CONTROL SIGNAGE

Direction, regulatory, warning and information signs are to be erected on-site to control traffic movements and to warn of potential hazards. Signage also includes pavement markings.

All traffic/parking control signs and pavement markings are to conform to the requirements of the Manual of Uniform Traffic Control Devices (Qld). All signs and line marking are to be self illuminated or reflectorised in accordance with current Queensland and Australian standards.

Direction signage at the site frontage and within the site is to be provided in respect of:

- The location of site access driveways and car parking areas, particularly rear parking areas,
- Where visitor or public parking is not visible from the frontage road or access driveway.

4.14 EXISTING STREETS/ROADS

In addition to the determination of traffic generation for the new development, it shall be necessary to determine the existing traffic volumes and classifications. Council may be able to provide such data. If no Council data is available, a minimum of a 12 hour traffic count on one day shall be undertaken by a suitably qualified person and in accordance with Austroads survey standards. This day shall be a normal weekday without any abnormal traffic patterns.

4.15 PAVEMENT SURFACING REQUIREMENTS

Surfacing of all urban roads and rural urban roads bounded by kerb shall generally be with dense graded asphalt surfacing. A bitumen chip seal (10mm aggregate) shall be used in conjunction with all asphalt surfacing.

Asphalt for subdivisional works shall be MRD Standard Specification dense graded road surface asphalt. Surfacing in urban and rural urban, roads bounded by kerb shall be asphalt. Asphalt 50mm thick and greater may be considered as part of the design pavement thickness. Surfacing below asphalt shall consist of a prime with surface aggregate.

Other areas shall be a two coat sprayed bitumen seal. Bitumen seals consist of a prime + 2 coat hot bitumen seal consisting of a 16mm aggregate + 10mm aggregate in accordance with prepared seal design.

Surfacing for rural access roads shall be a two coat sprayed bitumen seal. The bitumen seal shall consist of a prime +2 coat hot sprayed bitumen seal with 16mm aggregate in accordance with a prepared deal design.

4.16 VERGE AND FOOTPATH DESIGN AND CONSTRUCTION

4.16.1 Standards

Footpaths to be built to standard defined in Council standard drawings.

4.16.2 Specifications

Specification details defined on Council standard drawings where applicable.

4.16.3 Standard Drawings

Footpaths		
The pathway construction shall be in accordance with the IPWEAQ R-0065 Standard Drawing but with a nominal thickness of 100mm	Yes	Concrete Strip Footpaths

4.16.3.1 Connection of Stages

Developments constructed in stages are to make an allowance for interconnecting access pathways and bikeways.

Conditions to be considered include the following:

- sufficient for pedestrian and bicycle movements;
- have consideration for lighting and safety aspects;
- access for maintenance access and attendance;
- treatment for stormwater management and overland flow considerations;
- maintenance practice and long term maintenance costs of the pathway;
- impact on adjoining neighbours; and
- Compliance with requirements defined in Councils Pathway and Bikeways Management Plan.

4.16.3.2 Specific Information Requirements

Miriam Vale Council advise that all operational work details of proposed footpath and bikeway details are required.

4.17 BIKEWAY DESIGN & CONSTRUCTION

4.17.1 Standards

Bikeways to be designed and constructed in accordance with Councils bikeways details and AUSTROADS - Part 14.

4.17.2 Standard Drawings

Bikeways		
IPWEAQ P-0010		Entrance to Road Reserve
IPWEAQ P-0012		Pavement Joints
IPWEAQ P-0013		Slowdown Control, Reverse Curve
IPWEAQ P-0015		Slowdown Control, Offset Chicane

4.17.3 Development of the Bikeways Network

If development is proposed for land which is on or adjoining a proposed bikeway identified as part of the Shire Bikeways Network, or the development is likely to have a major impact on the network, the proponent is required to give consideration to the bikeway.

Where reasonable or relevant, Council will require as a condition of approval:

- construction of that part of the proposed bikeway network which traverses or adjoins the subject land and provision of appropriate on-site bicycle facilities; or
- contribution to be paid towards the construction of the bikeway and provision of on-site bicycle facilities and reservation of land for the future construction of the proposed bikeway and facilities.

4.17.4 Provision of Local Bikeway Networks

In new residential subdivisions, in addition to addressing any relevant bikeways as identified from the Shire Bikeways Network, Council requires the identification and construction of appropriate Local Bikeway Networks to provide access to schools, community facilities, parkland, shops, and to link to the Shire-wide Bikeways Network.

In new residential subdivisions, the proposed plan of layout must identify the proposed Local Bikeway Network. The proposed network and construction standards are subject to Council approval.

Where reasonable or relevant, Council will require as a condition of approval:

- construction of the Local Bikeway Network and provision of appropriate on-site bicycle facilities; or
- contribution to be paid towards the construction of the Local Bikeway Network and provision of on-site bicycle facilities and reservation of land for the future construction of the proposed Local Bikeway Network and facilities.

4.17.5 Provision of Bikeways on New Roads and Road Upgrades

Bikeways must be considered on all new roads and road upgrades in the Shire. Appropriate bikeways, in accordance with this Policy, are to be included in the design and construction of the following road types:

- arterial roads;
- sub-arterial roads; and
- collector roads.

4.17.6 Other Infrastructure

Safe bicycle movement, in accordance with this Policy, must be provided for in the design and construction of infrastructure works such as bridges, pedestrian overpasses/underpasses and streetscape improvements.

4.17.7 Provision of Bicycle Parking Facilities

Appropriate bicycle parking facilities are to be incorporated into development likely to attract or generate significant numbers of bicycle trips. For example, a swimming pool, caravan park, an office building, a community facility, an educational facility, etc. Bicycle parking facilities are required to be conveniently located and easy to find.

4.17.8 Provision of Signage and Line Marking

Appropriate signage and line marking is required in accordance with the Austroads Guide to Traffic Engineering Practice, Part 14 - Bicycles and the Manual of Uniform Traffic Control Devices, Part 9 - Bicycle Facilities.

4.18 SPEED CONTROL DEVICE DESIGN & CONSTRUCTION

4.18.1 Standards

Council's preference is for target speeds to be achieved by road alignment rather than using speed control devices. However, where speed control devices are required the following standards apply:

- Queensland Streets
- Manual Uniform Traffic Control Devices

4.18.2 Specifications

No specific details for construction of speed control devices. However, they are to be constructed using the general road construction standards outlined in this policy.

4.19 STORMWATER DRAINAGE

4.19.1 Standards

Stormwater drainage is to be designed and constructed in accordance with the following:

- Queensland Urban Drainage Manual;
- Australian Rainfall and Runoff

4.19.2 Specifications

MRS11.03	Drainage, Retaining Structures and Protective Treatments	12/93	9/97
SET-MRS11.04	General Earthworks	12/93	9/97

4.19.3 Standard Drawings

MRS11.24	Manufacture of Precast Concrete Culverts	12/93	
MRS11.25	Manufacture of Precast Concrete Pipes	12/93	8/97
MRS11.27	Manufacture of Fibre Reinforced Concrete	12/93	
MRS11.03	Drainage, Retaining Structures and Protective Treatments	12/93	9/97
Drainage			
IPWEAQ R-0140		Subsurface Drainage	
IPWEAQ R-0141		Subsurface Drainage Details at Medians/Islands	
Access Chambers			
IPWEAQ D-0010		Access Chamber – Details 1050mm to 2100mm	
IPWEAQ D-0011		Access Chamber – Roof Slabs 1050mm to 2100mm	
IPWEAQ D-0012		Access Chamber – Roof Slabs □ 1500 Extended 600 x 900	
IPWEAQ D-0013		Access Chamber – Rectangular, Standard Reinforcement	
IPWEAQ D-0014		Access Chamber – Cast Iron Cover and Frame, C.I. Conc. Filled Cover	
IPWEAQ D-0015		Cast Iron Cover and Frame, Bolt Down	
IPWEAQ D-0017		Roof Slab, Rectangular, Fabric Reinforcement	

Backfill and Bedding		
IPWEAQ D-0030		Excavation, Bedding & Backfill of Concrete/Fibre Reinforced Pipes
IPWEAQ D-0031		Excavation, Bedding & Backfill of Precast Box Culverts
IPWEAQ D-0041		Kerb and Field Inlets
IPWEAQ D-0050		Field Inlet- Field Inlet and Overflow Gully, Type 1 and 2
IPWEAQ D-0061		Gully – Precast Lintel Details
IPWEAQ D-0062		Grate and Frame Details
IPWEAQ D-0063		General Arrangement – Channel and Lip in Line
IPWEAQ D-0069		Precast Units Sag and Anti Pond – Lip in Line Only
The following are located on Main Roads website.		
MR1132		Construction of RC Deck and Kerbs
MR1179		Construction of base, aprons, walls and wings
MR1303		Construction of RC wingwalls and headwalls
MR1304		RC pipeculverts – construction of RC wingwalls and aprons for pipe dia up to 2400
MR1305		General arrangement and installation of wingwalls, headwalls and aprons
MR1306		Construction of un-reinforced wingwalls, headwalls and aprons
MR1316		General arrangement and installation of precast units
MR1317		Construction of nibs and aprons
MR1318		Construction of bases and recesses and aprons
MR1319		Construction of un-reinforced wingwalls and RC headwalls H=750 to 2400
MR1320		Crown unit hold down anchors

4.19.4 Inter-allotment or Roofwater Drainage

(i) General Requirements

Roofwater drainage systems and inter-allotment drainage sections will be classed as private drains and future maintenance responsibility will vest with the property owners. An easement in favour of all upstream property owners (for inter-allotment drains) will be required (minimum width 1.5 metres).

Inter-allotment drainage systems or roofwater drainage systems that take more than one allotment are not to discharge to the kerb and channel of the road. The inter-allotment drainage systems or roofwater drainage system is to be connected to a Council gully pit, field inlet, or manhole to the satisfaction of Council. A connection point at the lowest point is to be provided for each property.

All rear of allotment (roofwater) drainage systems must discharge to a Council gully, field inlet, etc. and not to the kerb and channel. Inspection pits are to be provided at regular intervals along the roofwater drainage.

At least one connection point, generally at the lowest point, shall be provided for each property. This connection point is to be a minimum of 100mm in diameter for urban residential - Low Density, 150mm for urban residential - High Density and 225mm for commercial or industrial development.

(ii) Residential Subdivisions

All allotments which do not fall at least 1 in 200 towards the road reserve must be provided with a rear inter-allotment roofwater drainage system in accordance with QUDM Section 5.18. Level II is required for “Urban Residential – Low Density” lots, while Level III will be required for all other classes of residential development (except rural or rural residential). This roofwater drain will be required regardless of the downhill property type.

For allotments which do fall towards the road reserve, two kerb adaptors are to be provided and conform to IPWEA Standard Drawing R-0081. One should be located at the centre of the block and

the other 500mm from the common boundary on the low side. Where a concrete footpath is to be constructed, a 90mm diameter UPVC pipe shall extend from the adaptor to the property boundary (refer to Figure 4.19.1 Residential Outfall towards the Road).

At least one connection point, generally at the lowest point, shall be provided for each property. This connection point is to be a minimum of 100mm in diameter for "Urban Residential - Low Density" and 150mm for "Urban Residential – High Density".

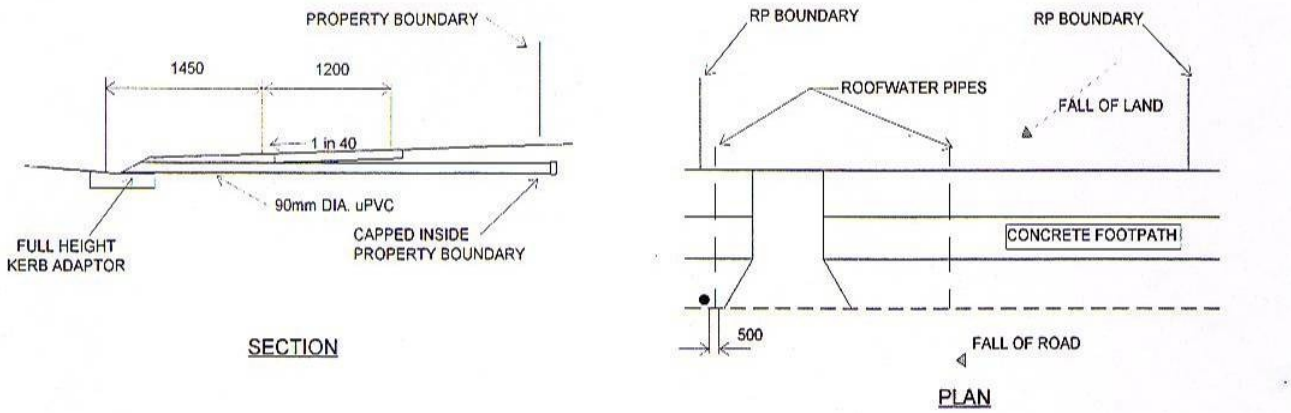


Figure 4.19.1 - Residential Outfalls towards the Road

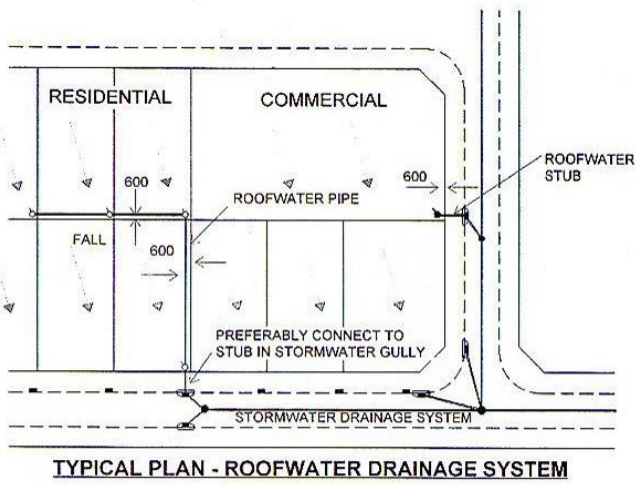
(iii) Industrial, Commercial Subdivisions

Should the land fall away from the road reserve, roofwater drainage must be provided in accordance with QUDM Section 5.18 (Levels III, IV & V).

For land which falls towards the road reserve, the roofwater system shall be piped and connected to the trunk drainage system, preferably at a manhole or gully. A stub shall be provided in new drainage systems for this purpose, located 600mm within the front property boundary. This must also be within 1.2 metres from the common boundary on the low side (refer Figure 4.19.2 - Inter-allotment Drainage Locations). Where a site is being redeveloped the lot must be reconfigured to ensure that these requirements are met.

Figure 4.19.2 - - Inter-allotment Drainage Locations

At lease one connection point, generally at the lowest point, shall be provided for each property. This



NOTES:
1. Minimum cover to roofwater pipes to be 450mm.
2. Roofwater drainage systems shall discharge into gully or stormwater manhole.

Roofwater Inspection Manhole with 150mm dia. Stub and end cap.

U.P.V.C. 'Y' Junction with 150mm stub and endcap.

Kerb Adaptors.

connection point is to be a minimum of 225mm for commercial or industrial development.

(iv) Rural Residential Subdivisions

Allotments which are less than 2000m2 in area and have on-site effluent disposal require inter-allotment drainage. This should be designed as per "Urban Residential - Low Density".

4.19.5 Specific Information Requirements

The following information must also be provided:

- A letter of approval from the adjacent (or downstream) property owner(s) accepting that the development proposes to discharge an altered or concentrated flow of stormwater runoff onto their property. Failing this, stormwater flows must be kept to pre-developed runoff volumes, peak rates and overall catchment response, or else the development will not be permitted to proceed.
- Information describing the method used in the selection of soil erosion and sediment control practices. Information should also be provided as to the commencement and completion dates of various stages of the development and the type of final stabilisation.
- Hydraulics calculations supporting the design of culverts, channels, drop structures, overland flow paths or and other methods used for stormwater runoff conveyance.
- Hydrology and/or hydraulic calculations for the design of water quality treatment facilities, including inlets, outlets, high level outlets, etc.
- Proposed management strategy or plan for water quality treatment facilities.

The following information may also be required:

- Information proving that upstream and/or adjacent flood levels will not be aggravated.
- Proof that the existing downstream drainage system will adequately cater for the altered stormwater runoff conditions (if any).
- The estimated Q100 flood contours for all flows on natural drainage corridors, designed channels or overland flow paths.
- Details, including hydrological, hydraulic and structural, of any interim drainage requirements for staged subdivisions or developments.

Drainage is to be designed and constructed in accordance with the following:

- Inter-allotment drainage systems are provided to all lots where any part of the lot falls away from the frontage roadway and are designed in accordance with QUDM Section 5.18;
- Easements created over all inter-allotment drainage systems;
- Pipe bedding and backfill are in accordance with Specification - Sewer Reticulation for uPVC pipes, and Specification No. 4.19.5 - Stormwater Drainage for RC and FRC pipes;
- Pipe materials are uPVC sewer pipe minimum class SH; uPVC drainage pipe PLASCOR or equivalent, of equivalent class to uPVC sewer class SH; R.C. pipe class "1" rubber ring jointed; or F.R.C. pipe class "2" rubber ring jointed;
- uPVC pipes are either rubber ring jointed or solvent weld jointed. Standard manufacturer's fittings are used in both cases;
- The minimum pipe size for inter-allotment drainage is 225mm diameter;
- Inspection Manholes are cast insitu concrete boxes, or precast FRC or RC pipe systems to the dimensions shown in Table 4.19.3 below;
- FRC and RCP systems are constructed by embedding the lower precast section into a wet cast-insitu concrete base. Cut outs for pipe penetrations are made using concrete saws/drills while minimising damage to the adjacent pipe materials;
- Lids to cast-in-situ manholes are light duty, close fitting bolt down cast iron or galvanised steel, concrete infill type (Gatic Light Duty, Polycrete Broadstel or similar) of approximately the same internal dimensions as the manhole;
- Lids to FRC and RCP manholes are in accordance with the manufacturer's proprietary concrete or concrete infill type;
- Lids match finished surface ground slope and sit 25-50 mm proud, and are marked "stormwater" impressed into the concrete infill;
- Infill concrete is Class N25;
- uPVC pipe and kerb adaptors are used where discharge is into the kerb and channel, or for commercial, industrial and community title premises, steel rectangular hollow section hotdip

galvanised pipe are used with the pipe being placed on compacted sand bedding and the opening to the kerb is either formed at the time of kerb and channel construction or saw cut and reinstated neatly with mortar;

- Inter-allotment drainage lines are located 0.5 metres from rear or side boundaries within the properties served;
- Manholes are located at a maximum spacing of 100 metres, at changes of grade, at changes of direction, changes of pipe diameter, at ends of lines, and 0.5m to 1.5m from boundaries;
- At least one connection point provided to serve each lot, with a minimum 100 mm diameter located 0.5m to 1.5m from the lowest property boundary and connections are made direct to inspection manholes;
- Connection points on line are in the form of a "Y" junction, bend, and inspection opening as for a sewer connection with the connection point being capped with a screw on or push on cap;
- Outlets from inter-allotment drainage systems are connected directly to the trunk drainage system by way of a gully or manhole;
- Where there is no trunk drainage system, individual discharge to the street shall be located within 0.5m of the lowest side lot boundary, measured square off the back of kerb and channel;
- Easements of minimum width 1.5m are provided over pipes of 225mm diameter or less, and 3m over pipes of 300mm diameter or more;
- The depth of the house connection is determined by the longest run of house drain to the connection point possible within the lot and allowing 0.3 metres cover to the house drain at the head of the line, and allowing a minimum grade of 1 in 100 for the house drain; and
- Materials and construction are in accordance with Council's Standard Specification for Stormwater Drainage;
- Overland flow paths are provided at all sag points;
- Side entry gully pits or gully pit/manholes are used in sags;
- Manholes are not located within the carriageway of any street or road; and
- Anti ponding gullies in curves are side entry type, chamber and lintel. Gully pits are not located on kerb returns.
- On steep embankments and batters, concrete or stone pitched chutes should be provided at table drain and catch drain outlets;
- Erosion protection shall be provided in all table drains and catch drains liable to scour. On steep grades, protection may include concrete inverts.
- For swales the following criteria shall be considered required for compliance:
- Minimum length of 30m
- Maximum length of swale without transverse velocity check weirs of 50m
- Minimum width = 0.6m (for maintenance requirements)
- Maximum width = 2.5m (for larger flows consider parallel swales)
- Maximum design flow depth of 75mm
- Batter slopes : Max 1V: 4H, but
- Desirable is 1V: 6H
- Operating design flow velocity < 1m/sec
- Preferred sectional shape – trapezoidal with a flat bottom or parabolic
- Minimum grade of 0.5% - consider sub soil drainage for swales less than 1.5%
- Maximum longitudinal grade of 4%
- Preferred grade of between 1 and 1.5%
- Preferred grass species – long swarded grasses tend to lay over and armour the bed and protect against erosion in high flows. Additionally grass control sediment transfer through roadside drainage
- Maximum design flow depth before diversion of high flows = 150mm

Table 4.19.3

Maximum Depth to Invert (mm)	Boxes - Internal Dimensions (mm)	FRC or RCP Systems
900	600 x 600	600 mm diameter
>900	900 x 900	750 mm diameter
Minimum Wall Thickness	100	N/A

Access easements permit Council to have access from the nearest surveyed road to any other drainage easement(s), in order to carry out maintenance and/or construction activities or works. This will normally be a requirement of all other drainage related easements in favour of Council.

In order for stormwater management facilities to function up to their designed level of service, most will require some level of periodic inspections, maintenance works, cleaning or repairs. Therefore, full consideration is to be given to the maintenance of the stormwater drainage system and stormwater quality management facility(s) during the design process.

Reasonable access for both personnel and equipment is one of the most critical design considerations of both the enclosed and open drainage systems. Any proposed landscaping should be designed in conjunction with access requirements.

5 PUBLIC PARKS INFRASTRUCTURE

5.1 PURPOSE OF THIS SECTION

This section is relevant to the assessment of compliance with Specific Outcomes relating to public parks infrastructure.

Reference shall also be made to the locality and zone codes to reflect the specific location of concern.

The following subsections set out the standards referred to in these acceptable measures, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to public park infrastructure. These information requirements apply in addition to those general requirements identified in Section 2 of this policy.

5.2 PARKS INFRASTRUCTURE DESIGN

5.2.1 Standards

The key standards applied are the Miriam Vale Shire Council "Parks and Open Space Landscape Standards".

Copies of this document are available by contacting Miriam Vale Shire Council's Parks and Reserves Section.

5.2.2 Specifications

Specifications applicable to public parks infrastructure are detailed in Miriam Vale Shire Council document "Parks and Open Space Landscape Standards"

5.2.3 Standard Drawings

Standard drawings applicable to public parks infrastructure are detailed in Miriam Vale Shire Council document "Parks and Open Space Landscape Standards"

5.2.4 Standard Landscape Details List

Standard drawings applicable to public parks infrastructure are detailed in Miriam Vale Shire Council document "Parks and Open Space Landscape Standards"

NO.	ITEM	GENERAL COMMENTS MVSC CROSS-REFERENCE	PAGE
4.1	SITE PREPARATION		
4.2	DRAINAGE		
4.2.1	Field inlet & overflow gully	Refer to MVSC Standard Dwg. D-0050	76
4.2.2	Strip drains		78
4.2.3	Open flow channel: Grass swales		80
4.2.4	Open flow channel: Grass/ Rocks/ Planting		82
4.2.5	Sub-surface drainage		86
4.3	EROSION WORKS		
4.3.1	Retention ponds / Natural water feature constructed wetland		88
4.3.2	Creek bank stabilisation		92
4.4	BASIC AMENITIES		
4.4.1	Beach shower		94
4.4.2	Drinking fountain		98
4.4.3	Water supply		100
4.4.4	Bicycle rail		102
4.4.5	Litter bin		104
4.4.6	Wheelie bin enclosure		106
4.4.7	Park seat: Timber & aluminium		108

NO.	ITEM	GENERAL COMMENTS MVSC CROSS-REFERENCE	PAGE
4.7.9	Timber boardwalk	Detail 4.6.18, Beach access option 4: Timber boardwalk is cross-referenced to detail 4.7.9 Timber boardwalk	208
4.8	PLANTING		
4.8.1	Turf area		210
4.8.2	Planting detail: Shrubs and ground covers		212
4.8.3	Planting detail: Advanced stock		214
4.8.4	Tree pit: Hard surfaces		216
4.8.5	Tree guard		218
4.8.6	Tree guying: Sub-surface		220
4.8.7	Garden bed edging: Timber		222
4.8.8	Garden bed edging: Concrete		224
4.8.9	Garden bed edging: Paving units		226
4.8.10	Raised timber planter		228
4.8.11	Raised masonry planter		232
4.8.12	Retaining walls: Timber		234
4.8.13	Retaining walls: Masonry		236
4.8.14	Retaining walls: Rock		238

5.2.5 Specific Information Requirements

Should any development wish to apply a standard above processes defined as standard by MVSC, then the developer shall be responsible for the following:

- Provision of additional maintenance costs as developer contributions over that defined as allowable under the Miriam Vale maintenance allocation. Details pertaining to the allocation of maintenance costs applied by MVSC, shall be subject to the application proposed by each individual development. Evaluation shall be undertaken by MVSC Shire Services at the time of submission.
- Provision of whole of life maintenance costs for all activities associated with the public park to be provided with proposed submission to detail the following:
  - comparison between forecast maintenance costs associated with MVSC standards and proposal made in conjunction with the individual park development additional standard.

6 CONSTRUCTION MANAGEMENT

6.1 PURPOSE OF THIS SECTION

This section is relevant to the assessment of compliance with Specific Outcomes relating to construction management.

Reference shall also be made to the locality and zone codes to reflect the specific location of concern.

The following subsections set out the standards referred to in these acceptable measures, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to construction management. These information requirements apply in addition to those general requirements identified in Section 2 of this policy.

6.2 CONSTRUCTION MANAGEMENT AND PLANNING

6.2.1 Specific Information Requirements

In order to demonstrate compliance with the performance criteria or acceptable solutions, Council may require the preparation and submission of the following plans.

6.2.2 Construction Management Plan.

The plan shall be developed to detail how the work shall be managed to ensure all processes outlined below are effectively managed to not incur breaches.

Such a plan should address:

- Proposed hours of construction and contact details;
- The protection of vegetation (vegetation management) with aesthetic or ecological value;
- Control of air, noise, vibration and light emissions
- Water quality
- Fauna
- Waste management (through a waste management plan
- Erosion and sediment control (Refer to section 6.4);
- Protection of existing infrastructure;
- Protection of assets to be contributed to Council
- Protection of public access
- Removal of excess natural or spoil material from site

6.2.3 Traffic management control plan (TMCP)

A traffic management control plan is to be prepared to provide for the safe and orderly passage of vehicular, pedestrian and bicycle traffic through and around the site during construction of works, and for management of environmental impacts of traffic.

The TMCP is to be prepared by a suitably qualified person, and shall define various stages of works.

The TMCP shall include:

- describe traffic arrangements which provide for the construction of the work while minimising disruption to local traffic from adjacent communities, emergency vehicles, pedestrians and cyclists;
- provide details of traffic management changes;
- describe how the construction work is to be physically isolated from traffic and pedestrians;
- provide details on how local access to communities and adjacent business will be maintained;
- provide advanced notice to the council, police and emergency services of proposed significant changes to traffic arrangements on the major roads;
- describe measures to effectively minimise dust which may occur during construction activity including transport of material to and from the site which may affect the safety and general comfort of the public, employees and/pr occupants of adjacent buildings;

- describe measures to ensure access for emergency vehicles to the construction site through all stages/phases of works (ie fire access);
- describe the measures to provide adequate information to ensure community, including local business, are informed of changes to traffic movements as a result of construction;
- describe where police officers are to be employed to assist with control of traffic, provide evidence of approval necessary arrangements with Queensland Police;

6.2.4 Parking Management Plan

A Parking Management Plan is to be prepared to provide details on how the construction works shall facilitate proposed operations for parking of:

- Subcontractors to work on the site;
- Proposed parking impacts on local/adjoining streets and roads;
- Delivery of materials;
- Short term parking requirements;
- Proposed changes to facilitate parking during works. If so the reinstatement process and timeframes.

The plan shall define the impacts on local residents, businesses and public transport

The Council shall accept the described document to ensure compliance with key issues in the location of works. Council shall use this document to audit during random inspections, but it shall be the responsibility of the developer of nominated representative to ensure all issues are effectively managed.

6.3 PROTECTION OR RELOCATION OF EXISTING UTILITIES ROAD & DRAINAGE INFRASTRUCTURE

6.3.1 Standards

- Electricity and Telecommunications Service Providers Standards (lighting and power)
- Individual utility protection requirements and guidelines

6.3.2 Standard Drawings

- Individual utility requirements

6.3.3 Service Crossings

- The relocation of any electricity or telecommunications service under a sealed road surface shall be by underboring. The relocation of other services under sealed road surfaces may be trenched and reinstated unless it is deemed that the disruption to traffic flow is too great and then the underboring must be used. If trenching and reinstatement is used to relocate a service the road surface shall be reinstated in accordance with standard drawing IPWEAQD-0030. This shall be at the discretion of the Director Engineering Services.
- Protection of :

  (a) Urban Environment

  Where clearance is allowable, and conflict of existing services is avoided, relocation of services or that of new services shall be bored under any urban road or any road with existing AC or concrete paving. Other roads may be may be trenched and reinstated.

  (b) Rural Environment

  Where clearance is allowable, and conflict of existing services is avoided, relocation of services or that of new services shall be bored under any urban road or any road with existing AC or concrete paving. Other roads may be may be trenched and reinstated

6.3.4 Specific Information Requirements

Submitted plans should clearly show:

- the location and levels of all exiting service and the clearance between them; and

- provision is to be made for the relocation of any Public Utility Plant within the site prior to and during the construction of works through:
    - Preparation, submission monitoring and updating of a Public Utility Plant Relocation Management Plan;
    - Management and co-ordination of public utility plant relocations;
    - Liaison and negotiation with Public Utility Authorities;
- The applicant will be responsible for the management of all outstanding work associated with relocation of affected utilities and to ensure that the specific relocation and/or replacement requirements of each responsible Public Utility are met;
- The applicant will be responsible for any damage to any Public Utility Plant (including any completed Public Utility Plant Relocation) caused by the execution of the work. The applicant is to make arrangements directly with the relevant Public Utility Authority for any such repair work;
- The applicant is to ensure that disruption in disconnecting and reconnecting Public Utility Plant to individual land owners and/or occupiers is kept to a minimum. The applicant is to consult with the relevant Public Utility Authority regarding special requirements regarding continuity of supply of any Public Utility Plant and take all measures necessary to satisfy such requirements;
- The applicant is to notify affected landowners and businesses and/or occupiers at least 24hours prior to planned works commencing;
- The applicant is to provide as constructed drawings to the standard specified by Council, as soon as practicable after the responsible Public Utility Authority has approved the utility or with remaining as constructed drawings.

6.4 WASTE MINIMISATION AND STORAGE

6.4.1 Standards

The management of all waste products associated with construction activities shall be the responsibility of the developer associated with site.

6.4.2 Demolition, Construction and Use of Premises

The developer is responsible for identifying the type of waste that will be generated and advising Council of how they intend to reuse, recycle or dispose of the wastes generated.

6.5 EROSION AND SEDIMENT CONTROL

6.5.1 Standards

ESCP are undertaken in accordance with specifications defined below.

6.5.2 Specifications

- Soil Erosion and Sediment Control, Engineering Guidelines for Queensland 1996, The Queensland Division of the Institution of Engineers, Australia and The Queensland Branch of the Australian Institute of Agriculture Scientists
- EPP Water Policy

6.5.3 Standard Drawings

In accordance with Soil Erosion and Sediment Control, Engineering Guidelines for Queensland 1996, The Queensland Division of the Institution of Engineers, Australia and The Queensland Branch of the Australian Institute of Agriculture Scientists

6.5.4 Specific Information Requirements

The developer is responsible to establish and maintain all erosion and sediment control devices. The developer or nominate representative shall develop a series of site plans and documentation for submission with operational works plan and details. Information to be demonstrated includes:

- stage of placement of control devices (ie controls will be different for earthworks to that of landscaping stages);
- method of monitoring;
- emergency incident procedure process;
- nomination of responsible person (s);
- Emergency Response Plan for sediment movement;
- Environmental control of sediment intrusion during “On Maintenance”, and monitoring plan during maintenance in the event of large rain events;
- Brief site description;
- Major site issues and concerns;
- Justification for the proposed ESC measures and the degree of sediment control;
- Design standards used for drainage sizing and sediment control;
- Proposed construction staging;
- Proposed ESC installation sequence;
- Calculations for the sizing of the various ESC measures, especially the sediment basin.

Evaluation of controls shall be audited by MVSC representatives and non conformances shall be advised to the developer.

The Erosion and Sediment Control Plan is to provide information on actions proposed to be taken to address the following:

- minimise disturbance;
- drainage control at each stage of works;
- erosion control at each stage of works;
- sediment control at each stage of works;
- site rehabilitation;
- maintenance and monitoring

All developers are to act in accordance with Environmental Protection Act and relevant state legislation.

Consideration shall be made to ensure protection of exposed surfaces is undertaken immediately after completion of earthworks to reduce risk of sedimentation transfer.

Possible options:

- Place turf, grass seed or hydroseed to stages or works completed to allow establishment of surface vegetation;
- Placement of mulch to surface of lot or works to control dust movement and sedimentation transfer during rain events;

7 INTEGRATED WATER MANAGEMENT

7.1 PURPOSE OF THIS SECTION

This section is relevant to the assessment of compliance with Specific Outcomes relating to the implementation of integrated water management.

Reference shall also be made to the locality and zone codes to reflect the specific location of concern.

The following subsections set out the standards referred to in these acceptable measures, and related specifications and standard drawings (as appropriate).

Also identified are any specific information requirements for applications in relation to integrated water management. These information requirements apply in addition to those general requirements identified in Section 2 of this policy.

DIVISION 39 WORKS SERVICES AND INFRASTRUCTURE CODE

SPECIFIC OUTCOMES		ACCEPTABLE SOLUTIONS	
SO9	Filling and excavation is carried out so that the visual amenity of the area and the privacy of the adjoining properties are not compromised.	No acceptable solution specified.	
Flood management			
SO10	An acceptable level of flood immunity is provided for new development and access to new development.	**AS10.1**	Development does not occur in areas known to be flood prone. Note: Insufficient data is available to accurately map the extent of 1 in 100 year and 1 in 50 year flood events. Please contact Council's Technical Services Branch to determine the extent of local information available regarding flooding.
Stormwater Management			
SO11	Development prevents or minimises adverse social and environmental impacts on the Shire's waterways, overland flowpaths, and constructed drainage network from stormwater run–off originating from or passing through development.	**AS11.1**	Development is undertaken in accordance with the stormwater management specifications in Planning Scheme Policy No 1, Engineering Standards for Development Works.
SO12	Stormwater run–off originating from development is of such quality that environmental values of receiving waters are protected or enhanced.	**AS12.1**	Development is undertaken in accordance with the stormwater management specifications in Scheme Policy No 1, Engineering Standards for Development Works.

7.2 INTRODUCTION TO INTEGRATED WATER MANAGEMENT

The intention of integrated Water Management (IWM) is to integrate all elements of the water cycle, whether they be drinking water, stormwater, wastewater or groundwater, to reduce impacts on the environment, infrastructure and the community.

Miriam Vale Shire Council is committed to Integrated Water Management through a range of projects and programs. Council's vision is to support and encourage Integrated Water Management to:

- Preserve our environment by conserving water resources
- Preserve our environment by reducing the impact and severity of stormwater runoff and quality
- Reduce the amount of wastewater discharged to the environment
- Improve water efficiency by Council and consumers
- Reduce social, environmental and economic costs through the implementation of IWM

This vision is also reflected through National, State and regional directions aimed at improving the management and efficiency of water use. Residential developers and manufacturing industries are also recognising the cost savings of efficient use of 'fit for purpose' water sources. There is also general community acceptance for improving the way water is used. For new developments there is now an expectation that best-practice technologies such as rainwater tanks, water sensitive design, water use efficiency audits and wastewater recycling will be incorporated into all facets of the development layout and function.

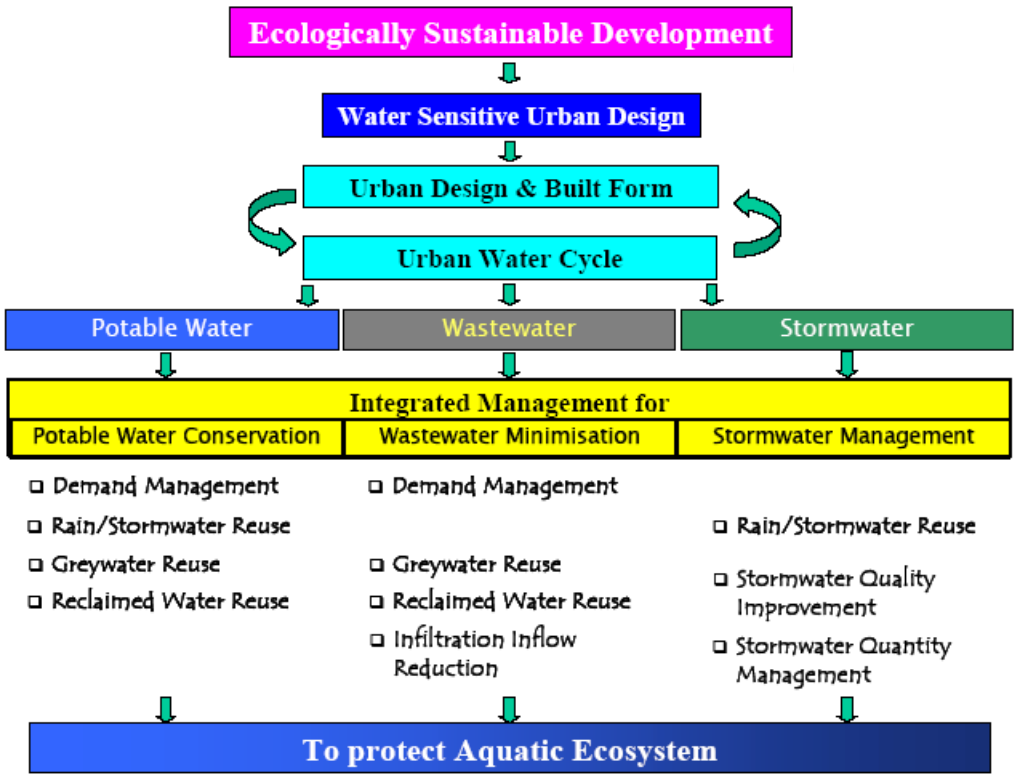


Figure 7.2.1 Integrated Water Management Elements and Practices (Australian Runoff Quality, 2003)

7.2.1 Preparation of an Integrated Water Management Plan

To demonstrate that all Performance Criteria have been addressed, the applicant should prepare an Integrated Water Management Plan, considering all elements of the water cycle. The Plan will need to be formulated in a logical sequence that includes the following elements:

1. A Water Cycle Management Strategy;
2. A Flood Assessment Report and
3. A Water Quality Management Strategy

Guidance on the documentation required demonstrating compliance with each of these elements is provided within the following sections of this Policy.

The preparation of this IWM Plan will need to occur early in the planning phases of a development to ensure that adequate practices can be incorporated into the layout, landscaping and built forms.

7.2.1.1 Key Issues

The Key Issues to be addressed by the Integrated Water Management Plan via the Water Cycle Management Strategy, Flood Assessment Report and Water Quality Management Strategy are:

1. A demonstrated integrated approach to the management of the urban water cycle with particular reference to stormwater management, reducing potable water demand and wastewater minimisation
2. Link water quantity controls with water quality controls;
3. Integrate stormwater management features into the development's landscape plan and built forms;
4. Address ecological protection issues that are influenced by the management of stormwater (e.g. waterway buffer vegetation and habitat management issues);

7.2.1.2 The Integrated Water Management Plan

An IWM Plan must provide a summary of the integrated water management objectives by:

- Identifying the IWM objectives and/or targets (including stormwater quality and quantity management, potable water demand management, the use of alternative water sources, and wastewater reduction).
- A description of how these IWM practices have been incorporated into the initial planning of development layouts.
- Clearly show how the elements of the urban water cycle, flood management requirements and water quality management measures have been dealt with in an integrated way.

Integrated Water Management Objectives will be achieved through the adoption of Water Sensitive Urban Design (WSUD) principles.

7.2.2 Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) refers to the integrated management and design of all elements of the urban water cycle.

Council requires the adoption of WSUD principles into all new developments and urban renewal developments. Applicants are required to demonstrate how WSUD principles and features have been incorporated into their site's water cycle management.

The principles of WSUD focus upon:

- Returning minor flows to conditions that mimic the pre-development landscape
- Treating urban stormwater runoff to meet water quality objectives
- Reducing potable water demand through re-use, source substitution and demand management initiatives such as water efficient appliances
- Minimising wastewater generation and treatment

7.2.3 References

Several guideline documents are in existence or will be available over the life time of this planning scheme policy and include:

- Queensland Urban Drainage Manual (QUDM Jones, N et al 1992);
- Australian Rainfall and Runoff (The Institution of Engineers Australia, 1987)
- Australian Runoff Quality
- Brisbane City Council's Water Sensitive Urban Design Technical Guidelines
- South East Queensland Water Sensitive Design Guidelines and Objectives
- Melbourne Water's Water Sensitive Urban Design Technical Manual
- Brisbane City Council's Natural Channel Design Guidelines
- NSW Department of Environment and Conservation Managing Urban Stormwater Guideline Series
- Publications by the Cooperative Research Centre for Catchment Hydrology

7.3 WATER CYCLE MANAGEMENT

7.3.1 Introduction

The integrated management of the whole water cycle, such as reduction in potable demand, reduction in wastewater volumes, increased rainwater and stormwater harvesting and provision of water that is "fit for purpose" is now expected for all development. Water resource managers have identified that water cycle management has many benefits, including preserving a limited natural resource, deferring the requirements for new infrastructure, reducing pressure on existing infrastructure, increasing water use efficiency and improving ecological health of our waterways.

7.3.2 Targets

Miriam Vale Shire Council and Miriam Vale Water Services are identifying appropriate water cycle management targets and objectives in conjunction with other local and regional agencies.

Council may require applicants to demonstrate compliance with these targets or objectives through the submission of a Water Cycle Management Strategy.

7.3.3 Elements of a Water Cycle Management Strategy

The following elements should all be addressed in a site based Water Cycle Management Strategy.

7.3.3.1 Stormwater management

The disconnection of impervious services from the trunk drainage network is a primary objective of a successful stormwater management scheme and can be accomplished through water sensitive urban design. Impervious areas directly connected to trunk stormwater should be minimised by using combinations of (but not limited to) the following features:

- Rainwater Tanks
- Vegetated Swales and Buffers
- Gross pollutant and sediment traps
- Detention Basins
- Bioretention Systems
- Infiltration Systems
- Constructed wetlands and ponds

Features such as those stated above may be applied regionally, to the entire development, and locally to individual lots or streets. Devices and treatment systems should reflect site limitations where applicable. These features when used in combination with other management practices may assist at achieving water quality and flooding targets in addition to those set for water cycle management.

7.3.3.2 Reducing potable water demand

The Applicant should demonstrate how using a selection of management practices within the development has reduced potable water demand. These measures may include:

- Rainwater Tanks
- Greywater Recycling
- Water efficient appliances

7.3.3.3 Wastewater minimisation

The Applicant should demonstrate how wastewater discharge from the development is minimised through the use of measures such as re-use of grey water or treated effluent (where available) and the adoption of water efficient appliances.

7.3.3.4 Alternative Sources

Alternative sources to potable water, such as rainwater, stormwater, greywater and recycled wastewater should be investigated for where the application does not require water of a potable quality and where public safety requirements can be maintained.

7.3.3.5 Rainwater Tanks

Where rainwater tanks have been identified as an element in a water cycle management strategy, the sizing of the tanks should consider the use of the tank as both a substitute source of water and as a stormwater retention or detention structure.

Guidance on tank sizing and configuration as a substitute water source is given in Miriam Vale Water Services Guidelines for the Installation of Rainwater Tanks in Reticulated Water Service Areas, however the applicant may be directed to undertake more detailed assessments using modelling tools, spreadsheets or hand calculations to confirm the performance of the tank for a variety of water cycle management functions (e.g. stormwater detention, alternative water sources etc).

Sizing of a rainwater tank should consider the available roof area for collection, the number of suitable connections to the premises, the number of occupants utilising these connections and a capacity for the short term detention of roofwater runoff.

Rainwater tanks, if appropriately configured, may have synergistic benefits when used in combination with other management practices and may assist at achieving water quality and flooding targets in addition to those set for water cycle management.

7.3.4 Demonstrating Compliance - Water Cycle Management

7.3.4.1 Water Cycle Management Elements for the Integrated Water Management Plan

Applicants may be required to prepare a water cycle management strategy as part of the IWM Plan outlining the necessary elements to achieve identified water cycle management targets. This strategy will need to investigate a range of options that consider:

- Water demand management;
- 'Fit for purpose' use of water where the quality is appropriate to the end use (e.g. drinking water quality is not required for toilet flushing or garden watering);
- Source Substitution, (e.g. rainwater harvesting, greywater reuse);
- Reinstatement of natural hydrological cycles
- Wastewater minimisation.
- Global water balances (i.e. over the whole development and in surrounding areas).

The effectiveness of these measures can be demonstrated through predictive numerical modelling, spreadsheet calculations or hand calculations, appropriate to the scale and complexity of the proposed development.

Where predictive numerical modelling is undertaken continuous water balance simulations are to extend for the full length of data record and have a minimum duration of 30 years. Results are to include 10, 50 and 90 percentile values and document the reliability of supply, reduction in potable demand, and reduction in wastewater generation.

7.4 FLOOD MANAGEMENT

7.4.1 Flood Immunity for Uses and Lots

7.4.1.1 Rural and Rural Residential development

For areas proposed as Rural allotments, a minimum of 600m^2 of each lot is to be located above the 100 year ARI flood level, and suitable for a building platform. For Rural Residential allotments, where portions of the allotment are below the 100 year ARI flood level a drainage easement may be negotiated by Council.

Access to Rural Residential and Rural building sites is to ensure that a low hazard criteria is met. The safety of the site can be determined by the following equation:

Low Hazard:

$D + 0.3V \leq 0.8$

where:

D = depth of floodwater in 100 year ARI event (m) and must be less than 0.8m and

V = velocity of floodwater in 100 year ARI event (m/s) and must be less than 2m/s

7.4.1.2 Open Space, Reserves and Parkland

Drainage requirements and flood immunity requirements are to be provided as shown in Table 7.1 below.

Table 7-1 Open Space, Parkland and Reserve Requirements for Flooding and Drainage

Open Space Type	Drainage and Flood Immunity Requirements
Sports Grounds and Courts Shire Wide	**Drainage:** On-site detention with discharge through natural filter (eg. wetland) to river or creek. All drainage away from adjoining residential areas or direct discharge to creek or adjoining bushland. **Minimum Q20** design flood level for ovals and fields and **Q50** design flood level for courts (**Q100** design flood level if courts fenced). All buildings (including playgrounds) to be located above **Q100** design flood level.
Sports Grounds and Courts Local	**Drainage:** On-site detention with discharge through natural filter (eg. wetland) to river or creek or street stormwater system. All drainage away from adjoining residential areas or direct discharge to creek or adjoining bushland. Minimum **Q10** design flood levels for ovals and fields and **Q50** design flood levels for courts (**Q100** design flood level if courts fenced). All buildings (including playgrounds) to be located above **Q100** design flood level.
Recreation Parks (includes formal parks and gardens, play and picnic parks, plazas and other hard urban spaces) Shire Wide	**Drainage:** Where possible drain into feature lake or creek through natural filter (eg. wetland) or street stormwater system. All drainage away from adjoining residential areas or direct discharge to creek or adjoining bushland. Except where the intrinsic character of the park or location makes it impractical (eg. adjacent to watercourse) all these parks are to be located above the **Q100** design flood level. In all circumstances, areas containing buildings (including playgrounds) are to be located above the **Q100** design flood level.
Recreation Parks (includes formal parks and gardens, play and picnic parks, plazas and other hard urban spaces) District	**Drainage:** Where possible drain into feature lake or creek through natural filter (eg. wetland) or street stormwater system. All drainage away from adjoining residential areas or direct discharge to creek or adjoining bushland. Except where the intrinsic character of the park or location makes it impractical (eg. adjacent to watercourse) all these parks are to be located above the **Q100** design flood level. In all circumstances, areas containing buildings (including playgrounds) are to be located above the **Q100** design flood level.
Recreation Parks (includes formal parks and gardens, play and picnic parks, plazas and other hard urban spaces) Local	**Drainage:** Where possible drain into feature lake or creek through natural filter (eg. wetland) or street stormwater system. All drainage away from adjoining residential areas or direct discharge to creek or adjoining bushland. Except where the intrinsic character of the park or location makes it impractical (eg. adjacent to watercourse) all these parks are to be located above the **Q100** design flood level. In all circumstances, areas containing buildings (including playgrounds) are to be located above the **Q100** design flood level.
Waterside Parks	**Drainage:** 'Soft' engineering constructions with natural filter to river.
Linear and Linkage Reserves Shire Wide	**Drainage:** 'Soft' engineering constructions with natural filter to river.

7.4.2 Flood Immunity for Certain Infrastructure

7.4.2.1 Emergency Services

Allotment levels of Emergency services, Hospital, residential, commercial and industrial developments are to be above the 100 year ARI flood level.

7.4.2.2 Mechanical and Electrical Works

Mechanical and electrical works (eg. pump stations) are to be located above the 100 year ARI flood level.

7.4.2.3 Roads

The flood immunity for roads is to be provided in accordance with the Queensland Urban Drainage Manual (QUDM) except for the Bruce Highway, which must be above 100 year ARI flood levels.

7.4.2.4 Farming Activities

Farming activities in water resource catchments are confined to areas above the 10 year ARI flood level. Intensive animal industries are confined to areas above the 100 year ARI flood level.

7.4.3 Building Floor Levels

For detached house, annexed units, display homes and caretakers residences:

Buildings are to have a minimum floor level of at least:

(a) 2.5mAHD to provide protection from storm surge events;

(b) (i) 300mm above the 100 year ARI flood level or;

(ii) 600mm above the highest recorded flood level which ever is greater.

Enquiries regarding Miriam Vale shire Council's historical flood records may be made through the customer service centre.

For all other building types:

Buildings are to have a minimum floor level of at least:

- 2.5m AHD to provide protection from storm surge events.

AND

- Floor levels of Emergency services and Hospitals are a minimum of 1000mm above the 100 year ARI flood level or 1000mm above the highest recorded flood level in areas where no design flood levels have been determined.

OR

- Floor levels of residential, commercial and industrial buildings are a minimum of 400mm above the 100 year ARI flood level and at least 600mm above the highest recorded level for the site. Where design flood levels have not yet been determined the floor level shall be a minimum of 600mm above the highest recorded flood level.

AND

- Openings to basement carparks have a minimum level equal to the requirements stated above.

7.4.4 Other Issues Requiring Consideration

7.4.4.1 Design Hydrology

Miriam Vale Shire Council is currently reviewing the appropriateness of Australian Rainfall and Runoff (ARR) Volume Two design event temporal patterns for our region. In some instances historical rainfall patterns recorded in the past 20 years have yielded greater discharge volumes and peak flood levels than those produced using the standard ARR patterns. Where flood plain storage is potentially significant consultants may be required to consider recorded historical rainfall patterns in addition to ARR design temporal patterns.

7.4.4.2 Local Drainage Design Capacity

Local drainage systems shall have a design capacity in accordance with QUDM. Further reference on stormwater drainage is given in section 4.6 of this Policy.

7.4.4.3 Climate Change

It is anticipated that climate change is likely to have some impact over the design of hydrologic and hydraulic systems, including changes in rainfall volumes, recurrence intervals and intensities. As yet Miriam Vale Shire Council has not adopted standard requirements for climate change, however consultants are encouraged to consider the potential impact of climate change on their base assumptions and provide references to sourced information.

7.4.4.4 Legal Points of Discharge

A legal point of discharge is to be negotiated and agreed to with adjacent landowners in accordance with QUDM - Chapter 3. Legal points of discharge need to be identified and approved before development approval can be given.

7.4.4.5 Regulation Line

Where a "regulation line" has been set by Council to define the limit to which development may encroach onto a floodplain, development is undertaken outside such "regulation line".

7.4.4.6 Excavation and Filling

Where excavation and/or filling are to occur within the flood plain, below the 100 year ARI level, adequate assessment (within the IWM Plan) will be required to determine the impacts of the loss of storage and other hydraulic factors. Generally, filling below the Flood Regulation Line and/or adverse impacts on adjacent properties would not be acceptable. Equitable flood plain management practices dictate that cumulative loss of storage will also need to be considered as part of the assessment process.

7.4.4.7 Rehabilitation of Riparian Zones

When preparing a rehabilitation plan to address the requirements of the Waterways and Wetlands Code, due consideration must also be given to the effects on channel roughness (commonly expressed as Mannings "n") by the mature rehabilitated vegetation. This should be addressed in the Flooding Assessment Report. Applicants are directed to the Brisbane City Council's Natural Channel Design Guidelines for further guidance on Mannings "n" and vegetation densities.

7.4.5 Demonstrating Compliance - Flood Management

7.4.5.1 Stormwater Quantity Management

To address the management of stormwater quantity both within and outside of the applicant's site, a flood assessment report will be required as part of a IWM Plan. The IWM Plan must also show how integration of the management of stormwater quality and quantity through the adoption of water sensitive urban design principles is addressed on the site. These include identifying infrastructure that can provide multiple uses. For example, a wetland may also be able to provide a flood detention capacity or rainwater tanks may be used on a development to minimise the impacts of peak flows and improve the performance of water quality management measures.

7.4.5.2 Professional Requirements

All elements of the flood assessment report are to be undertaken and certified by a suitably qualified and experienced Registered Professional Engineer Queensland (RPEQ).

7.4.5.3 Codes and Standards

The flood assessment report is to be prepared in accordance with Council's Planning Scheme and other appropriate references including but not limited to:

- Queensland Urban Drainage Manual (QUDM Jones, N et al 1992);
- Australian Rainfall and Runoff (The Institution of Engineers Australia, 1987)

7.4.5.4 Matters to be Addressed

The matters that Council will seek to be addressed in a flood assessment report includes but is not limited to the following:

Catchment and Stream Development

Hydrologic, and hydraulic performance of the site, including upstream and downstream systems that may affect or be affected by the proposed development are to be considered. The following conditions are to be investigated:

- Existing (pre-development) catchment and stream conditions.
- Modified catchment and stream conditions as likely to exist at the completion of each major stage of the proposed development.
- Modified (post development) catchment and stream conditions as likely to exist at the completion of the proposed development.
- Ultimate (fully developed) catchment and stream conditions.

Impacts

For both post and ultimate development conditions, identify and quantify any increase in peak flow rates, flood levels, frequency of flooding, sedimentation or scour effects, duration of inundation and runoff volume. In general, Council requires no worsening or nuisance (QUDM Chapter 3.0).

Channel Freeboard

Freeboard requirements will generally be in accordance with QUDM Table 8.02 except for road flows which are to satisfy QUDM Section 5.08.

Council will place a rate notation advising the minimum habitable floor level applicable to a lot against all lots where the minimum freeboard is not provided by fill on the lot and also against all lots that adjoin a waterway.

Events

Examine rainfall events with ARIs as required by Council's Planning Scheme and QUDM. Key ARIs to be examined include:

- 100 year ARI for identifying flood prone land and major drainage system performance and roadway safety.
- 10 year ARI for identifying land unsuitable for effluent disposal, open space and access driveway safety, and minor road cross drainage and minor drainage for commercial areas.
- 2 year ARI for open space and rural access flood immunity, and minor drainage system performance; and
- 3 month ARI for environmental flows ($Q_{0.25}$ assumed to be half the Q_1).

Infiltration and Groundwater

Council intends that new development be undertaken in a manner that preserves or enhances the groundwater regime to that which existed prior to any site disturbance.

Sensitivity

The sensitivity of analysis results to variations in key variables is to be considered. Possible variations due to seasons, maintenance periods, survey accuracy etc are to be determined and reported.

The sensitivity of results to the method of analysis is to be considered. Where the level of risk is high, alternative methods of analysis are to be used to determine the sensitivity of results to the method of analysis.

The mode of failure is to be considered for events that exceed the normal design criteria. Systems are to be designed to avoid catastrophic failure during extreme events.

Lifecycle Costs - Operation and Maintenance

Details of the ongoing lifecycle costs associated with the operational and maintenance requirements for the proposed stormwater management system that will ultimately rest with Council are to be provided. Details are to include:

- estimates of operational and maintenance costs,
- lists of maintenance activities,
- monitoring requirements in terms of locations, parameters, frequency and reporting,
- inspection requirements; and
- operational and maintenance advantages and disadvantages of the proposed system compared to other systems considered.

The following reference "An Introduction to Life-Cycle Costing of Structural Stormwater Best Management Practices", Taylor A.C.,CRC for Catchment Hydrology, Melbourne, 2003 is recommended for determining life-cycle costs

Wetland Management Report

A **Wetland Management Report** is to be provided for each and every constructed wetland or lake that forms part of the stormwater management strategy for the site.

7.4.5.5 Documentation - Flood Assessment Report

The Flood Assessment Report should give details of all aspects addressed in the study. The main report should include details of all input data and their source, assumptions, method of analysis, options considered, results and adopted management systems with constraints and impacts.

An electronic copy of hydrologic, hydraulic and water quality computer models must accompany the main report. Supporting details, including plans showing the location of all elements of the models, must also be provided.

Preliminary design drawings are to be provided with the main report to:

- Detail the extent of earthworks required. Pre and post development contours and other features on the site are to be provided.
- Define the extent of inundation associated with the 2, 10 and 100 year ARI flood events for both existing conditions and the proposal with ultimate catchment conditions. Depth and product of depth and velocity should be reported on the same plans at appropriate locations.
- Demonstrate how a suitable stormwater system (infiltration and retention measures, pipes, overland flow paths, etc) can be provided with appropriate arrangement, alignment and grades to maximise infiltration and direct excess flows to the outlet(s) for major and minor storm events.
- Demonstrate how hydraulic structures can be provided at nominated locations with appropriate geometry and arrangement to satisfy the design requirements nominated in the report. General arrangement drawings will be required for infiltration and retention measures, detention basins, energy dissipaters, stream training works and major road cross drainage.

Extracts of relevant sections from all non-Council codes or standards that are referenced are to be provided in an appendix of the main report. If a referenced code or standard specifies different design criteria to Councils Planning Scheme, the implications of adopting the different design criteria are to be quantified.

7.5 WATER QUALITY MANAGEMENT

Water Quality Objectives (WQOs) are defined in *Environmental Protection (Water) Policy 1997* as being numerical concentration levels or statements for indicators that protect a stated environmental value. The need to identify and meet relevant WQOs in part arises from the *Environmental Protection (Water) Policy 1997* which is subordinate legislation under the Queensland *Environmental Protection Act 1994*. The Policy provides a process that is consistent state-wide for determining Environmental Values of receiving waters and converting these to measurable WQOs. This process is also consistent with the *National Water Quality Management Strategy* (ANZECC/AWRC, 1992). WQOs are measurable 'standards' that describe the quality of water that is needed on a sustained basis in receiving water such as a creek or river. WQOs are set so that Environmental Values of receiving waters downstream or within a development are maintained or enhanced during a development's design, construction and operational phases. Environmental Values (EVs) are beneficial uses of the receiving waters, such as the ability to safely swim in a river, or the ability of the waterway to sustain healthy aquatic ecosystems.

The determination of water quality objectives relevant to a particular development is the one of the most critical steps for integrated water management. It identifies the necessary goal posts to be achieved by water quality management measures on site and the integration of flood management and water cycle management elements with water quality management measures may lead to synergistic benefits that assist in achieving the water quality objectives.

7.5.1 Process for Determining Water Quality Objectives

Given the complexity involved with following the process in the *Environmental Protection (Water) Policy 1997* on a site-by-site basis, the process set out below allows proponents to identify objectives that may already be identified. This does not preclude the derivation of specific objectives for a development, should they wish to undertake the necessary studies to justify them as set out in the *Environmental Protection (Water) Policy 1997 (see Step C)*.

Step A Identify the Nature of Affected Receiving Waters

- Determine the location of the nearest affected receiving waterways (can be within the boundary and/or outside of the development activity).

If the receiving waters that are likely to be affected (i.e. contaminated) include groundwaters ***and*** use of this groundwater potentially occurs, consult with the State Government Agency that regulates groundwater usage (i.e. currently the Queensland Department of Natural Resources) to identify relevant EVs and WQOs. Note that the use of groundwater in an area may result in the need to protect a set of EVs that do not normally apply to surface waters across the catchment (e.g. protection of groundwaters for irrigation).

Step B Check Schedule 1 of the Water EPP

The State Government has the ability to set WQOs and/or EVs for waterways across the State and list them in Schedule 1 of the Queensland Environmental Protection (Water) Policy 1997. Where this is done, these WQOs and/or EVs take precedent over all other sources of information. Currently, none are listed for the Miriam Vale Region, however the applicant should check this whenever the Environmental Protection (Water) Policy is updated

Step C Check for (or Initiate) Site-specific Studies

A developer may wish to undertake site-specific studies to generate a new set of EVs and WQOs for the site that are superior to those generated by Council for the Shire. If this option is chosen, the onus is on the developer to demonstrate the new set of WQOs and EVs are based upon:

- sound consultation with key stakeholders;
- high quality data/information on ecological risks, health risks, etc.;
- information from the South East Queensland Regional Water Quality Management Strategy (or other site-specific studies); and
- the approach promoted by the National Water Quality Management Strategy.

In the majority of cases, the applicant would consider the the WQOs in the documents listed in Step F, rather than undertaking their own studies.

Step D Identify Where WQOs apply

WQOs can be applied to a development in two ways:

As *receiving water quality objectives*. If the nearest affected waterway buffer (as defined by the Waterways and Wetland Code and associated Planning Scheme map in the Miriam Vale Plan) is within or immediately adjacent to the subject site the WQOs would apply and monitoring would occur (if needed) at the point immediately prior to where the discharge enters the buffer.
As *stormwater/waste water discharge criteria*. If the nearest affected waterway buffer (as defined by the Waterways and Wetland Code and associated Planning Scheme map in the Miriam Vale Plan) is ***not*** within or immediately adjacent to the subject site the WQOs apply and monitoring would occur (if needed) as soon as stormwater or waste water leaves the site.
Note that:

- The closest affected waterway buffer (as defined by the Waterways and Wetlands Code and associated Planning Scheme map), may be located either within or immediately outside of the site. As discussed above, the WQOs apply immediately prior to the discharge entering these buffers.
- Some extra WQOs may apply within constructed waterway features (e.g. lakes, ponds, wetlands) if they have some recreational function, for example, guidelines for recreational water quality in ANZECC/ARMCANZ Australian Water Quality Guidelines 2000.

Step E Match the Type of Development Activity and WQOs

- Determine which water quality indicators (e.g. pH, the concentration of total suspended solids [sediment], the concentration of Copper) are relevant to the type of development activity being assessed. The following activities and parameters are a guide, and are dependent on the actual activities proposed for a subject site:
    - Residential Development - Total Suspended Solids, Total Nitrogen, Total Phosphorus and Gross Pollutants
    - Commercial Development - As for Residential Development, and also addressing vehicle related pollutants such as petroleum hydrocarbons and heavy metals.
    - Industrial Development - As for Residential and Commercial Development and also addressing any industry related contaminants (e.g. pesticides, organic compounds, etc).

Step F Adopt the Relevant WQOs

Adopt WQOs from the following hierarchy of documents, with the documents higher in the list taking precedence over the ones below. It may be that not all WQOs come from the one document, e.g. WQOs for heavy metals may only be in the State Guidelines, whereas the remainder come from MVSC related documents:
WQO Document Hierarchy List

1. Site Specific Studies (eg. detailed monitoring and interpretation completed for the site in question)
2. Miriam Vale Shire Council related documents (eg. Local Stormwater Quality Management Plans, A Water Quality Objectives Guideline, Catchment Management Plans etc). Contact Program Coordinator - Waterways, Environmental Management Branch for guidance on recently released documents
3. South East Queensland Regional Water Quality Management Strategy Water Quality Objectives - these will be specific for regional waterways such as the Miriam Vale River) see: www.healthywaterways.org
4. State Guidelines (eg. draft Queensland Water Quality Guidelines) see: http://www.epa.qld.gov.au/environmental_management/water/water_quality_guidelines/ {Website address?}
    * National Guidelines (ie. ANZECC Australian Water Quality Guidelines - 2000) see: http://www.deh.gov.au/water/quality/nwqms/volume1.html

7.5.2 Application of WQOs

Once a set of relevant WQOs has been identified for a proposal, they are to be *applied* as ***discharge limits*** for the quality of stormwater (or waste water) leaving the site. It approach allows for the scenario that if all land in the catchment was developed and allowed to discharge the same quality of water, then the EVs in the receiving waters would still be protected.

WARNING:
Meeting WQOs over the long term to ensure ecological sustainability does not obviate the need for compliance with the "General Environmental Duty" at all times (see the *Environmental Protection Act 1994)*. For example, say a development had an isolated exceedance of a WQO that led to environmental harm. In this example a fish kill was associated with the release of acidic surface water from a development in acid sulfate soils and the person(s) responsible did not take "reasonable and practicable measures" to prevent the harm. Clearly, they would still be liable to prosecution under the *Environmental Protection Act 1994* for causing environmental harm even if over say 12 months of monitoring the water quality draining from the site met WQOs in terms of the median pH value.

Note that in most cases, WQOs are expressed as concentration ranges (or upper limits) for which the median value of a substantial data set must fall within (or below). This approach allows for rare exceedances associated with major storm events, as the median concentration would not be significantly affected. Thus, the WQOs may at first appear to be conservative and difficult to meet, but it has been shown that they can still be met even with occasional exceedances.

7.5.3 Pollutant Load Reduction Targets

In addition to the above WQOs, if not otherwise specified, additional pollutant load reduction targets will apply. These are:

- Total Suspended Solids reduction of 80% from an untreated development case
- Total Nitrogen reduction of 45% from an untreated development case
- Total Phosphorus reduction of 60% from an untreated development case

Pollutant load based reduction targets will only apply as discharge targets and will need to be met in addition to the WQOs.

7.5.4 Demonstrating Compliance - Water Quality Management

7.5.4.1 Elements to be included in the Water Quality Management Plan

For development involving more than 40% impervious area or more than 2000m^2 total development area (excluding land that will not be disturbed during construction or subsequent use eg conservation areas, existing waterways), an **Water Quality Management Strategy** will be required as part of the Integrated Water Management Plan (IWM Plan), to demonstrate that the water quality objectives of the receiving waters would be met and that appropriate water sensitive urban design features and management practices can be implemented.

This component of the IWM Plan should be prepared such that it addresses all stages of a development in a conceptual design sense (i.e. a high level plan is developed to show the overall stormwater management strategy for a development), outlining measures to address compliance with the water quality objectives identified in the IWM Plan. This occurs prior to the submission of an operational works plan, which should identify the final size, layout, configuration, maintenance requirements, engineering and structural drawings and life-cycle costs of the proposed measures.

The **Water Quality Management Strategy** should include:

1. Identify clearly pollutants of concern and their sources for both the construction and operational phases of development
2. Identify an optimum combination of structural and non-structural Stormwater Quality Best Management Practices (SQBMPs) to limit the pollutant export potential of the site for both the construction and operational phases of development;
3. Where proprietary devices are proposed, provide independent analysis results to verify performance;
4. Address the requirements of the construction phase with an emphasis on erosion and sediment control Best Management Practices (BMPs) that have been selected for the site for the construction phase including an **Erosion and Sediment Control Program**;
5. A description of those Best Management Practices (BMPs), that have been selected for the site for the operational phase;
6. Site plans showing key features (e.g. drainage pathways) as well as the location of the above-mentioned measures;
7. A program indicating the timing and sequence of installation of the above-mentioned measures;
8. Responsibilities for installation, inspection and maintenance of the above-mentioned measures;

9. An inspection and maintenance program for the above-mentioned measures;
10. Maintenance Plans for structural measures whether on private or Council land;
11. Life-cycle costs. The following reference "An Introduction to Life-Cycle Costing of Structural Stormwater Best Management Practices", Taylor A.C.,CRC for Catchment Hydrology, Melbourne, 2003 is recommended for determining life-cycle costs
12. A simple audit program to check the installation and maintenance of BMPs that have been selected for the site during the construction phase (where required);
13. A description of how records are to be kept on site performance (including incidents, complaints, etc.);
14. Emergency procedures to protect stormwater quality (e.g. how to manage the collapse of a sediment basin or burst hydraulic hose);
15. Training requirements for construction and maintenance personnel (including an on-site induction program); and
16. Address the management of specific water quality issues (where relevant) such as:
    - the use of lakes, ponds and wetlands (refer to Section 7.5.4.2);
    - sewer overflows;
    - effluent reuse;
    - acid sulphate soils; and
    - bin and car washing areas;
17. Specify a water quality monitoring program where necessary;
18. Outline maintenance requirements for any structural elements that are proposed, especially those to be transferred to Council ownership
19. Ensure site-based measures complement regional water management measures already delivered (or planned) through Council Integrated Water Management Plans, Stormwater Management Plans or Waterway Management Plans, where present; and demonstrate how the proposed combination of BMPs will ensure that agreed objectives and targets will be met.

7.5.4.2 Water Body Design and Management Requirements

Where a constructed wetland or water feature (such as a lake or pond) containing a permanent or semi-permanent body of water is part of the stormwater management system the following requirements will need to be addressed.

In addition to the detailed design documentation required to support the application, provide a **Water Body Design Report** as part of the IWM Plan for each separate proposal for a constructed wetland or water body. The report should incorporate the following information:

(a) A summary of the rationale for and the objectives of the design;
(b) A summary of any site-specific constraints relevant to the site, or the design, which may affect ongoing maintenance (presence of acid sulphate soils, rare and endangered species, restricted or protected areas, sewer mains etc);
(c) A summary of the design data and assumptions used for the hydrological study;
(d) A summary of the design flows and predicted operating water levels;
(e) Summary hydraulic calculations for the design of all inlet and outlet structures;
(f) A summary of predicted water balance for each key stage of the development contributing to the water body;
(g) Details of water augmentation requirements and source (if required) during extended periods of drought;
(h) A summary of the design pollutant loadings and modelling assumptions used to derive the design pollutant loadings;
(i) A summary of the design performance criteria;
(j) A summary of the predicted water quality outcomes and compliance with the design performance criteria;

(k) A brief description and summary of the monitoring program, including sampling site locations, frequency, etc;

(l) A summary of the planting details including areas, planting rates, establishment water levels and normal operating water level requirements;

(m) A summary of weed control strategies for common weeds. Identify weed species by common name and scientific name. If possible include at least a black and white photograph;

(n) A summary of operating requirements for the variable water level controls available to the operator;

(o) Details of any proposed sludge disposal sites;

(p) Details of any special requirements for the handling and disposal of materials to be removed from the water body during routine maintenance; and

(q) A summary of how health and safety aspects have been managed with respect to the construction and maintenance of the proposed wetland. These should include:

  (i) physical issues such as selection of batter slopes, depth and duration of ponding, and access to structures;

  (ii) public health issues such as possible exposure to chemical and biological contaminants, and mosquito control; and

  (iii) occupational health and safety issues related to the ongoing management and maintenance of the system.

Also, the applicant will need to provide a **Water Body Management Report** prior to acceptance of the water body "on maintenance". The report is to contain the following:

(a) A complete copy of the Water Body Design Report revised to include changes made to the wetland during construction and operation;

(b) "As constructed" plans showing relevant details and levels for all components of the wetland;

(c) A summary of water quality test results obtained prior to hand over to Council;

(d) A brief comparison and discussion of the possible reasons for any difference between predicted and actual results of the water quality monitoring along with management recommendations to mitigate unacceptable results;

(e) Briefing notes suitable for maintenance personnel sufficient to satisfy any known Occupational Health and Safety issues related to the ongoing management of the site;

(f) A summary checklist, including a timetable, for the routine inspection and maintenance of both the hard-scape and soft-scape elements of the water body; and

(g) A summary of staff, plant, minor and special equipment and costing information associated with the previous operation and maintenance of the water body to allow budget preparation for future maintenance.

The Wetland Management Report should be self-contained and as brief as possible, yet clear and succinct. The document is intended for use by Council's out-door supervisory staff who do not need to, and are unlikely to, read through a lot of verbose text to find the salient points. If possible, use dot point summaries, tables and diagrams to present essential information. Use of technical language should be minimised.

The main issue that will affect the success or failure of the wetland will be the operation and maintenance of the water level control structures and how they affect the weed management strategy. Council therefore expects this issue to be covered thoroughly.

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8 QUALITY CONTROL & AUDIT INSPECTIONS

The following figures provide guidance on the obligations of supervising engineers and procedures for the construction.

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Pre Start Meetings				Superintendent shall: • Invite relevant staff incorporated with all facets of development to prestart from MVSC. • Ensure contractor holds copy of approved design & specification • Outline Performance and standard required • Highlight critical aspects of the approved Design • Provide electronic copy of all final approved design plans accompanied • Design Plans to include plan showing boundaries of future development stages. • All electronic plans to be in CAD format. Refer "Specification for the Supply of Digital Geo-referenced Data"	Council shall: • Outline performance and standard required • Highlight critical aspects of the approved Design • Complete project details on the Prestart meeting Form Appendix C (Water & Sewerage) and Appendix D (Roads & Drainage) • Undertake minutes of pre start meeting to rcord any specific issues addressed during the meeting; DA representative shall be chairperson for the meeting. Details to be distributed to all key representatives from each unit within Council.
Workplace Health and Safety				Superintendent and contractor shall ensure that compliance with the Workplace Health & Safety Act and other relevant safety legislation the Roadworks Signing Guide and Council's Safety Policy and Manual is maintained throughout construction including specifically: • Correct signing on existing roads • Approved Safety clothing • Adequate protection of the works • Correct use of "Stop-Go" workers and other traffic control devices • Approved construction plant and equipment	Council shall periodically check the construction site for compliance with health and safety requirements and refer any non-compliance to the Superintendent and where necessary the Contractor directly.
General Control of the Works During Operation				Superintendent and contractor shall ensure that updated copies of the approved design and all subsequent approved amendments are on site and available for use at all times during construction. Superintendent shall be responsible for progressively checking the	Council shall where appropriate, check the works for compliance with the approved design and approved amendments and refer any non-compliance to the Superintendent for attention.

ELEMENTS OF WORKS	TESTING REQUIREMENTS TEST	STANDARD	FREQUENCY	SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
				works for compliance with the approved design and for checking test results for compliance with this ITP.	
1. ROADWORKS, STORMWATER DRAINAGE, & ALLOTMENTS WORKS					
a. Allotment Filling & Road Embankments					
Quality of Material	Visual/Grading as required	AS3798Min. Level 11 responsibility	Each allotment with fill >300mm and each road embankment 1 test per 5000m3 and minimum 1 test per project and material type 1 test per allotment and 1 test per 500mm thickness or part and 100m embankment length or 500m3 Allotment boundaries and other features	Make sufficient job visits to confirm quality of material and compaction procedures and to examine and endorse test results. Ensure final levelling of Allotments for drainage purposes by Licensed Surveyor and fill quality and compaction testing by Geotechnical Engineer Lodge test results with Council.	Visit site for random audit inspections if considered warranted. Check results are submitted at On Maintenance inspection
Compaction	AS1289.5.3	AS3798 Section 4.3			
Alignment & Level	F.S.L. Survey	95% Standard (Residential) 98% (Commercial/ Industrial) 100% and 95% (Roads)			
b. Rock Walls and Retaining Walls					
Location Level	Survey/ Measurement check	MVSC Table of Construction Standards & Tolerances	Each end and other locations as necessary	Inspect foundation to confirm base materials and depth. Make sufficient job visits and checks to confirm profile, thickness, rock, backfill, seepage, drains, grouting, and that location and level comply with approved design	Visit site for random inspection including checking of works for compliance with approved design and referral to Superintendent where necessary.
Design Detail	Survey/Measurement check	MVSC Standard Drawing or other subject to Council approval	Critical locations and others as necessary		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Backfill	Visual	Granular	Each wall and minimum 1 check per 50m2		
c. Stormwater Drainage					
Location Structures	Survey/Measurement check	MVSC Table of Construction	Each	Inspect before backfilling and check to ensure compliance with approved design and specification and to examine and endorse all test results including survey Lodge test results with Council.	Visit site for random inspection and testing if considered warranted including checking of works for compliance with approved design and concrete strength requirements and referral to Superintendent where necessary
SL & IL at Structures	Survey	Standards & Tolerances	Each		
Bedding Material	Visual/grading as required	MVSC Standard Drawing	Each Line		
Manholes/Pits	Visual		Each		
Pipes	Visual	Straight and on line and grade	Each Line		
Backfilling - Quality - Compaction	 Visual/grading as required AS1289-5.1.1	 Graded (max 75mm) or other subject to Council approval 95% Standard under roads	 Each line 1 test per line at subgrade and one other test where subgrade cover exceeds 500mm		
d. Allotment Stormwater Drainage					
Location of Structures	Survey/ Measurement check	MVSC Table of Construction	Each	Make sufficient job visits and check to confirm that all structures and pipelines are constructed to approved design and to Council requirements Lodge test results with Council	Visit site for random inspection and testing if considered warranted including checking of works for compliance with approved design and referral to Superintendent where necessary
IL at Structures	Survey	Standards & Tolerances	Each		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Bedding Material	Visual	MVSC Standard Drawing	Each Line		
Manholes/Pits	Visual		Each		
Pipes	Visual	Straight and on line and grade	Each Line		
Pipes	CCTV	Confirmation of standard and performance	Each Line		
Backfilling	Visual	Granular or other subject to Council approval	Each Line		
e. Subgrade					
Compaction Below - 300mm 300mm to subgrade level	AS2289.5.3 (density) and proof rolling	95% Standard and nominal movement 100% Standard and no discernible movement	1 test per 100m carriageway or part thereof and minimum 2 tests	Make routine visits and checks to confirm construction to approved design. Undertake proof rolling and examine and endorse all test results level checks and cross-section geometry before joint inspection with Council. Lodge test results with Council	Conduct joint inspection with Superintendent (including proof rolling). Upon satisfactory testing approve placement of sub-base and base materials or select fill as applicable. Check works for compliance with approved design and issue inspection memo to Superintendent where necessary
CBR Testing	AS1289F1.1 sample compacted at optimum moisture content or greater	100% Standard	Representative each material layer and 1 test per 500m carriageway or part thereof		
Horizontal & Vertical Alignments	Survey				

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Profile	String line or level survey	MVSC Table of Construction Standards & Tolerances	IP, TP, Centreline (20m) 1 check per 20m max		
f. Select Fill/ Subgrade Replacement					
Material Quality	Grading and Atterberg or AS1289F1.1	Minimum CBR 15 Granular or other subject to Council approval	1 test per 500m carriageway or part thereof and minimum 1 test per project/stage and material type	Make sufficient routine visits to ensure quality of materials and that operations will achieve a sound compacted layer. Undertake proof rolling and examine and endorse all test results, level checks cross section geometry before joint inspection with Council Lodge test results with Council	Conduct joint inspection with Superintendent (including proof rolling) Upon satisfactory testing approve placement of subbase and base materials
Compaction (a) for o/s material (b) for graded material	Proof rolling AS1289.5.2.1 and proof rolling	No discernible movement 100% Standard and no discernible movement	1 test per 100m carriageway or part thereof		
Profile and Depth	String line or level survey	MVSC Table of Construction Standards & Tolerances	1 check per 20m		
g. Sub-soil Drains					
Pipe	AS2439 Part 1	MVSC Table of Construction Standards & Tolerances	Batch	Check compliance with approved design. Inspect and approve pipe and filter. Confirm bedding and surround, and general grade of the pipe. Ensure pipe is flowing prior to final inspection.	Visit site for random audit inspections and testing if considered warranted including checking of works for compliance with approved design
Filter Material	Visual Grading as required	Max 10m screenings or other subject to Council approval	1 test each project or 100m3 max		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Cleaning Joints & Markers	Visual	MVSC Standard Drawing	Each		
h. Road Crossings					
Conduits	Visual	Service authority requirements	Each	Inspect before backfilling and check to ensure conduits are in locations and to depths in accordance with approved decision	Visit site for random audit inspections if considered warranted including checking of works for compliance with approved design
Markers	Visual	MVSC Table of Construction Standards/ Tolerances	Each		
Backfilling	Visual	MVSC Standard Drawings	Each		
i. Kerb and Channel					
Horizontal & Vertical Alignments	Survey/ Measurement check	MVSC Table of Construction Standards/ Tolerances	Each drainage structure, intersection and road low point 1 cross section per 20m at other critical locations 1 cross section per 50m for general control	Inspect pegging and stringing before placement and check to ensure that Kerb and Channel is installed to dimensions as per approved design and in particular at Drainage Structures and connections to existing Kerb and Channel. Lodge test results with Council where applicable	Visit site for random audit inspections and testing if considered warranted including checking of works for approved design and concrete strength requirements
Concrete	Cylinder Strength/Impact Strength (Schmidt Hammer)	MVSC Standard Drawings	1 test per $50m^3$		
j. Sub-Base Layer					

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Material Quality	Grading and Atterberg	MRS11.05	1 test per 500m carriageway or part thereof and minimum 1 test per project/stage	Make sufficient visits to ensure gravel quality and that operations will achieve a sound compacted. Undertake proof rolling and examine and endorse all test results, level checks and cross section geometry before placement of base material Lodge test results with Council	Visit site for random audit inspections and testing if considered warranted Obtain periodic quality test results from suppliers as necessary
Compaction	AS1289-5 and E8.1 and proof rolling	100% Standard and no discernible movement	1 test per 100m carriageway or part thereof (minimum 2 tests)		
Profile and Depth	String line or level survey	MVSC Table of Construction Standards/Tolerances	1 test per 20m		
k. Base Layer – Pre-seal					
Material Quality	Grading & Atterberg	MRS11.05 (Type 2.1. 2.2 or Type 2.2 as required)	1 test per 500m carriageway or part thereof and minimum 1 test per project/stage	Make sufficient visits to ensure gravel quality and that operations will achieve a sound compacted layer. Undertake proof rolling and examine and endorse all test results, level checks and cross section geometry before joint inspection with Council. Lodge test results with Council. Check to confirm construction complies with approved design	Conduct joint inspection with Superintendent (including proof rolling). Inspect Drainage. Upon satisfactory testing approve placement of surfacing material Check works for compliance with approved design and issue inspection memo to Superintendent where necessary
Compaction	AS1289-5 E8.1 and proof rolling	100% Standard and no discernible movement	1 test per 100m carriageway or part thereof (minimum 2 tests)		
Horizontal & Vertical Alignments	Survey		1 cross section per 20m, at critical locations and 1 cross section per 50m for general control		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Profile	String line or level survey	MVSC Table of Construction Standards/Tolerances	1 test per 20m max		
l. Roofwater					
Location of MH's & YJ's	Survey	Inter-allotment drainage	Each	Engineer to make sufficient job visit to confirm generally that all structures and pipelines are constructed to Council tolerances	Joint 'on maintenance' inspection with Consulting Engineer and notify requirements, if any
IL and OL at MH's & YJ's	Survey	Inter-allotment drainage	Each		
Bedding materials	Grading	Stormwater Drainage	1 test per 200squared		
Manholes	Appearance	Stormwater Drainage	Each		
Pipelines	Survey	Line and Grade	100m		
Backfilling	AS1289-5.1.1				
m. Surfacing					
Material Quality	Mix Analysis	MRS relevant standards	Min. 1 test per 100 tonne or 1500m2	Confirm mix design and spray rates. Superintendent to oversee surfacing operations and to endorse all test and level results	Visit site for random inspection if considered warranted
Compaction and Thickness		MRS relevant standards			
Profile	String line or level survey	Standards/Tolerances	As required		
n. Topsoiling and Grassing					
Sediment and Erosion Control	Visual	MVSC Standards	Sufficient for general control and at specific critical locations	Ensure all affected areas are topsoiled, grassed and maintained to 80% grass cover; and approved sediment and erosion control structures are in place and functioning satisfactorily	Visit site for random inspection if considered warranted
All works Prior to On-Maintenance	Visual		As required	Ensure all works comply with approved design before arranging "on maintenance" inspection	Conduct joint "on maintenance" inspection with Superintendent, check compliance with approved design and advise any requirements

ELEMENTS OF WORKS	TESTING REQUIREMENTS TEST	STANDARD	FREQUENCY	SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
Prior to Acceptance on Maintenance	As Constructed Drawings should be submitted to MVSC in both Hard Copy and Electronic format Complete Test Results to be compiled Supervision Certificate and Inspection and Testing Plan Check Sheet to be endorsed			Lodge documentation as per Testing Requirements Lodge written request for On Maintenance Lodge written request for bond refund/reduction where applicable	Check documentation lodged by Superintendent within twenty-eight (28) days and advise any requirement. When complete, reply to Superintendent's request for On Maintenance
During Maintenance Period	Any defects to be repaired Works to be maintained safe and in good order Maintenance programs to be implemented and inspected			Ensure all minor omissions and defects are rectified. Examine and approve site prior to request for Off Maintenance inspection	Advise Superintendent of any known defects or maintenance not being undertaken
Off Maintenance	Confirmation that no defects are evident Works maintained safe and in good order			Accompany Council Inspector and note any requirements. Arrange completion of requirements and check prior to further joint inspection. Lodge written request for Off Maintenance and bond refund/reduction where applicable	Accompany Superintendent and Contractor and advise any requirements. When complete refund/reduce bond and reply to Superintendent's request for Off Maintenance and bond refund/reduction
o. Street Lighting					
Bulb Wattage Check		ERGON Public Lighting Manuals	Each	Accompany Council Inspector and note any requirements. Arrange completion of requirements and check prior to further inspections.	Check works for compliance with approved design and issue inspection memo to Superintendent where necessary
p. Street Signs					
Road Name Check	Visual	Council Road Name approval letter.	Each	Accompany Council Inspector and note any requirements. Arrange completion of requirements and check prior to further inspections.	Check works for compliance with approved Road Names and issue inspection memo to Superintendent where necessary
2. AS CONSTRUCTED DRAWINGS					
In accordance with Council requirements					
3. WATER RETICULATION					
a. Water Reticulation					

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Reticulated Water Supply Location RP Bdy Set Out Valves, Hydrants, Scours, Bend	RL where nominated Visual elsewhere	Water Reticulation within corridor	100m	Engineer to make sufficient job visits to confirm generally that construction is in accordance with requirements and that location of all fittings are within Council. requirements. All testing results to be examined and endorsed before forwarding to Council. Pressure testing of all pipelines to be witnessed. Water quality testing by NATA registered laboratory Arrange chlorination of all mains	Joint 'on maintenance' inspection with Consulting Engineer and notify requirements, if any. Inspection and testing of water supply construction works shall also be carried out by Council's Inspectors and the Water Branch Manager or his delegate to ensure the works conform to the Specifications and Drawings prior to acceptance of the works on-maintenance
Depth	Grading/visual	WSAA Water Reticulation	1 test per 200m3		
Bedding Materials	Visual	Water Reticulation	Before backfill		
Pipeline	AS1289-5.5-1	Water Reticulation	100m and every road crossing		
Backfilling	Pressure Test	Reference WSAA specification	All lines		
Pressure Testing	Field and laboratory test	Reference WSAA specification	All lines		
Disinfection/Water Quality Testing	RL where nominated Visual elsewhere	Water Reticulation within corridor	100m		
4. SEWERAGE RETICULATION					
a. Sewerage Reticulation					
Location MH's and YJ's	Survey	Refer Std Drawing	Each	Engineer to make sufficient job visits to confirm generally that all structures and pipelines are constructed and located within Council Tolerances and to endorse all test results. Engineer to witness and approve all vacuum tests of pipelines and access chambers	Joint 'on maintenance' inspection with Consulting Engineer and notify requirements, if any Inspection and testing of sewerage construction works shall also be carried out by Council's Inspectors and the Water Branch Manager or his delegate to ensure the works coform to the Specifications and Drawings prior to acceptance of the works on-maintenance
IL at MH's and YJ's	RL	Refer Std Drawing	Each		
Bedding Materials	Grading/Visual	Sewer Reticulation (WSAA)	1 test per 200m3		
Maintenance Holes	Appearance - leak proof, smoothly benched and clean	Sewer Reticulation (WSAA)	Each		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Pipelines	Survey - internal examination for straightness, clean true to grade. CCTV Video inspection as directed.	Sewer Reticulation	Each		
Backfilling	AS1289-5.1.1	Sewer Reticulation	100m and every road crossing		
House Connections	Complying with Council Standards	Refer to Standard Drawing	All connections		
Pumping Equipment	Performance testing with mains electricity supply	WSAA Specification	All pumping equipment		
Vacuum Testing all Pipelines	Vacuum test	WSAA Specification	All lines		
Vacuum testing Maintenance Holes	Vacuum test	WSAA Specification			

8.1 PROCEDURES DURING CONSTRUCTION

8.1.1 Inspection & Testing Subgrade Evaluation and Pavement Design

The applicant/supervising engineer is to arrange for inspection of subgrade/ pavement to be undertaken with Council officers.

Inspections will be undertaken in accordance with the "Quality Control and Audit Inspections", as outlined in Section 9.5.

Council may undertake audit inspection of any or all of the works without prior notice.

A brief summary of items for inspection will include the following: The applicant/supervising engineer is to submit, as early as possible, subgrade evaluation tests at approximate box level together with recommended pavement depths determined prior to inspection request date.

The testing is to be carried out by a NATA registered testing company .A period of one working week should be allowed for Council processing and approval of the proposed pavement design.

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

- Subsoil Drainage

The applicant/supervising engineer is to arrange with Council an inspection of the subgrade before pavement materials are placed, to determine if mitre drains are required. Side drains are to be inspected with the subgrade.

- Inspection and Testing by Council

During construction, Council may conduct audit inspections of any or all of the works without prior notification.

The major inspections and their coverage are listed below. The listings are not intended to be exhaustive and Council may require inspection and testing of other items.

Subgrade

Subgrade inspection will generally include:

(a) checking service conduit locations against markers, if kerb and channel is in place;
(b) determination of the location of mitre and side drains;
(c) proof rolling bottom of subgrade box after compaction;
(d) checking of subgrade level and crossfall;
(e) checking all related civil works.
(f) checking of side drains and mitre drains checking testing results of pavement compactions and moisture results before sealing and asphalt.

Note: Certified pavement thicknesses and subgrade compaction test results, and compaction test results for backfill to trenches, are to be available for the inspection.

If Council does not obtain pavement ITP results or carry out an inspection, all details must be submitted at "On Maintenance" inspection.

Road Pavement

The pre-seal inspection will generally include:

(a) Proof rolling of base course gravel and checking of profile after compaction. Compaction test results and gravel quality test results of the base, sub-base and select fill courses are to be available for the inspection. If Council does not obtain pavement ITP results or carry out an inspection, all details must be submitted at "On Maintenance" inspection.
(b) pre-prime inspection of the pavement surface to ensure profile is correct and surface is suitable for priming, in accordance with the requirements of the relevant approved Specifications;
(c) side drains and mitre drains checking and testing;
(d) checking of conduit markers against service conduits;
(e) for spray seal - proposed application rates of prime and binder and spread rates of pre-coated aggregate are to be approved prior to the inspection;
(f) for asphaltic concrete – checking of details associated with chip seal (application rate etc); proposed application rates of prime and results of mix acceptance tests are to be approved prior to the inspection;
(g) that stormwater drainage works affecting the roadworks have been completed;
(h) that all pipe and services crossings of the roadworks have been completed, and certified as correctly located by the applicant/engineer;

(i) checking kerb and channel - line and levels checking and certified as within tolerances by the supervising engineer;
(j) checking of intersection contouring.

It is the applicant's/supervising engineer's responsibility to ensure that all the necessary details as listed above are complied with prior to asking for an inspection by Council. Failure to do so will delay the prime and incur a reinspection fee.

8.2 BONDING

8.2.1 Purpose

The purpose of this is to set out the circumstances and processes associated with the following Council requirements to protect progress of works by the developer:

a) accepting security for proposed operational works prior to commencement of construction may be requested
b) accepting security prior to On Maintenance for uncompleted works.

"Bonding" is the submission of a financial security to Council by the developer, and is used in the following circumstances:

- To cover incomplete development obligations in order to obtain the early release of Survey Plans.
- To cover all development construction works during the operations and maintenance period.

Note: Development obligations refer to all conditions of approval relative to the development permit. This includes, but is not limited to, Civil Works, Park improvements, provision of “As Constructed” information, test certificates, revegetation, sediment and erosion control, maintenance plans being implemented.

All bonds shall require a completed deed of agreement.

8.2.2 Construction Bond (Commencement of Proposed Works)

Council may request a construction bond; this bond is required to provide security to Council in the event that costs are incurred as a result of the following:

- Protection of on-street works from damage by contractors, sub-contractors and suppliers
- Repairs to on-street works resulting from damage caused by contactors, sub-contractors and suppliers
- Protection and repair of existing Council services (i.e. sewerage connections, water connections etc)
- Inadequate Soil and Water Quality Management during construction
- Inadequate provision for traffic
- Urgent action required by Council to resolve unsafe construction or emergency repairs required to protect persons and/or property from consequential damages, safety.
- Any safety or environmental incidents not attended too within reasonable time by the contractor (superintendent to supervise). To be used as security in the event of public safety or potential harm for Council to amend and make safe at developers cost.
- Clean up of environmental incident, or inclement weather impact on site / Council drainage systems.

Process to be applied:

- Letter submitted by Council requesting bond security for proposed value of works (5% of total value or as deemed applicable by Council for the level of risk associated for the development)
- Provide schedule of works and value which are proposed to be bonded
- Pay relevant bond amount
- Substantiate proposed timing for the completion of works
- Complete Deed of Agreement (obtain Deed of Agreement and attach)

At the completion of the works and the acceptance of the works “On Maintenance”, the security bond shall be returned to the developer or may be substituted for the uncompleted works and maintenance bond.

8.2.3 Uncompleted Work Bonds (Prior to On Maintenance)

Council may, at the request of the developer, agree to release the Survey Plans prior to completion (On Maintenance) of development obligations and subject to the applicant being able to demonstrate:

a) 100% completion of bulk earthworks to be completed and stabilised to Council's satisfaction
b) 100% completion of water supply
c) 100% completion of sewerage reticulation
d) 100% completion of pump stations (if applicable)
e) 100% completion of stormwater drainage
f) 100% completion of structures - drainage, bridges, accesses:
g) majority of all approved subdivisional works have been satisfactorily completed. This includes roadworks to sealed asphalt surface available for access with regulatory signage and markings in place.

Process to be applied:

- Letter submitted by Consultant requesting plan sealing by the Council for remaining works outside that outlined above
- Provide schedule of works and value which are proposed to be bonded. Shall include a list of infrastructure assets that are proposed to be handed over to Council (detail items to be completed)
- Provide bond security for proposed value of works outstanding
- Substantiate proposed timing for the completion of works. Notification from a suitably qualified engineer (RPEQ) that the information provided to Council is correct and that the uncompleted works are scheduled for completion within three (3) months of the date of the sealing of plans or as negotiated with Council representative;
- Complete Deed of Agreement (obtain Deed of Agreement and attach)
- Provide to the Council a certificate from a licensed surveyor that all the property survey marks are reinstated, and As Constructed details are submitted in accordance with Council requirements.

8.2.4 Special Conditions

Council may upon receipt of a written submission from the applicant, waive or relax components of the requirements on an individual basis.

In relation to development works given as a condition of approval by the Council, or by a referral agency as a condition of the approval, Council shall specify the works to be completed prior to acceptance of the bond for compliance.

8.2.5 Security

The Bond security given shall be in the form of either:

- cash;
- an unconditional bankers undertaking from a bank; or
- such other security as the Council may approve.

8.2.6 Release of Bond

The Council may upon written request of the applicant:

- Release the security where the applicant has fulfilled the provisions of the bonding agreement
- Released the maintenance security where the applicant has complied with requirements set out in Councils acceptance of “Off Maintenance”

8.2.7 Calling Up Bond

The Council may upon notification relating to conditions outlined below call upon the Bond based on:

- The Council may, where the applicant has failed to comply with the terms of the Bonding Agreement, serve written notice on the applicant requiring the applicant within seven (7) days of the receipt of the notice to either comply with the terms of the bonding agreement or show cause why the Council shall not call up the security and complete the works;
- The Council may call up the security if the applicant has failed to comply with notice served under and in the interest of public safety, environmental health or structural failure certain works are

required to be undertaken by the Council prior to the expiration of the term of the Bonding Agreement

8.2.8 Appeal Process

Any person dissatisfied with a decision of a delegated officer may request that the decision be reviewed.

Where a person requests a review of the decision of a delegated officer, notification shall be made to the following:

Chief Executive Officer
Miriam Vale Shire Council
36 Roe St
Miriam Vale

8.3 PLAN SEALING

8.3.1 Introduction

A person who makes application for the sealing of a plan of subdivision shall make the application in the form required by the Council and shall accompany such application with an application fee of an amount which is in accordance with a scale of fees determined by the Council, and subject to resolution as determined.

8.3.2 Submission

The application for sealing of the plan shall not be lodged with Council until:

- All subdivision works have been completed to the satisfaction of the Council and accepted "on Maintenance" (including the submission of as construction information), unless otherwise bonded.

8.3.3 Application Requirements

The application made for sealing of the plan shall be:

a) made in writing
b) signed by the applicant or applicants, or :
    - in the case of a partnership by one of the partners thereof, or in the case of an incorporated association by an authorised officer thereof
    - in the case of a company or body corporate, under the seal of the company or body corporate,
c) accompanied by the consent in writing of the registered proprietor of the registered lessee of the land as the case may be
d) Addressed to the Chief Executive Officer and shall be truly set forth the following
    - real property description of the land
    - the postal address
    - the name of the registered proprietor or the registered lessee as the case may be
    - the zoning which the land is included at the date of the application
    - the name and full postal address of the applicant
e) Accompanied by the plan of subdivision suitable for deposit in the office of the Registrar of Titles which plan shall comply in all respects with the subdivision permit, the approval of the engineering requirements, drawings and specifications.
f) Require all drawings and electronic information detailing current "As Constructed" data excluding outstanding bonded works prior to sealing being approved by the Council.
g) All infrastructure charges as detailed in an infrastructure agreement or infrastructure charges notice shall be paid.

8.3.4 Plan Details

It shall not be allowed for a licensed surveyor to amend any plan of subdivision after it has been submitted to the Council for approval and sealing, without the informing the Council of such amendments and obtaining approval. Amended copies shall be advised to the Council and forwarded.

In no case shall amendments be made which contravene the terms and conditions of the Council approval.

The Council shall compare the plan for subdivision sealing with the subdivision proposal plan as approved by the Council during submission.

If the Council finds the plan of subdivision conforms with the proposal plan as approved, and no material change, variation or alteration has been made, and all conditions of the subdivision approval have been complied with to the Councils satisfaction, sealing shall be carried out.

Council shall as part of the operation note its approval on the plan of subdivision, including a certificate that all the requirements of the Council have been complied with, and shall return the plan of the subdivision to the applicant to be lodged on the office of the Registrar of Titles.

The applicant shall lodge a certificate signed by a licensed surveyor stating that the completion of the works associated with the development, survey marks were re-instated where required and all survey marks are in the correct position in accordance with the plan of subdivision at the particular date.

The certificate shall be in the form prescribed by the Council, and shall not be endorsed or sealed until the required certificate is lodged with the Council.

In the event of the Registrar of Titles, upon lodgement of the plan approved by Council requires an alteration of any such plan in any particular way, the licensed surveyor who prepared the plan shall within a period of one (1) month from the requested alteration, notify the Council and forward two (2) copies.

Additionally an electronic copy in accordance with As Constructed detail is to be provided.

8.4 AS CONSTRUCTED

8.4.1 Submission

'As-Constructed' drawings serve two distinct functions:

- Checking: To enable a quantitative check of the 'As-Constructed' works against the approved design, so as to ensure design philosophies and criteria have been achieved.
- Recording: To provide an accurate record of the 'As-Constructed' asset details and locations for total asset life-cycle management.

Information required for the checking function must be presented in a form that allows ready comparison between design and 'As-Constructed' data by engineering staff.

The data is to be presented in a hard copy for record purposes and electronic format (see 1.0.3 below) for direct transfer to Council's Geographic Information System (G.I.S.) and Asset Management Systems.

As-Constructed Drawings and Documentation shall be submitted using the appropriate form and shall comprise the following:

- As Constructed Drawings – Hard copy

  Every drawing included in the approved design, including stormwater calculation sheets, catchment plans and landscaping plans, shall be submitted in certified 'As-Constructed' form as full size drawings.
- As Constructed electronic submission
- As Constructed Drawings – Submission and Compliance Report (FORM No. 1.1 attached)
- Operation and Maintenance Manuals (Where specific maintenance procedures are required eg: Artworks, Stormwater Pollution Devices)
- Structural Certification for retaining walls.

The digital data is to include at least two relatively well-spaced permanent survey marks with AMG co-ordinates and AHD levels to fourth order standard as defined by the Department of Natural Resources Specification.

8.4.2 Certification

A standard proforma, ('As Constructed' Checklist) with the facility for signing off by Council staff, shall be completed by the consultant. The proforma is to show the following information:

- Contract/Development Name and Stage;
- MVSC Contract Number (if applicable)

- Consulting Engineer and Surveyor;
- Council File Reference Number;
- Certification of "As Constructed" data as described herein;
- Certification that level datum is A.H.D. and detail of P.S.M. from which datum was derived;
- Confirmation of Grid Co-ordinates on the MGA 94 (GDA94) datum.

In addition to the above, the consultant shall identify the nature and number of items of "As Constructed" data that do not comply with the approved design. This information shall be either:

1. certified that the completed works do not in any way compromise the design intent; or
2. tabled as appropriate to give details of proposed rectification works and time for completion.

Engineering certification of each drawing is also required and the certification shall be 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 person, Registered under the Surveyors Act 1977. We hereby accept responsibility for the as constructed information shown on this drawing.
> Certified By ....."

Because the 'As-Constructed' drawings are to become public property through the Council, copyright on these drawings is therefore to be removed.

8.4.3 Specific Requirements

The following sections describe in detail, the type of information to be provided by the consultant.

8.4.3.1 Roadworks

Nominal face of kerb line, edge of bitumen, crown of road and the like are to be shown. Certification that the works have been constructed in accordance with the design plans is sufficient provided that level information on change of grade is given on the plan.

Constructed Road Surfacing Type, pavement thickness and composition including pavement and subgrade C.B.R. values shall be provided for each individual road segment.

8.4.3.2 Water Supply and Sewerage Reticulation

On completion of the works and before any works goes on maintenance as-constructed drawings certified by a Registered Professional Engineer Queensland shall be provided together with as-constructed digital drawings suitable for use with AutoCAD.

As-constructed drawings can be the approved design drawings, but shall be updated to show all as constructed details. Water main drawings shall how all valves, levels, service pipe connections & other relevant information. Sewer drawings shall confirm all details as constructed including any changes in invert levels, natural surface level, depth to invert, gradient & other relevant information.

Drawings shall be provided in digital formation, DXF or DWG file in addition to the hard copy.

The signing of as-constructed drawings implies that all works have been designed & constructed in accordance with Councils Water Supply & Sewerage Standard. The as-constructed drawings shall clearly state: which issue of this Standard applies; & full details of any agreement reached with Council where any section of this standard does not apply.

8.4.3.3 FORM: 'AS CONSTRUCTED' DRAWINGS –SUBMISSION AND COMPLIANCE REPORT

File No. .....

8.4.3.3.1.1	**Contract/Development Name and Stage**
8.4.3.3.1.2	**MVSC Contract Number (if applicable)**
8.4.3.3.1.3	**Consulting Engineer and Surveyor**
8.4.3.3.1.4	**Council File Reference Number**
8.4.3.3.1.5	**Datum and detail of P.S.M.'s from which datum was derived**
AHD	
AHD	
8.4.3.3.1.6	**Confirmation Grid Co-ordinates on the MGA 94 (GDA94) datum**
8.4.3.3.1.7	**Certification of "Works"**
Construction Methods and Testing We hereby certify that the completed works have been constructed/installed and tested in accordance with Council Standards **As Constructed data** This drawing/data 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 person, Registered under the Surveyors Act 1977. We hereby accept responsibility for the as constructed information shown on this drawing.	
8.4.3.3.1.8	**Detail "As Constructed" outside construction tolerances, or differing from the approved design**
We hereby certify that the completed works do not in any way compromise the design intent. OR List details and give details of proposed rectification works and time for completion	
8.4.3.3.1.8.1.1	*Tender schedule / bill of quantities is attached*

It is hereby certified that the "As Constructed" drawings submitted herewith have been prepared, checked and amended in accordance with the requirements of Miriam Vale Shire Council Standards and Specifications and that the completed works comply with the requirements therein, except as noted below.

Compliance with the requirements of "As Constructed" Drawings and Documentation	Compliance Yes / No	Non-compliance - refer to non-compliance report
Street Names		
Earthworks		
Roadworks		
Stormwater Drainage		
Water Supply		
Sewerage Reticulation		

Consultant Firm .....

Engineer.....

Signature.....

Position .....

Date

8.4.3.4 Statement of Compliance

A statement of compliance is to accompany each submission of 'As Constructed' drawings. As Council will be checking only a sample of the 'As Constructed' information, any departure from the guidelines will be grounds for rejection of the submission, and resubmission after amendment.

8.5 ON MAINTENANCE

8.5.1 General

This section defines the requirements to be applied prior to “On Maintenance” approval and “Off Maintenance” asset handover by the representatives from Miriam Vale Shire Council.

8.5.2 Acceptance of Works "On Maintenance"

Council will accept operational works "On Maintenance" on completion of those works to an acceptable standard, and compliance with any conditions of the development permit which may include:

- completion of works in accordance with the requirements and conditions of the development permit;
- completion of the requirements from On Maintenance inspection;
- submission of As Constructed information;
- payment of any headworks or other contributions or charges specified in the development permit
- or levied by Council;
- submission of a clearance from Electricity and Telecommunications Service Providers stating that its requirements for the provision of underground electricity to the land and the lots contained therein have been satisfied;
- submission of a clearance from Electricity and Telecommunications Service Providers stating that its requirements for the provision of street lighting to the land and the lots contained therein have been satisfied and that payment has been made for the first two years supply;
- submission of a clearance from Telstra stating that its requirements for the provision of underground telephone services to the land and the lots contained therein have been satisfied;
- Landscaping maintenance programs submitted.
- Lodgement of an engineers certificate that water and sewerage works have been undertaken in accordance with the approved plans and specifications by Council;
- Payment of maintenance security bond;
- Submission of all test results required as part of the Inspection and Testing Plan;

Prior to acceptance of any works On Maintenance it will be necessary for the works to be inspected.

In the event of the works being unacceptable, a reinspection fee is to be charged for subsequent inspections. Fees are defined under infrastructure charges obtained from Miriam Vale Shire Council representatives.

Following a satisfactory On Maintenance inspection and acceptance of the As Constructed drawings and documentation, the applicant is to submit a written request for acceptance of the works On Maintenance and release or reduction of any uncompleted works bond within seven (7) days.

Council will, upon confirming that the maintenance security bond amount has been approved and received, and all other relevant fees and charges paid, confirm acceptance of the works “On Maintenance” and arrange for release or reduction of any uncompleted works bond held.

During the maintenance period the applicant is to pay the full cost of any necessary repairs to roadworks, drainage and associated work, water and sewerage reticulation, pump stations and associated equipment. The costs are also to cover all required reoccurring maintenance and testing to satisfy the Councils requirements, and for the developer to prove development criteria set out in original submission. Developer in accordance with site maintenance plan is to ensure landscaping is monitored in accordance with allowable water controls at the time of operation.

The applicant or the applicant's agent or representative will be advised of works required and a time in which repairs must be completed.

Should a safety issue of either a technical or operational perspective be identified during the maintenance period, it shall be the responsibility of the developer to attend to the issue to ensure public safety is maintained. If the issue cannot be addressed immediately, safety of the site shall be

carried out within 24hrs, and signed until repairs can be undertaken. Advise of all operations shall be provided to the Councils Shire Services unit.

Should the make safe attendance not be carried out by the developer or nominated representative within 24hrs, the Council shall be able to complete required safety works and all costs be borne by the developer of concern from the security bond.

8.5.3 "On Maintenance" Inspections

The consultant is to arrange for representatives from the Principal Contractor to be present in conjunction with a representative from the key nominated divisions from Miriam Vale Shire Council.

Failure to do so may result in cancellation of the inspection and/or the charging of a reinspection fee.

Notwithstanding the above, the works will not be formally accepted "On Maintenance" until the maintenance security deposit has been lodged, and '"As Constructed"' drawings and documentation have been submitted and approved.

8.5.4 "Off Maintenance"

Prior to acceptance of any works On Maintenance it will be necessary for the works to be inspected after the completion of the full 12 month defect period.

The consultant is to arrange for representatives from the Principal Contractor to be present in conjunction with a representative from the key nominated divisions from Miriam Vale Shire Council.

APPENDICES

APPENDIX A: COMPLIANCE CERTIFICATE

MIRIAM VALE SHIRE COUNCIL

STATEMENT OF COMPLIANCE

ENGINEERING DESIGN

This form duly completed and signed by an authorised agent of the Consulting Engineer shall be submitted with the Engineering Drawings for Council Approval as part of Operational Works Policy.

Development Application No …….

Name of Development ……..

Location of Development ……..

Applicant ……..

Consulting Engineer ……..

Drawings No. ……..

It is hereby certified that the Engineering Drawings, and supporting reports, calculations and outlined details submitted herewith have been prepared, checked and amended in accordance with the requirements of the Miriam Vale Shire Council's Operational Works Policy, MCU or ROL and that the completed works comply with the requirements therein.

We being Director(s) / Associate(s) of the Consulting Engineering Firm nominated above and being duly authorised on their behalf do hereby declare that our firm is qualified in the engineering fields relevant to this application, and that the attached engineering drawings, specifications and supporting calculations have been prepared where practicable, in conformance with all the condition of Councils subdivision approval dated the …../…../….. and in compliance with the Miriam Vale Shire Councils requirements and planning policies, the Operational Works Policy, and with accepted engineering practice.

We further declare that our firm has / has not been engaged to provide Construction Inspection Services as detailed in the attached construction requirements and we shall facilitate the completion of the Inspection and test Plan requirements. In the provision of the Construction Inspection Services we undertake to exercise reasonable skill and diligence in order to ensure that the works referred to in this application shall be executed in accordance with.

(a) Councils Development Approval Conditions;
(b) Councils relevant policies;
(c) Council approved drawings, specifications and relevant industry and Australian Standards;
(d) Miriam Vale Shire Council codes and operational works policy

Consulting Engineer ……... **RPEQ No**……...

Name in Full ……..

P.I. Insurance No. & Company

……..

Signature …… Date ……

APPENDIX B: PLAN PRESENTATION

Plans submitted with an operational works, material change of use or reconfiguration application should comply with the following requirements. Standardisation of the presentation of engineering plans is necessary for consistency in Council's records and desirable for expedient checking and approval.

Drawings Required

Engineering drawings shall generally include the following:

1. Cover sheet
2. Locality
3. Subdivision layout / staging
4. Earthworks
5. Roadworks and drainage
6. Longitudinal section of each road
7. Standard cross-sections
8. Cross-sections of each road
9. Detail plan of each intersection, cul-de-sac, slow points
10. Details of bikeways and disability points
11. Longitudinal section of each drainline
12. Stormwater device details
13. Sewerage reticulation
14. Longitudinal section of each sewer line
15. Water reticulation
16. Longitudinal section of watermains 300m diameter and greater
17. Interlot drainage
18. Drainage calculations and catchment plan
19. Water quality control system
20. Structural details
21. Erosion and sediment control

The minimum requirements for each of the above are detailed below.

General Requirements

Title Block

To show:

- Estate Name (if any)
- Real Property Description and locality
- Developer's Name and Consultant's Name(s)
- Council's Development application number
- Scales and reference to Australian Height Datum (AHD)
- Plan Number and Sheet Number
- Schedule and Date of Amendments
- Signed design certification, by an experienced designer
- Signed checking certification, by a Registered Professional Civil Engineer (RPEQ)
- North Point

Scales

Scales used for all plans should preferably be those recommended by the Standards Association and AUSTROADS, namely:

- 1:1, 1:2 and 1:5 and multiples of 10 of these scales
- Although not preferred, the scales 1:25 will be accepted and 1:125 and multiples and sub-multiples of 10 of these scales

The following scales are suggested for particular uses.

1. General:
    - Overall layout plans - 1:1000 or 1:500
    - Longitudinal Sections - Horizontal - 1:1000 or 1:500
    - Longitudinal Sections - Vertical - 1:100 or 1:50
2. Plans of intersections, cul-de-sacs and slow points:
    - Details - 1:200, 1:100 or 1:250
    - Cross-sections - 1:100
    - Engineering Details - 1:20 or 1:10
3. Water and Sewerage Plans:
    - Overall layout plans - 1:1000
    - Detail plans - 1:500
    - Longitudinal Sections - Vertical - 1:100
    - Longitudinal Sections - Horizontal - 1:1000
    - Engineering Details - 1:20 or 1:10

Dimensioning on Plans

- Linear dimensions on all roadworks plans should be in metres, with the exception of some detail plans of small structures (e.g. manholes) and some standard plans (e.g. kerb and channel), which may be in millimetres.
- Details of methods of dimensioning should be in accordance with AS 1155, Appendix A, Metric Units in Construction.

Standard Cross-section Intervals

- Cross-sections should be provided to roads at 20.0m intervals, with further subdivision of 10.0m to 5.0m intervals where necessary due to horizontal or vertical curvature.
- Cross-sections are to be shown at proposed culvert locations on rural roads. Culvert dimensions, levels and cover is to be shown.
- Cross-sections of driveways are required where access profiles need level control.

Chainages

- Chainages on plans shall be expressed to a minimum of 0.01m.
- Chainages on plans are generally to commence on the bottom left hand corner and increase to the right.

Levels

- All levels shall be reduced to Australian Height Datum (AHD).
- Reduced levels of Bench Marks and Reference Pegs including Permanent Survey Marks shall be expressed to three decimal places i.e. 0.001m.
- Reduced levels of roadworks and stormwater drainage may be expressed to three decimal places i.e. 0.001m.
- Reduced levels of sewerage reticulation may be expressed rounded to two decimal places i.e. 0.01m

Grades

- Road grades shall be shown to two significant figures.
- Pipe grades shall be shown to three significant figures.

Requirements for Specific Plans

Locality Plan

- Scale 1:25000
- Locate the subdivision in relation to adjacent towns, main roads, major streets, etc
- May be included on layout / staging plan for large jobs or roadworks and drainage plan for smaller jobs

Layout / Staging

- For large subdivisions, the layout plan should show the relationship of all new roads to each other, and to existing roads adjoining the subdivision.
- For small subdivisions, where all new roads can be shown on one detail plan, the layout plan may be omitted.
- Where development is to be carried out by stages, the boundaries of proposed stages should be shown on this plan, and the stages identified by numbering, and the method of connection (ie walkways, bikeways) between stages.

Earthworks

- Legend
- Existing site contours and finished surface levels and contours
- Limits and levels of major lot cut and fill - distinguish by hatching and/or finished surface levels (FSLs) at corner of lots
- Fill quantities
- Location of cut and fill batters relative to lot boundaries
- Location and levels of retaining walls (if required)
- Batter slopes
- Defined flood level (if appropriate)
- Flood fill level (if appropriate)
- Planned locations of Acid Sulphate treatment as linked to Acid Sulphate Management Plan (refer to Code 2.1 Acid Sulfate Soils in the planning scheme)
- For small subdivisions, the earthwork details may be included on the roadworks and drainage plans.

Roadworks and Drainage

- Legend
- Road reserve boundaries
- Lot numbers and boundaries, both existing and proposed
- Centreline, or other construction line
- Chainages on centreline or construction line
- Bearings of the centreline or construction line
- Tangent point chainages of each curve
- Radius, arc length, tangent length and secant distance of each curve
- Chainage and the intersection point of road centrelines or construction lines
- Kerb lines, kerb radii, and chainage of all tangent points of the kerb line
- Edge of pavement, where no kerb is to be constructed
- Dimensioned road reserve, footpath, pavement widths and bikeways, where these differ from the standard cross-section
- Existing contours / levels and finished surface levels, highlighting cut and fill areas
- Drainage catchment boundaries and identification reference *
- Drainline locations, diameters and identification
- Manhole locations, and inlet and outlet invert levels and identification on long sections
- Gully locations and devices
- Location of proposed new utilities and existing utilities or other existing works within the site
- Location and levels of Bench Marks
- North point
- Linemarking and signing **

* may be shown on separate catchment plan

** may be shown on separate plan(s)

Longitudinal Section of Roads

- Chainages
- Existing surface or peg levels
- Design road centreline and kerb lip levels or kerb levels
- Design grades
- Chainages and levels of grade intersection points
- Chainages and levels of tangent points of vertical curves
- Chainages and levels of crest and sag locations
- Lengths and radii of vertical curves
- Superelevation diagrams showing transition lengths and rate of rotation
- Road classification with ESAs (equivalent standard axles)
- Minimum or nominal AC surfacing and pavement thicknesses
- Location of other services with cross roads
- Sight distance diagram, for each direction of travel, where warranted

Standard Cross Sections

- Road reserve width
- Pavement widths
- Verge widths
- Crossfalls of pavement and verges
- Pavement depth - minimal or nominal
- Type of kerb and channel
- Type of pavement surfacing (include special surface treatments)
- Subsoil drainage
- Footpaths
- Bikeways
- Above ground services

Cross Sections of Roads

- Road reserve boundaries
- Pavement centreline and/or other construction line
- Natural surface
- Design cross-section
- Crossfall of pavement and verges, pavement and verge widths and pavement depths wherever these differ from the standard cross-section

Longitudinal Sections of Drains

- Chainages
- Existing surface levels
- Design finished surface and invert levels
- Manhole chainages and offsets and inlet and outlet invert levels
- Distances between manholes
- Grade of each pipe (anchor blocks where required)
- Diameter of each pipe length
- Class of each pipe length
- Hydraulic grade line and design storm frequency
- Manhole diameters and/or reference to separate detail drawing
- Water quality treatment device locations

Sewerage Reticulation

Based on supplementary details top WASA, Miriam Vale Shire Council Sewerage Services provide the following requirements:

- Finished surface level contours at intervals not greater than 0.5m
- Finished surface spot levels at corners of proposed allotments.
- Sewer line and maintenance hole numbers.
- Details of allotments with zero or reduced building setback alignments

Pt 1 - 9.2.4 Structures

Structures shall be referenced to GDA mapping co-ordinates

Pt 1 - 9.2.5 Longitudinal Sections

Design Drawings shall include:

- Levels and references to AHD
- Chainages and invert levels of all proposed house connections
- Sewer line and maintenance hole numbers.
- Pipe bedding type
- Depths to pipe invert
- Depth and location of other services including stormwater.

Pt 1 - 9.2.6 Title Block Notation and Standard Notes

Design Drawings shall include:

- Estate name (if any)
- Council Development Application number – if available
- Drawing number and revision number

Pt 1 - 9.3 - Drafting Standards

Drawings shall be prepared in accordance with Miriam Vale Water Services Quality Assurance Guidelines document - CAD Standards and Requirements – MWS_MW_GL_004 (Details available if requested).

Water Reticulation

The design drawings shall include locations of existing or proposed footpaths. For subdivisional works, the design drawings are to include:

- Finished surface contours at intervals generally not greater than 1 metre.
- Finished surface spot levels at corners of proposed lots.
- All proposed lot numbers, lot boundaries, existing structures, benchmarks, easements, etc.
- Angles of bends.
- Location of road crossing conduits.

Longitudinal sections shall include:

- Pegged chainages,
- Pipe size, type and class,
- Pipe bedding requirements,
- Invert levels in grades,
- Surface levels, existing and finished,
- Datum (AHD),
- Location of all valves, hydrants and fittings,
- Depths to invert,
- Depth and location of services including stormwater drainage.

Longitudinal Sections (Required only for mains 250mm diameter and greater)

The following information shall be shown:

- Pegged chainages

- Pipe size, type and class
- Pipe bedding requirements
- Invert levels and grades
- Surface levels, existing and finished
- Datum (AHD)
- Locations of all valves, hydrants and fittings
- Depths to invert
- Depth and location of services including drainage

Interlot Drainage

- Location and size of interlot drainage lines
- Invert and surface levels at pits
- Location and size of pits
- Location and size of house connections
- Pipe material details
- Lengths and grades to all interlot drainlines
- Label interlot drainage pits and receiving stormwater structures

Drainage Calculations and Catchment Plan

- North point
- A plan of the development showing the road and lot boundaries
- Existing and finished surface contours (in different line types) at an interval close enough to define the terrain and allow definition of the subcatchments
- Contours shall extend beyond the limits of the development site to fully define the limits of external catchments
- Subcatchment boundaries, labels and areas
- Line diagram of drainline, manhole, gully and outlet locations
- Labeling of stormwater structures
- where changes may affect adjacent properties

Erosion and Sediment Control

- Limits of disturbance
- Vegetation retention plans
- Soil maps
- Existing site contour plan
- Final site contour plan
- Construction drainage plans for each stage of earthworks
- Location of temporary drainage, erosion and sediment control measures
- Technical notes possible relating to:
    - site preparation and land clearing
    - erosion control measures
    - material and installation specification and maintenance requirements
    - installation sequence
    - site revegetation and rehabilitation requirements
    - legend for standard symbols used within the plans
- Construction details for various ESC measures
- Operational maintenance procedures and nominated personal responsible

APPENDIX C: ON MAINTENANCE CHECK LIST

MIRIAM VALE SHIRE COUNCIL

"ON MAINTENANCE" INSPECTION CHECKLIST

DEVELOPMENT NAME: _____

DEVELOPMENT LOCATION: _____

ITEM	DESCRIPTION	WORK PASSED YES/NO/NA	COMMENTS
ROOF WATER RETICULATION			
A1	Roofwater drainage system is constructed to plan		
A2	Outlets to kerb and channel are satisfactory, installed with full height kerb adaptor		
A3	Outlets other than to kerb are satisfactory		
A4	Each lot falling to the street has a full height kerb adaptor		
A5	Roofwater system has been flow tested and is operating as designed		
A6	Prefabricated lids are used on inspection pits		
ENCLOSED STORMWATER DRAINS			
B1	Pipe layout is as per the plan or approved amendments with respect to pipe size, levels and location.		
B2	All pipe joints and lifting holes are mortared, except for externally banded pipes (invert only) and rubber ringed joints		
B3	All pipework is free of debris, saltation etc		
B4	Outlet/Inlet structure are satisfactorily constructed and are protected from scour or saltation		
B5	Trenches: • No visual subsidence has occurred • All density tests are available and satisfactory		
B6	Closed circuit television camera (CCTV) inspection to demonstrate that the pipes do not sustain any premature cracking		
B7	Pipe connections to gully pits are not constructed to the corner of two walls such that the capacity is reduced.		
B8	All gullies are constructed to the correct standards (including grate types, slots, backstones etc)		
B9	Grates are seated in frames without movement		
B10	All manholes roofs (aspros) are mortared to the manhole walls		
B11	Manhole lids are seated in frames without movement		
B12	All manhole and gully pit pipe connections are mortared flush with the walls and that no pipe reinforcement is exposed		
B13	Manholes are constructed to standards and satisfactory ie absence of any foreign materials or voids		
B14	Step irons have been securely installed to provide easy access		
B15	Step irons have been securely installed in gullies and manholes>1.35m deep		
B16	Pipework has been visually inspected and is satisfactory, ie: • Free of debris and siltation • Pipe joints satisfactory with no deflection or movement • No visible sign of trench subsidence • No exposed reinforcing steel to cut pipe ends		
B17	Gully pits and manholes have been visually inspected and are satisfactory, ie:		

	• No ponding • No excessive cracking or distress of reinforced concrete works • Clear of silt and debris • All mortar is in place, no excessive spalling, flaking or cracking • No visible sign of subsidence If gully baskets are present, they are cleaned and maintenance program is nominated		
B18	Gross pollutant traps have been visually inspected and are satisfactory, ie: • Free of debris and siltation • No cracking or distress of concrete at fixing points • Fasteners are secure • Structures have not misaligned due to excessive loads No corrosion at any location evident		
B19	All test results made available		
SEWERAGE			
WATER RETICULATION			
WATER MANAGEMENT DEVICES			
OPEN CUT CHANNELS			
C1	Open channels are constructed to design profiles		
C2	Lining of channel is to the required thickness and reinforcement, with appropriate weepholes		
C3	Low flow channels or pipe has been constructed satisfactorily		
C4	Unlined sections are stable and/or grass/turf has been established		
C5	Smooth transitions have been provided between new work and natural channels		
C6	Cut off walls have been constructed to all concrete channel edges and outlet or inlet structures		
C7	Concrete catch drains have been visually inspected and are satisfactory, ie: • Clear of silt and debris • No damage or cracking Overland flow path profile maintained		
MISCALLANEOUS DRAINAGE			
D1	Appropriate overland flow paths are provided and clear of obstruction		
D2	Outlets and outfalls have been constructed to control discharge flow in accordance with the plans		
D3	Subsoil drainage discharges to gullies or other approved point of discharge		
D4	Subsoil drains have been checked to be clear and free flowing		
D5	Side drains have been checked hydraulically and found to operate satisfactorily		
D6	Flow paths have satisfactory access for maintenance activities to be undertaken		
ROAD PAVEMENTS			
E1	Plan layout and geometry of road system is in accordance with the drawings. Details to be validated by As Constructed details.		
E2	Finished levels at crown and channel are at design levels. Details to be validated in accordance with ITP		

	data to be provided.		
E3	Cross falls are to approved plan. Details to be validated by ITP survey plan requirements.		
E4	AC surfacing is satisfactory in respect of finish and thickness. Details to be validated in accordance with ITP test data.		
E5	Joints in the seal (especially where connection to an previous stage) are flush		
E6	The sealed surface is free of any blemishes, including those caused by the base of the backhoe legs. When caused by utility service providers, the damage should be repaired during the maintenance period. Validation that no settlement of service trenches have resulted.		
E7	No areas of ponding around islands, adjacent to manholes or channels, or near or after turning lanes/corners.		
E8	All test results for subgrade, and pavement layers is shown to be conforming in accordance with ITP test requirements.		
MISCALLANEOUS ROADWORKS			
E9	Footpaths and concrete works satisfactory in accordance with approved plan and standard drawings.		
E10	Bikeways and associated works satisfactory.		
E11	Street name signage satisfactory.		
E12	Alternative pavement surfacing is satisfactory.		
E13	House numbers painted in layback kerb for every 1 in 3 allotments.		
SEGMENTAL PAVERS			
F1	All pavers are laid to the correct pattern to within allowable tolerances, compacted and the joints filled. No sign of settlement against existing or new asphalt joints.		
F2	Bedding sand for pavers drain to subsoil drain		
F3	Pavers adjacent to CKC, edge restraints are cut and laid as per the specified standard provided for the works.		
F4	Weedicide has been placed on the bedding sand.		
STENCILLED PATTERN CONCRETE			
G1	Level of concrete pavement joins neatly onto the AC surface and the CKC		
CONCRETE KERB AND CHANNEL (CKC) AND MEDIANS			
H1	The correct type used at all locations in accordance with specified standards		
H2	Ponding of stormwater does not occur. Water test to be carried out.		
H3	Transitions and connections to existing construction are smooth and to a satisfactory standard and workmanship		
H4	Service markers are placed in kerb face. Conduits should be exposed for inspection purposes		
H5	Lip and back of kerb are flush with the roadway and footpath respectively.		
H6	All channelisation works and medians have been satisfactorily completed.		
H7	Infill treatment of medians has been inspected and found satisfactory. Any landscaping has been completed as per approved drawings.		
H8	Backing strips are provided to median kerbs where required		
H9	Side drains are provided under medians.		
VERGES			
I1	Profile are as per plan		
I2	Verges are topsoiled in accordance with the specified standard		
I3	Verges are grass seeded and fertilised or turfed to the specified standard		
I4	All service fixtures (such as valves) are flush with the surrounding verge		

I5	Concrete footpaths are constructed to the specified standards		
I6	Pram ramps are constructed as required to specified standards		
BIKEWAYS			
J1	Location and width are as per the plan.		
J2	Kerb ramps and crossings are constructed		
J3	Safety rails, signs and Linemarking are established as per drawings and specified requirements		
FENCING AND FEATURES			
K1	All fences other than approved entrance features are constructed within allotments. Survey pegs are visible		
K2	Specifically approved entrance features are constructed in accordance with the drawings		
K3	Entrance features and fences have satisfactory Building Approvals		
K4	Sound attenuation fences are contained wholly within the allotments and constructed in accordance with drawings		
EARTHWORKS			
L1	Toe of fill batters and top of cut batters are setback a minimum of 0.3m from boundary of the public space		
L2	Retaining walls are contained wholly within the allotments		
L3	Retaining walls are constructed in accordance with the approved drawings.		
L4	Retaining walls have required structural certification (where required)		
L5	Batter slopes are constructed in accordance with the approved drawings		
L6	Batter slopes stabilised against erosion		
L7	Interim drainage is constructed in accordance with approved drawings		
L8	Erosion and Sediment controls for duration of maintenance period have been satisfactorily established		
L9	Maintenance plan for managing erosion and sediment impacts provided. Details may form part of the Construction Management Plan.		
LANDSCAPING			
M1	Landscaping is placed as per the approved landscaping plan		
M2	Irrigation system has been removed, or dated for removal nominated.		
M3	Maintenance program provided and contact details of parties associated.		
WATER QUALITY			
N1	Implement the approved erosion and sediment control plan as detail during construction phase and for in maintenance period.		
N2	If required, implement water quality sampling analysis as set down in project specification		
PARKS			
O1	The park layout is in accordance with the approved Landscape Drawing layout and requirements		
02	The park has been cleared of debris, old fences, noxious weeds, disused structures		
03	Contaminated land (if present) has been remediated and evidence of removal from the Contaminated Land Register of the EPA provided		
04	Earthworks profile have been achieved: • Grassed open activity areas with a slope of less than 1V:20H and greater than 1V:150H • Sports fields draining to the perimeter at a grade of 1V:100H • Maintained parkland with gradients no steeper than 1V:4H if grassed and 1V:3H where planted with		

	vegetation (1V:6H preferred)		
O5	Retaining earth structures are constructed in accordance with the approved plans including: • Subsoil drainage to back of walls connected to soackage trenches or stormwater • Geotextile fabric behind boulder walls • Edging and landscape strips • Barrier/balustrade at top of structure adjacent to park activity areas		
O6	Batters, mounds, embankments and retaining structure do not encroach onto park activity spaces		
O7	Existing vegetation designated for retention has been protected, dead wooding and pruning hazardous trees has been completed to the required standard		
O8	Proclaimed, noxious and environmental weeds are being controlled.		
O9	Rehabilitated surfaces of erosion prone and degraded areas including adjacent roadsides are stable and plants are well established at the required density and in a condition to survive dry periods		
O10	Grassed areas have been trimmed to direct site drainage evenly and efficiently to stormwater inlets or infiltration areas, drainage is not directed towards visitor and recreation facilities or neighbouring residence		
O11	At least 80% grass cover is achieved on mown areas; potential hazards such as stones and boulders have been removed or covered with 100mm of topsoil; new grassed areas are married into existing levels and to hard surfaces to avoid trip hazards; stabilising strips of turf are laid within overland flow paths; areas subject to regular inundation along side pathways and around visitor and recreation facilities		
O12	Mulched areas have a nominal thickness of 100mm and edge of the mulch is shaped to allow easy mowing, erosion control matting is used within overland flow paths and areas subject to regular inundation		
O13	Concrete edging is provided around gardens and landscaping beds, edging is straight or with long sweeping curves for ease of mowing (corners are between 45and 90 degr)		
O14	Hollows have been eliminated in mown areas or field gullies provided in accordance with standard drawings		
O15	Drainage from roads and car parks is dispersed into bio-retention swales or to the stormwater network to approved plans		
O16	Drainage does not unduly impede maintenance operations		
O17	Drains do not unduly impede maintenance operations		
O18	Stormwater discharge into the park are constructed to the approved plans		
O19	Tree planting and landscaping has been completed in accordance with approved drawings. Individual trees in grassed areas have mulched zone of at least 0.3m radius, trees and plants are well established and conditioned to survive dry periods		
O20	Imported topsoil used in landscape comply with required standards. Details to be provided in accordance with ITP		
O21	Temporary irrigation systems have been removed or will be removed by an agreed date		
O22	At least one tap is provided adjacent to or within landscaped and garden beds requiring on going maintenance		
O23	Infrastructure colours comply with those defined by Council		
O24	Vandalism and graffiti resistant materials are used for park infrastructure to be validated. Any vandalism or		

	graffiti to be corrected during maintenance period		
O25	Park facilities and access infrastructure complies with *AS 1428 Design for Access and Mobility*		
O26	Maintenance and emergency vehicle access points extends from road frontage into the park, and each access point provided with: • A formed or constructed driveway; • Appropriate queuing areas; • A removable bollard or lockrail;		
O27	Access is available to all maintained sections of the park for maintenance and emergency vehicles		
O28	Fencing is installed in accordance with approved plans		
O29	Signage is installed to promote safe and appropriate use of the park		
O30	Park entrances, pathways, bridges and boardwalks, roads and car parks and pavement areas are constructed in accordance with approved drawings and required standards		
O31	An electricity supply pillar is installed at the park boundary within 25m of a maintenance vehicle access point		
O32	Lighting is installed in accordance with approved plans and to standards		
O33	Playground is manufactured and constructed in accordance with standards		
	GENERAL MISCELLANEOUS		
P1	As Constructed details provided		
P2	Public Utility certificates provided		
P3	Test results in accordance with ITP provided		
P4	On maintenance programmed works provided		

APPENDIX D: STENCIL ASPHALT SPECIFICATION

General

Treatment locations

Thresholds at local traffic areas to visually enhance traffic control devices such as mini-roundabouts, diamond slow-ways, single lane angled slow-ways, approaches to intersections, and road humps (traffic calming device) and to visually enhance school zones or demarcation of parking area, bicycle lanes or bus lanes.

Visual assessment

Inspect the installed coloured treatment to assess uniformity and compliance with the minimum skid resistance requirement. Use test boards (product samples that have been tested for skid resistance and found to be satisfactory) to aid the visual assessment. Conduct visual assessment during the on maintenance inspection.

British Pendulum tests

Undertake a minimum of 2 skid resistance tests in each treatment area. Increase test frequency as required (minimum 1 test per 100 m^2 or part thereof per site) to delineate any non-conforming areas. If required, rectify defects. Conduct tests at the end of the defects liability period (i.e. 12 months from the date of on maintenance acceptance).

Type 1 Treatment (including Stencilled or Stamped / Imprinted Surfacing System)

Surfacing system

Generally a proprietary treatment approved by Miriam Vale Shire Council and that has been specifically developed for installation by trained personnel to produce a uniformly coloured, highly durable, and seamless surface finish of adequate skid (on road surface) or slip resistance (on pedestrian surface).

Surface preparation

Water blast the substrate to be treated to remove all oil, grease, dirt and anything foreign to the surface. Remove thermoplastic road markings. Treat joints and cracks in accordance with the manufacturer's instructions.

Base coat (colour required)

Use base coat that is capable of filling voids in the asphalt and concrete surfaces.

Top coat (colour required)

Incorporate uniformly UV stable organic and/or metallic oxide pigments, graded aggregates, specialty resins and other additives such as wetting agents and super plasticisers.

Protective sealer

Provide protection against petroleum based fuels and oils as experienced on road surfaces.

Manufacturer's guarantee

Minimum period of 3 years against the loss of colour, stripping and delamination, and maintaining the skid resistance characteristics specified in *Clause 7.3*.? The product guarantee does not extend to defects arising from damage caused by settlement, subsidence or failure of the underlying stratum.

Where a resin bonded aggregate system is used as a Type 1 Treatment; Clause 7.4.3? applies except that the aggregate requirements are as follows:

Requirement

Provide aggregates that are clean, dry, hard, tough, durable, moderately sharp grains of pre-coated coloured natural stone, of uniform quality, free of dust, dirt and other deleterious matter.

Grading

Not more than 5% (by weight) is retained on a 2.36mm A.S. sieve and not more than 5% (by weight) passes 0.6mm A.S. sieve.

Frictional characteristic

Achieve a Polishing Aggregate Friction Value (PAFV) of > 60 determined in accordance with test method AS 1141.41.

Type 1 Treatment System Approval

Type 1 Approved Surfacing Systems must comply with one of the following:

The system has a minimum of 3 years of documented history of satisfactory performance/trials and or usage locally or interstate. Council may require further trials before approval.

The system is approved by an internationally recognised body such as the HAPAS British Board of Agreement (BBA) for its intended purpose.

The system has been subjected to accelerated testings for Scuffing, Wear and Tensile Adhesion in accordance with the defined tests in TRL Report 176, Appendix G, H and J respectively (OR equivalent tests) and the results are satisfactory to Council

Type 2 Treatment (High Friction Surfacing System)

General

High Friction Surfacing system

Generally a proprietary anti skid and resin bonded aggregate system approved by Miriam Vale Shire Council and that has been specifically developed for installation by trained personnel to produce a textured, durable surfacing of high skid resistance.

Surface preparation

The surface shall be vigorously treated to remove dust laitance and other loose material. The treatment shall consist of the application of hot chemical application or dry surface abrasive blasting as determined by a site inspection.

Any visible oil not removed during the process described above shall be removed by washing & scrubbing the surface with a mild detergent solution and flushing with clean water. The surface shall then be allowed to dry prior to surface application of the binder.

All existing utility pit covers and raised pavement markers shall be suitably masked.

Any newly laid asphalt surface shall be trafficked for a period of at least 6 weeks prior to surface binder application.

The system shall not be applied to a surface that has been exposed to rain in the previous 48 hours (for full lane/carriageway application)

Resin Binder

Use a certified industrial grade thermosetting 2 component polymer resin binder suitably pigmented to provide the necessary depth of specified colour in the finished surface coating. The binder shall upon mixing and application to the pavement surface have a maximum in service time of 4 hours at an ambient surface temperature of 20º Celsius.

The binder shall comply with the specified requirements for the material tests specified in Table 3.A.1.

Table 3A.1 - Binder Material Tests

Test	Parameter	Test Method	Requirement
Binder Tensile Adhesion	Stress at –10 +/- 2ºC	TRL 176 Appendix J	≥1.0N/mm2
Binder Tensile Adhesion	Stress at 20 +/- 2ºC	TRL 176 Appendix J	≥ 0.5N/mm2
Binder Elongation at break	7 days @ 23ºC	BS 2782	≥ 30%
Binder Tensile Strength	7 days @ 23ºC	BS 2782	≥ 10.5N/mm2

Aggregates

Requirement

Provide aggregates that are clean, dry, hard, tough, durable, moderately sharp grains of either natural stone or calcined bauxite, of uniform quality, free of dust, dirt and other deleterious matter.

Grading

Not more than 5% (by weight) is retained on a 3.35mm A.S. sieve and not more than 5% (by weight) passes a 1.18mm A.S. sieve.

Frictional characteristics

Achieve a Polishing Aggregate Friction Value (PAFV) of not less than 70 determined in accordance with test method AS 1141.41.

Application

The binder shall be applied by spray, brush or squeegee on to a dry surface at a rate, which varies according to the surface texture and porosity. On a smooth closed textured surface the amount of binder shall not be less than is required to hold the aggregate permanently in position.

The temperature of the binder components heated to facilitate mixing or spray application shall be measured using a temperature gauge accurate to +/-2ºC and shall not exceed the maximum temperature recommended by the manufacturer. Heated binders shall be allowed to cool prior to the application of aggregate.

After binder application, aggregate shall be broadcast to cover the binder uniformly and to excess, in accordance with manufacturer's instructions. Rolling of the aggregate is not permitted. Upon initial curing all excess aggregate shall be removed by a vacuum sweeper or equivalent means.

Manufacturer's guarantee

Minimum period of 3 years against the loss of colour, stripping and delamination, and maintaining the skid resistance characteristics specified in *Clause 7.3*.? The product guarantee does not extend to defects arising from damage caused by settlement, subsidence or failure of the underlying stratum.

Type 2 Treatment System Approval

Council Approved Surfacing Systems must comply with one of the following:

The system is an approved high friction surface product/method for this application under the HAPAS British Board of Agreement(BBA) or an equivalent internationally recognised body

The system has been subjected to accelerated testings for Scuffing, Wear and Tensile Adhesion in accordance to the defined tests in TRL Report 176, Appendix G, H and J respectively (or equivalent NATA certified tests) in accordance with the requirements and test method as detailed in Table 3.A.2.

Table 3 A.2 - Test Methods

Tests		Parameter	Result
Scuffing (conducted at 45 C) Test Method TRL 176 Appendix G	Initially	Texture depth (mm)	≥1.4
	After 500 wheel passes	Texture depth (mm) Erosion index	≥ 1.2 ≤ 3
	After heat ageing for 112 days at (70+/-3) ºC and 500 wheel passes	Texture depth (mm) Erosion index	≥ 1.2 ≤ 5
Wear Test Method TRL 176 Appendix H	Initially	Texture depth (mm) BPN	≥ 1.4 ≥ 65
	After 100 000 wheel passes	Texture depth (mm) Erosion index BPN	≥ 1.1 ≤ 3 ≥ 65
Tensile Adhesion Test Method TRL 176 Appendix J		Stress at (-10 +/-2) ºC N/mm2	≥ 1.0
		Stress at (+20 +/-2) ºC N/mm2	≥ 0.5

Colour

General

Produce surfacing colour to be an approximate match to the specified AS2700 colour standard. Undertake assessment of colour matching in the test light booth in accordance with the procedure prescribed in AS/NZS 1580.601.1.

Local Traffic Area/LATM schemes

Permitted colours for threshold treatments on pavement

Red of an approximate match to any of the standard colours R13 Signal red or R14 Waratah or R15 Crimson.

Permitted colours for edge strips of threshold treatments on pavement

Yellow of an approximate match to any of the standard colours Y11 Canary or Y12 Wattle or Y13 Vivid yellow or Y15 Sunflower or Y22 Custard or Y23 Buttercup.

Permitted colours for at median infill

Red of an approximate match to any of the standard colours R42 Salmon pink or R43 Red dust or R52 Terracotta.

Bicycle lanes

Permitted colours

Green of an approximate match to any of the standard colours G13 Emerald or G21 Jade or G27 Homebush green or G51 Spruce.

Bus lanes

Permitted colours

Red of an approximate match to any of the standard colours R13 Signal red or R14 Waratah or R15 Crimson.

General Streetscape

Where Type 1 treatments are used for purely decorative or street scaping purposes, red, green and light shaded colours must not be used.

APPENDIX E: BONDING DEED

DATE: ……..

NAME OF APPLICANT

and

MIRIAM VALE SHIRE COUNCIL

BONDING DEED

MIRIAM VALE SHIRE COUNCIL

Engineering Services Department

36 Roe Street

MIRIAM VALE Q 4677

Telephone: (07) 4974 6222

Facsimile: (07) 4974 6299

THIS DEED is made on the date stated in Item 1 of the Schedule

BETWEEN The person named in Item 2 of the Schedule ("Applicant").

AND MIRIAM VALE SHIRE COUNCIL, a body corporate created by the under the Local Government Act 1993 and the Local Government (Adjustment of Boundaries) Act 1978 ("the Council").

Recitals

A The Applicant applied to the Council pursuant to the Act for the development of the premises.

B The Council approved the Application upon certain conditions.

C The Applicant has already or will proceed with and shall complete the development of the Land in accordance with the conditions of the Approval and the Applicant acknowledges and agrees that it is responsible for undertaking the Required Action.

D The Applicant and the Council have determined that a monetary guarantee shall be furnished by the Applicant to the Council by way of security for undertaking the Required Action.

Operative Provisions

In consideration of the mutual covenants in this deed the Applicant and the Council covenant and agree as set out in this deed.

1. Definitions and Interpretations

(a) Unless a contrary intention appears in this deed, the following expressions shall have the meanings respectively assigned to them:

"**Applicant**" means the person described in Item 2 of the Schedule and includes executors, administrators and permitted assigns in the case of a natural person and successors and permitted assigns in the case of a corporation.

"**Application**" means the application for the Development of the Land described in Item 4 of the Schedule;

"**Approval**" means the resolution of the Council approving the Application as described in Item 5 of the Schedule;

"**Delegated Officer**" means any officer appointed by CEO to undertake representative works for the Council or any officer acting in that capacity;

"**Bank Guarantee**" means a Monetary Guarantee which is an unconditional bankers undertaking or similar undertaking which conforms with Council's Financial Guidelines;

"**Chief Executive Officer**" means the Chief Executive Officer to the Council and includes the person (if any) for the time being acting as Chief Executive Officer to the Council;

"**Council**" means the Council of Miriam Vale Shire and includes its successors and assigns;

"**Development**" has the meaning given to it by the Integrated Planning Act;

"**Land**" means the land described in Item 3 of the Schedule;

"**Planning scheme policy**" means the Planning Scheme policy - Bonding for Uncompleted Operational Works (Engineering) as amended and any other Planning Scheme policy which replaces Planning Scheme policy - Bonding for Uncompleted Operational Works (Engineering);

"**Monetary Guarantee**" means a security in the form and amount approved by the Authorised Officer and described in Item 6 of the Schedule;

"**Obligor**" means a bank approved by the Chief Executive Officer and includes its successors and assigns;

"**Prescribed Period**" means the time for undertaking the Required Action as specified in Item 9 of the Schedule.

"**Premises**" means any land, building or structure and includes any part thereof;

"**Requested Action**" means the action requested by the Applicant to be undertaken by the Council in consideration of the Applicant providing to the Council a Monetary Guarantee as described in Item 7 of the Schedule;

"**Required Action**" means the action required by the Council to be undertaken by the Applicant in consideration of the Council undertaking the Requested Action as described in Item 8 of the Schedule;

"**Works**" means the works that the Applicant is required to execute and complete as a condition of the Approval.

(b) Unless a contrary intention appears in this deed, a reference to:

(i) a clause is to a clause in this deed;

(ii) the singular includes the plural and vice versa;

(iii) any gender includes all other genders; and

(iv) a person includes a corporation and/or association and/or body, whether incorporated or not and vice versa.

(c) The clause headings appearing in this deed are inserted for convenience of reference and shall not affect the construction of this deed.

(d) Whenever more persons than one constitute the Applicant all the covenants, agreements, conditions, restrictions and provisos contained or implied in this deed shall be read and construed as joint and several.

(e) The Schedule shall for all purposes form part of this deed.

(f) This deed shall in all respects to interpreted in accordance with the laws of the State of Queensland and the parties hereby submit to the non-exclusive jurisdiction of all the courts of the state.

(g) Nothing contained in this deed shall affect, prejudice or derogate from the rights, powers and authorities of the Council under the provision of any statute, rule, regulation or local law.

2. Applicant's Obligations

The Applicant shall at its own costs;

(a) provide a Monetary Guarantee to the Council to guarantee the Required Action; and

(b) undertake the Required Action within the Prescribed Period.

3. Council's Obligations

The Council shall undertake the Requested Action where the Applicant has;

(a) complied with the Planning Scheme policy or otherwise to the satisfaction of the Authorised Officer;

(b) provided to the Council this deed and the Monetary Guarantee;

(c) paid all costs, charges and expenses required by clause 10; and

(d) satisfied the Authorised Officer that the Required Action can be completed within the Prescribed Period.

4. Default by Applicant

(a) Where the Applicant fails to complete the Required Action, the Authorised Officer shall certify the fair estimated cost of performing the Required Action which costs shall include the Council's charges for supervision, interest administration costs, legal costs on a solicitor own client basis, overheads and such reasonable contingency sum as may in the absolute discretion of the Authorised Officer by determined.

(b) The Council may recover the fair estimated cost of undertaking the Required Action from:

(i) the Applicant as a liquidated debt;

(ii) the Council's Trust Fund where the Monetary Guarantee was a sum of money that was placed in Council's Trust Fund;

(iii) An Obligor where the Monetary Guarantee was a Bank Guarantee; or

(iv) the Applicant, the Council's Trust Fund or an Obligor jointly.

5. Use of Monetary Guarantee

(a) The Council shall be at liberty to apply any sum paid to it pursuant to clause 4 as far as the sum shall extend to or towards all or any one or more of the following:

(i) carrying out the Required Action within the Prescribed Period;

(ii) altering or amending any improperly completed or partly completed works done or undertaken as part of the Required Action;

(iii) carrying out such other development work (including any addition or extension to any development work then carried out by the Applicant) whether within or outside or

partly within and partly outside the perimeter of the Land as the Council may consider necessary to mitigate the effects of any uncompleted or improperly completed or partly completed work undertaken as part of the Required Action or to make any such uncompleted or improperly completed or partly completed work in the opinion of the Council more effective or useful; and

(iv) reimbursing itself for any damages suffered by it.

(b) If the sum received or recovered by the Council pursuant to clause 4 is insufficient to complete the Required Action referred to in clause 5(a) in accordance with the requirements of this deed, the Council may, at its election:

(i) carry out, alter or amend the Required Action at its discretion so far as the moneys received or recovered by it pursuant to clause 4 will, in the opinion of the Authorised Officer, reasonably allow; or

(ii) complete the carrying out or altering or amending of the Required Action in accordance with the requirements of this deed and recover the difference between the costs actually incurred by it in so doing and the sum received or recovered by it pursuant to clause 4 from the Applicant as a liquidated debt.

(iii) For the purposes of exercising its rights under clauses 5(a) and (b), the Council and its members, agents, servants, employees, contractors and sub-contractors and agents and servants of it contractors and sub-contractors and others whether of the class just mentioned or not, authorised by the Council, shall have the full and free right and liberty to enter upon the Land with all necessary vehicles, plant and equipment and the like.

6. Release of Monetary Guarantee

The Authorised Officer shall:

(a) reduce the Monetary Guarantee as the Required Action is completed provided the amount of the Monetary Guarantee retained is not less than an amount estimated to be 1.5 times the value of that part of the Required Action yet to be completed and the value of the maintenance security deposit, and

(b) release the Monetary Guarantee where the Applicant has complied with the provisions of clause 2.

7. Assignment by Applicant

(a) The Applicant shall not assign, either absolutely or by way of security, its interest, rights or obligations under this deed without the prior consent of the Authorised Officer in writing under the hand of the Chief Executive Officer which consent shall not be unreasonably withheld.

(b) Should the Authorised Officer grant consent to any assignment pursuant to clause 7(a), then in such case, such consent shall be subject to compliance with the provisions of clause 8 and the Authorised Officer may impose conditions for the giving of such consent which are not inconsistent with the provisions of this deed.

8. Novation of Deed upon Transfer

(a) The Applicant shall not sell, transfer or otherwise alienate the Land or any part thereof or any interest therein prior to the compliance with and fulfilment of the provisions of this deed except subject to the condition that the purchaser, transferee or alienee shall:

(i) enter into a deed of novation of this deed with the Council whereby the purchaser, transferee or alienee becomes contractually bound to the Council to comply with the fulfil the provisions of this deed or such of them as have not been complied with the fulfilled at the time of such sale, transfer or alienation; and

(ii) obtain at its own cost and expense in favour of the Council and in a favour on terms approved by the Authorised Officer a Monetary Guarantee in order to secure to the Council the compliance with and fulfilment of the provisions of this deed.

(b) Until the proposed purchaser, transferee or alienee executes the required deed of novation and furnishes the required Monetary Guarantee or in the event of the sale, transfer or alienation being made otherwise than in compliance with clause 8(a):

(i) the Applicant shall remain liable for the performance and fulfilment of this deed as though no sale, transfer or alienation and taken place; and

(ii) the Applicant shall perform and fulfil such of the Applicant's obligations under this deed as have not been performed and fulfilled forthwith or at such other time or times as the Council shall require, notwithstanding that the time or times otherwise appointed for such performance and fulfilment shall not have then arrived.

9. Waiver

No waiver by the Council or any breach by the Applicant of any of the provisions of this deed shall be implied against the Council or to be otherwise effective unless the same shall be in writing under the hand of the Chief Executive Officer and no laches or delays by the Council at any time or times in enforcing any of its rights, powers and the like under this deed shall prejudice or affect those rights or powers.

10. Costs

The costs, charges and expenses of and incidental to the preparation, completion and stamping of this deed and of stamp duties payable on this deed and all counterparts thereof shall be borne and paid by the Applicant.

11. Time

Time shall, in all cases, be of the essence.

12. Service

Any certificate, demand or notice by or from the Council to or upon the Applicant shall be sufficiently made, given or served if left at or forwarded by prepaid post in an envelope addressed to the Applicant at the Applicant's address or place of business in Queensland last know to the Council and such certificate, demand or notice, if sent by post, shall be deemed to have been made, given or served at the time when, in due course of post, it would be delivered at the address to which it is directed whether or not it is actually received and in proving such service by post, it shall only be necessary for the Council to certify to that effect under the hand of the Chief Executive Officer.

IN WITNESS HEREOF the Applicant and the Council have executed and delivered this deed.

THE COMMON SEAL of	**THE COMMON SEAL** of **XX)**
MIRIAM VALE SHIRE COUNCIL	was hereunto affixed by) .....
	..... a Director and)
	.... a Director)
.....	authorised and in the presence of)
DELEGATED OFFICER being the	.....
proper officer to affix such seal	**A JUSTICE OF THE PEACE**

APPENDIX F: ASSET REGISTER

ASSET REGISTER

The asset register is an essential part of the engineering and architectural plans and should be accurate and included on the leading drawing, generally in accordance with the proforma set out in Table D1.1. The applicant is required to identify and quantify the asset only as the actual construction costs may not be known at the design stage. The register should include all structures and items associated with the subdivision or development that which will be handed over to Council following Off Maintenance. These items are generally referred to as **donated or contributed assets**.

Table D1.1 lists a comprehensive set of donated assets excluding water supply and sewerage items. It is envisaged that only a subset of the listed items will apply in most cases as the list also incorporates historical asset such as arched brick drains and heritage construction material such as porphyry. The applicant should not assume that the listed item will imply automatic acceptance of a particular material or product, for example, the use of pavers is now restricted.

The final **asset register should reflect the actual construction and should be submitted as part of the As Constructed Drawings**. For each item, the applicant should specify the asset type, quantity, unit rate, and estimated value. Council will use the unit rates solely for the purpose of asset valuation and capitalisation.

SCHEDULE

ITEM 1 …….. **(DATE)**
ITEM 2 …….. **(APPLICANT)**
ITEM 3 …….. **(LAND)**
ITEM 4 …….. **(APPLICATION)**
ITEM 5 …… **(APPROVAL)**
ITEM 6 …… **(MONETARY GUARANTEE)**
ITEM 7 …… **(REQUESTED ACTION)**
ITEM 8 …… **(REQUIRED ACTION)**
ITEM 9 …… **(PRESCRIBED PERIOD)**

NB: Items 7 & 8 (Required Action) is where specific conditions can be inserted.

APPENDIX G

Miriam Vale Shire Council
Water Supply Standards

This document sets out the requirements for the design and construction of water supply systems for acceptance by Miriam Vale Shire Council as donated assets.

The Water Supply Code of Australia (WSCOA) is not reproduced in this document. The document can be obtained from the following organisations:

Water Services Association of Australia
469 Latrobe Street
Melbourne Victoria 3000

Standards Australia
1 The Crescent
Homebush NSW 2140

Miriam Vale Shire Councils water supply requirements are those contained in the *Water Supply Code of Australia –WSA 03-2002 Version 2.3*, published by the Water Services Association of Australia with the additions and amendments set out in this document. Part and Section references are those given in the WSCOA. Where no reference is made to a Section in the WSCOA, the Section applies in full without amendment.

If conflict is considered to exist between the WSCOA and an amendment the matter shall be referred to Council for resolution.

The water supply requirements are applicable to the majority of situations. However, variations may be necessary to meet special circumstances or to overcome other problems not addressed in the requirements. Whenever the proposed design varies in anyway from the requirements the proposed variation shall be authorised by Miriam Vale Shire Council.

9 PART 0: GLOSSARY OF TERMS, ABBREVIATIONS AND REFERENCES

The following definitions from the WSCOA are reproduced below for the assistance of readers of this document.

Water Agency	Miriam Vale Shire Council
Concept Plan	A package of information provided to the Designer by the Water Agency to enable appropriate planning and design of major water supply system components to be performed.
Constructor	An individual, corporation or legal entity including any contractors and sub-contractors that is accountable at law for delivery of Works under a specific contract or development agreement.
Developer	A person, organisation, local government authority or government authority (other then the Water Agency) responsible for provision of a water supply scheme or water reticulation scheme.
Designer	Person(s) or firm responsible for a design output. Such person or firm may be accountable to a Project Manager or other person having responsibility under a contract or otherwise.
Works	All those Works being water mains, valves, hydrants and accessories and shall include valve chambers and storage facilities as shown on the Design Drawings and include any part of the Works.

PART 1: PLANNING AND DESIGN

1.4 DESIGN OUTPUT

Any variations to the Water Supply Standards, and the reasons for the variation, shall be highlighted in a boxed note on the design drawings.

1.5.2 DESIGN RESPONSIBILITIES – WATER AGENCY

Unless otherwise agreed, the Water Agency will provide a concept plan nominating the size and location of reticulation mains and pressure control valves, etc. The Water Agency will ensure that the trunk mains are capable of supplying the minimum standards of flow and pressure stipulated in the Water Supply and Sewerage Guidelines, DNR, Dec 2005. MVSC may make available a WaterCad model of the Agnes Water/1770 reticulation system.

1.5.3 THE DESIGNER

The design of the works shall be carried out under the direction of and certified by a Registered Professional Engineer of Qld. (RPEQ).

The Designer shall obtain the written approval from Council for any variations to the requirements of latest edition of WSA 03-2002 Water Code as amended by this Supplementary Manual prior to the submission of the final design.

2.1.2 PROVIDING A NEW WATER SUPPLY

Rainwater storage tanks must be provided for all buildings in accordance with Appendix J The minimum capacity to be provided is listed in the following table:-

Class of Building	Example of Building	Minimum Rain Water Storage Requirement	
		Single Storey	Multiple Storey
1a	Single detached house	22,000 litres	22,000 litres
1b,2,3,5,6,7,8,9	All other habitable buildings	The greater of 22,000 litres or 73.3 X Roof Area in square metres	

Where a development is proposed in a Defined Water Supply Area and it does not fit in with the Water Agency's sequencing policy for provision of water services, the proponent must provide a water supply strategy that can supply 250l/ep/d, based on full occupancy throughout the year, and with a failure rate not exceeding 2%.

Fire fighting requirements listed in Section 3.2.4 need to be provided.

For all commercial developments, the water quality needs to comply with the Australian Drinking Water Guidelines 2004.

2.2.1 DEMANDS

The reticulation system shall be designed to handle a flow rate of 450 l/ep/d. The ep density is to be based upon the design populations for particular developments listed in the Infrastructure Charges.

Fire Fighting requirements shall be provided in accordance with Section 3.2.4

2.2.3 PEAK DEMANDS

Peak demand factors are based on the DNR Water Supply Guidelines, October 1989. The following factors are to be used in modeling water supply demands:-
Mean Day Maximum Month/Average Day =1.5
Maximum Day/Mean Day Maximum Month=1.5
Maximum Hour = 2 X Average Hour Demand for Maximum Day

2.3.2 SYSTEM CONFIGURATION

Supply mains of DN250 and larger shall be classed a trunk mains. No service connections shall be permitted on trunk mains.

2.4.3 OPERATING PRESSURES – AMEND TABLE 2.2

The minimum and maximum mains pressure for residential zones shall be 250kPa and 800kPa respectively. The minimum and maximum mains pressure for industrial/commercial properties shall be 300kPa and 800kPa respectively.

2.4.3.2 MAXIMUM ALLOWABLE SERVICE PRESSURES

The maximum allowable SP is 380kPa. The SP for consumers is measured at the water meter.

2.4.3.3 MINIMUM ALLOWABLE SERVICE PRESSURE

The minimum allowable SP is 250kPa for residential zones and industrial/commercial properties.

2.6 PUMPING STATIONS

The conditions under which in-line boosters may be acceptable are:

In–line booster pumping stations, without associated high-level storage, may be used in situations where all of the following conditions apply:

(i) It is impractical to build storage;
(ii) Duty Standby is provided
(iii) Each property connection must have a minimum static pressure of 50kPa when the pump is offline; and
(iv) The pump motor is to be variable speed.

3.2.1 SIZING OF MAINS – GENERAL

The Water Agency standard reticulation main sizes are DN 100, 150, 200, 250 and 300.

3.2.2 MINIMUM PIPE SIZES

DN 63 PE shall be used in cul-de-sacs, subject to a maximum length of main of 40 m and not more than 8 water service connections.

3.2.4 FIRE FLOWS

Fire fighting requirements shall be provided in accordance with Water Supply and Sewerage Guidelines, DNR, Dec 2005, namely 15 l/s for 2 hours for residential areas and 30 l/s for 4 hours for commercial areas. These flows are to be superimposed upon 2/3 maximum hour demands for populations less than 2,000 ep, and maximum hour demands for populations greater than 3,000 ep.

3.2.5.3 HYDRAULIC ROUGHNESS VALUES

The hydraulic analysis of the system shall utilise Hazen-Williams C roughness values of 150.

3.5.3 TABLE 3.2. FATIGUE DE-RATING

For pumped mains, assume a minimum 6 cycles/day unless hydraulic modeling indicates otherwise, ie for boosted systems

3.7.2 MINIMUM PRESSURE CLASS

The minimum pressure class for water supply pipes and fittings shall be Class 12.
PVC pipe shall be Series 2 Class 12 (AS/NZS 1477) minimum.

4 HYDRAULIC DESIGN

Existing and proposed water supply systems upstream or downstream of the area under design shall be included in the hydraulic analyses. Design shall ensure that Standards of Service are maintained in existing or proposed water supply systems.

4.1.1 DESIGN TOLERANCES

Horizontal alignment shall be referenced to the Australian Map Grid coordinate system GDA 94.

4.3 LOCATION OF WATER MAINS

Water mains shall be located in accordance with Public Utilities in Subdivisions, Typical Service Conduit Sections, IMEAQ Standard Drawing R-0101.

Pipe fittings shall not be positioned under kerb and channel.

4.3.3 WATER MAINS IN EASEMENTS

EASEMENTS ARE REQUIRED WHERE THE MAIN IS NOT LOCATED IN A DEDICATED ROAD RESERVE.

The easement width shall be 3m for reticulation mains and 5m for trunk mains. The Developer shall arrange for the provision of easements.

Water mains shall not be located in an easement to reduce capital costs where a suitable route in a road reserve is available.

4.3.6 CONTAMINATED SITES

Applicant shall be referred to the appropriate State Government Agency during the IDAS approval process.

4.3.9 RAILWAY RESERVES

Where a water main crosses a Railway Reserve a deed of Agreement is required between the Railway Authority and the Water Agency.

4.3.11 OVERHEAD POWER LINES AND TRANSMISSION TOWERS

Where the distance from a metal water mains to a power line or transmission tower is within the distances stated in this clause, a report detailing the procedures to be adopted for the construction and maintenance of the main shall be provided by a Registered Professional Engineer.

4.3.12 TRACER WIRE AND MARKER TAPE

Tracer wire of 2mm 316 stainless Steel cable, 7/19 construction shall be installed immediately above the marker tape on all water mains.

4.7 CONNECTION OF NEW MAINS TO EXISTING MAINS

Connections shall comply with:

All works on the existing reticulation system shall be considered as "live works" and will be constructed by the Water Agency at the Contractor's cost. These works shall be clearly delineated on the Design Drawings and shown in sufficient detail such that the works can be readily constructed.
The connection point to the existing system shall be located to minimise disruption of supply to customers and be subject to Council approval.

Acceptable connection arrangements

(a) Extension from the end of an existing main.
A socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall commence from the valve.

(b) Side branch from an existing main.
A flange branch with a socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall commence at the valve. If it is not possible to locate the valve adjacent to the existing main, the Contractors works shall commence with a gate valve at least 5 m from the existing main. If the proposed main crosses a roadway adjacent to the connection point, the full length of main at the road crossing shall be included in the "live" works.

(c) New main between existing mains.
A flange branch with a socketed or flanged valve shall be installed on the existing main as part of the "live works". The Contractors works shall construct from this valve to no closer than 5 m from the other main. The Water Agency shall complete any outstanding connections to the existing system after acceptance of the Contractors works.

4.8 TERMINATION POINTS

Where a future main is planned to extend the system beyond the development currently being serviced the water main shall finish with a valve. A legal right of way (easement or

reserve) shall be provided 3 m wide through the adjoining allotment(s) to permit its future extension. The right of way shall be vested in Council.

4.8.3 TEMPORARY ENDS OF WATER MAINS

A temporary dead-end termination point shall comprise a length of pipe extending from a scour fitting. When the main is to be extended, the dead end shall be removed, a valve fitted and the mains laid. If the extension is likely to occur shortly after construction of the main, a valve rather than a dead-end shall be installed.

4.9.1 SIZING OF PROPERTY SERVICES

Standard sizes for water services are DN 20 and DN 25.
Single residential lots shall have a DN 20 property service unless a DN 25 service has been requested by the property owner and agreed to by the Water Agency.
Property services laid across a road shall be one size larger than the individual property connection. The mains tapping fittings and the meters are common for DN 20 and DN 25 services.
If the long-term static head of the property service is less than 350 kPa (35m) or if private booster is required, the minimum size of property service shall be DN 32.
All the sizes stated above relate to copper services. Polyethylene water services shall be one nominal DN size larger than that of a copper service.

4.9.2 LOCATION OF PROPERTY SERVICES

Where practicable, property service connection points shall be located 500 mm from the RP side boundary on the opposite side of the lot to the electrical service pillar-box. If, as may occur at corner properties, electrical pillar-boxes are located on both side boundaries, the property service connection shall be placed at the RP boundary truncation point.

Services shall be located at least 0.5 m from electrical light poles and clear of existing or future driveways

Property services laid along a footpath shall be located on a 1.2 m alignment from the RP boundary. DN 100 and 150 services shall terminate in the footway approximately 250 mm from the property boundary.

4.9.3 MULTIPLE PROPERTY SERVICES

Multiple Property Services shall comply with:

Multiple services will only be permitted for single residential lots where the services are laid across the road carriageway and shall be limited to serving 2 lots.

Multiple services shall be laid in copper.

4.9.4 PROPERTY SERVICE CONDUITS

Water services up to DN32 which are located under existing or future roadways, concrete or paved driveways, footpaths, bikeways or other hardstand areas, shall be installed in a solvent welded DN 50 Class 12 PVC conduit. The conduit shall have a maximum length of 25 m and extend 150 mm beyond the back of the kerb or concrete/paved area.
Conduits shall not be installed in the same trench as electrical cables.

Brass or Stainless Steel markers indicating the service location shall be placed on the kerb or concrete/paving edge.

4.9.5 TRACER WIRE AND MARKER TAPE

PE water services shall have a 2mm 316 stainless steel 7/19 construction cable plus marker tape placed 150mm above the pipe embedment. Where the PE service is placed inside a conduit the marking tape and tracer wire shall be placed 150mm above the conduit

4.9.6 WATER SERVICES DN100 AND GREATER

Water services DN 100 shall be specified in DICL in accordance with the requirements for comparable sized DICL water mains. Vertical bends shall have flanged connections. SCL pipework is acceptable where space constraints prevent the use of DICL. PVC shall not be specified for water services.

4.9.7 SERVICES TO COMMUNITY TITLE SCHEMES

Community title schemes shall be provided with a single service to the property boundary. Responsibility for water supply charges rests with the Body Corporate.

4.10.5 UNDERGROUND OBSTRUCTIONS & SERVICES

The location of all existing services shall be confirmed with the appropriate Authority prior to the commencement of any excavation work.

Council takes no responsibility for the accuracy of any as constructed information.

4.10.5.2 CLEARANCE REQUIREMENTS

Water mains shall be located with sufficient clearance to structures to allow for maintenance and operation activities and provide protection against damage from pipeline bursts.

4.10.7 DEVIATION OF MAINS AROUND STRUCTURES

THE ANGLE AND TYPE OF ALL BENDS SHALL BE SHOWN ON THE DESIGN DRAWINGS

5.5.1 GEOTECHNICAL CONSIDERATIONS

Where difficult ground conditions are anticipated a geotechnical and construction method report shall be submitted with the design.

5.6 PIPE MATERIALS

For approved pipe materials refer to Appendix A.

Where a proposed road crosses an existing AC main, the main shall be replaced with an approved material.

5.9.1 PIPE ANCHORAGE

All DN100 and larger valves and tapers, including flanged items shall be secured with anchor blocks

5.9.2 THRUST BLOCKS

Thrust blocks shall be sized for a design pressure of 1200 kPa (120 m).

5.9.4 RESTRAINED ELASTOMERIC JOINT SEALS

Where space available for thrust blocks is limited, a commercial restrained joint system may be used subject to Water Agency approval.

6.1.2 VALVES – SITING PRINCIPLES

Valves, hydrants and scours shall not be installed in trafficable roadways where an alternative
location is available.

6.2 STOP VALVES

Valves shall be *anticlockwise* closing. Resilient seat valves shall be used. Valve covers shall be in accordance with WAT-1304, Type H1.

6.2.3 STOP VALVES FOR RETICULATION MAINS

Stop valves for reticulation mains shall be provided in accordance with Table 6.1 or as directed by the Water Agency.

6.4.2 AIR VALVES TYPE

Air valves shall be of Vent-o-Mat type valve or other approved equivalent.

6.7 SWABBING POINTS

Swabbing points are not required.

6.8 HYDRANTS

Hydrants shall not be installed on constant flow reticulation systems.

Hydrants shall be DN80 spring hydrants with the standard claw type head.

Hydrant boxes shall be painted safety yellow with glass beads embedded in the paint.

Hydrants shall be located in line with side boundaries of a lot and not more than 80 metres apart. A hydrant shall be located within 10 metres of an intersection.

Where the end of the water line is permanent, a duck foot bend hydrant shall be used. Hydrant covers shall be in accordance with WAT-1306, Type H2.

6.8.3 HYDRANT TYPES

All hydrants shall be of the spring type with standard claw type head.

6.8.6 HYDRANT SIZES

Hydrants shall have DN 80 flanges.

6.8.7 HYDRANT SPACING –

The spacing of hydrants on water mains in urban areas shall comply with the following requirements:

- within 40 m of property boundaries and within 90 m of the furthest point of the building envelope measured around the perimeter of the building envelope, except that in residential in-fill areas only the 90 m requirement applies,
- at a maximum interval of 80 m,
- as directed by the Water Agency

7.2 DESIGN DRAWINGS - GENERAL

Design Drawings shall comply with Miriam Vale Shire Council Planning Scheme Policy No. 1 - Appendix B.

7.3 AS CONSTRUCTED – GENERAL

As Constructed drawings shall comply with Section 8.4 of the Miriam Vale Shire Council Planning Scheme Policy No. 1.

PART 2: PRODUCTS AND MATERIALS

8 PRODUCTS AND MATERIALS OVERVIEW

As this area is reasonably remote, the types of materials utilised in water supply systems shall be limited such that the availability of spares is maximised and the inventory of spares carried by repair crews and Council stores is minimised.

Pipeline Materials

Below DN100 water mains shall be constructed in:

a. DN 63 PE (AS/NZS 4130) PN12, blue lined.

Between DN100 and DN250 (inclusive) water mains shall be constructed in:

b. uPVC AS/NZS 1477, Series 2 PN12 rubber ring joint;

c. PVC-M AS/NZS 4765, Series 2 PN 12 rubber ring joint;

d. OPVC AS/NZS 4441, Series 2 PN Class 12 rubber ring joint;

e. DICL AS/NZS 2280, PN35 rubber ring joint, polyethylene wrapped AS 3680.

DN300 and over water mains shall be constructed in:

f. DICL AS/NZS 2280, K9, rubber ring joint, polyethylene wrapped AS 3680;

Ductile Iron (Pipes)

DI pipe shall not be used in ground below RL 5.0 unless soil testing indicates that actual or potential acid sulphate soil conditions are not present.

Gibault Joints

Gibault joints shall be long barrel type with stainless steel (Grade 316) fasteners. Gibault joints used below RL5.0 or in the presence of actual or potential acid sulphate soils shall be protected by application of petrolatum mastic and tape wrap.

Stabilised Sand

Stabilised sand shall contain a minimum of 4% cement by weight.

Embedment Material

Where pipes are installed below RL 5.0 or are likely to be in contact with actual or potential acid sulphate soils, pipes shall be bedded using a limestone crusher dust material complying with the WSCOA grading requirements.

8.7 ADDITIONAL PRODUCT AND MATERIAL INFORMATION

Valves

Valves shall be PN 16 or better with spigot or socket joints and shall be anti-clockwise closing. Valves shall be fully coated internally and externally with thermo-bonded

polymeric coatings in accordance with AS4158 (rilsan nylon 11 or similar approved coating).

Valves shall be fitted with fully encapsulated rubber sealing wedges and o-ring seals, complying with AS 2638.2 - 2002. Stainless steel (316 grade) fasteners shall be used.

Hydrants

Hydrant tees shall have socket joints. Hydrants shall be DN80 spring hydrants coated internally and externally with thermo-bonded polymeric coatings in accordance with AS4158 (rilsan nylon 11 or similar approved coating).

All hydrants shall suit a DN100 tee or riser. Valve and hydrant boxes shall be in accordance with WAT-1304 to WAT-1306. All hydrants shall be supplied with coated metal caps.

Fittings

Socketed fittings shall be the elongated (extended barrel) type i.e. griptite/nortite or equivalent, suitable for PVC applications.

Gibault joints shall be the elongated (extended barrel) type.

All nuts, bolts and washers shall be Grade 316 Stainless Steel installed with nickel anti-seize grease or equivalent applied to the threads prior to assembly.

All fittings shall be fusion bonded polyethylene (FBE) coated ductile iron, complying with AS/NZS 2280 (2004) and AS/NZS 2518.

10.2 PERSONNEL QUALIFICATIONS

The Plumbing and Drainage Regulation 2003 requires that the work be carried out and supervised by a licensed plumber.

During any construction activity at least one person on site must have completed a pipe laying training course appropriate to the type of pipeline under construction and have documentary evidence of current accreditation for the type of pipe being installed.

The pipe laying training courses appropriate for various pipelines are:

Pipeline	Course	Training contact
DICL	Century Plus	Tyco Water – Training Co-coordinator Ph: (03) 9217 3154
PVC	Flexitec PVC Pipe Installation	Partec Mt Gravat TAFE Ph: (07) 3849 7878
PE	Welding of PE – Electro-fusion	Partec Mt Gravat TAFE Ph: (07) 3849 7878

12 PRODUCTS AND MATERIALS

All pipe materials and fittings to be used in the water reticulation network shall be authorised by the Water Agency. A list of the authorised items is included in Appendix A.

Where products are required, but not included in the Authorised product list, they shall be referred to the Water Agency for appraisal.

Pressure Pipes and Fittings

Installation of pipes and fittings shall comply with the following:

PVC Pipe

PVC shall be laid in accordance with the requirements for laying PVC.
PVC pipes shall not be cut within 1.5m of the socket and in general the minimum length of PVC pipe shall be 1.5m. (This requirement relates to the potential for longitudinal splits to occur down the main particularly if a hole is drilled in a short length of pipe. In addition short lengths of pipe have the potential to compound joint rotation increasing the possibility of spigot and socket disengagement*.)*
Ductile iron or cast iron spigots shall not be joined to PVC sockets.
Stainless steel repair clamps shall not be used on oPVC pipes

FBE Coated Flanges

FBE coated flanges shall be joined by Grade 316 stainless steel bolts, nuts and washers. In this configuration, flanges do not need to have a corrosion protection wrapping.

Restrained Joint Rubber Sealing Rings

Where restrained joints are used on DICL mains, the joint shall be installed in accordance with manufacturers written instructions.
The joint shall be tested by inserting a feeler gauge to ensure that the rubber ring is installed with the correct depth.
Where restrained joint DICL mains are used, a pink marking strip shall be placed over the top of the embedment material directly over the pipe to alert maintenance crews of the restrained joints.

Steel pipes and Fittings

Flanged Joints

All flanged connections shall be tightened evenly and alternatively across the flange until a torque of 60 Nm for M 16 and 140 Nm for M 20 bolts is achieved. Hot-dip galvanised bolts, nuts and washers shall be used for flanged fittings within concrete valve chambers or above ground locations.

Polyethylene Pipes and Fittings

Only DR brass male threads shall be screwed directly into pre-tapped connectors or tapping bands. Male thread polyethylene connection fittings shall not be used in such connections. (*Ground movement can cause the PVC fittings to shear at the thread interface.)*
Metallic male threads shall not be screwed into unrestrained plastic female threads. *(Excessive tightening can cause the plastic socket to split, or over time, the joint can leak due to plastic creep.)*
Field butt welding of PE pipe shall be carried out by a suitably qualified welder. The minimum allowable bend radius for PE pipe is 25 x Pipe OD. PE pipe has a high coefficient of expansion (0.18mm/m/oC) and must be installed in the trench such that no thermal induced stresses develop on the pipe or fittings.
The backfilling of side support and overlay zones shall not be placed when the ambient temperature adjacent to the pipe falls out side the range 12-27^{o}C. The pipe shall be snaked horizontally in the trench to allow for thermal movement.

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11 PART 3: CONSTRUCTION

13.2 LIMITS OF EXCAVATION

Where excavation exceeds the required depth by more than 200mm, the excavated material shall be replaced with stabilised sand to the required level.

15.2.1 & 15.2.3 BENDING OF PVC PIPE

Bending of PVC pipe is not permitted.

15.6 PROPERTY SERVICES AND WATER METERS

Water service lines shall be installed to each property boundary in accordance with the following table:

Land Use	Water Service By
Residential, Rural Residential, and the constant flow scheme	Constructor
Non-Residential Water Service Areas such as Industrial and Commercial	Council

Council will install the meters at a later date.

Tapping Bands

Tapping bands shall be 40mm nominal bore outlet and shall serve no more than two properties via branching of the service pipe.

The tapping band shall be installed with the outlet vertical and located within 0.5m of adjoining property side boundaries.

In constant flow developments, a tapping band may be substituted for an air valve.

Pipe

Service pipes shall be installed perpendicular to the front property boundary and extend 300mm into each property, at 0.5m offset. At the termination of the service pipe, the pipe shall be 450mm deep and completely backfilled with bedding material to natural surface level.

15.10.2 MARKER TAPE AND TRACER WIRE

Marking tape and tracer wire shall be laid above buried non-metallic pipes along the top of the embedment zone or at 1 m below the surface; whichever is the higher.

15.11.3 DISTANCE BETWEEN FITTINGS

Sockets of adjacent fittings shall be separated by a straight length of pipe of minimum length of 500 mm.

16.2 EMBEDMENT MATERIAL

Embedment material for water mains and water services shall be 5 to 7 mm single sized aggregate. This is considered to be self compacting.

16.3.1 COMPACTION OF EMBEDMENT – METHODS

Flooding compaction is not permitted.

16.3.2 COMPACTIONS TRIALS

The pre-qualification of embedment compaction method shall not be used as an alternative to compaction testing.

17.1.2 TRENCH FILLING-MATERIAL REQUIREMENTS

Trench filling material shall consist of the best material from the trench excavation, free from organic matter, with particle size not exceeding 75mm and can achieve the required compaction.

A layer of geo-fabric is to be placed between the embedment material and backfill material.

For trenches in the roadways and footpaths, fill material shall be in accordance with the requirements of the road owner.

18 SWABBING

Swabbing is not required.

19.3.4 TRENCH FILL COMPACTION TESTING

The Contractor shall be responsible for all compaction testing and shall arrange for the testing to be carried out by a NATA certified Test Laboratory.

Prior to commencing work the Contractor shall prepare a testing plan showing the number of tests and depths in each zone where tests are to be carried out.

The Laboratory shall randomly select test locations in each zone. The Water Agency may direct the Laboratory to undertake additional tests in any zone. The test locations shall be uniformly distributed over the works.

Test Frequency

Testing shall not be clustered within a zone or at boundaries of a zone.

In deep trenches where more than 1 layer is to be tested, the test locations shall, where practicable, be staggered from those layers above or below by at least 5 m for water mains and 2 m for water services.

Compaction Certificates

Prior to the issue of the Certificate of Practical Completion, the Contractor shall submit the individual compaction test records and a Certificate of Compliance from the NATA

Test Laboratory confirming that the tests have been completed in accordance with the testing plan and that the specified compaction has been achieved.

Non-Compliance of Compaction testing

If the compaction tests fail, the Contractor shall remove and re-compact the fill from all areas that fail the test. The compaction tests shall be repeated at the Contractors' cost until satisfactory compaction levels are achieved.

19.4.1 PRESSURE TESTING – GENERAL

Testing shall include water services and stop cocks.

19.4.2 SYSTEM TEST PRESSURE

The test pressure shall be 1200 kPa applied as close as practicable to the lowest point of the main.

19.4.3 MAXIMUM ALLOWABLE LOSS

No water loss is permitted over a 15 minute period at the test pressure.

19.4.4 PRESSURE TEST PROCEDURE

All Pressure Testing in accordance with AS 2566.2

19.5 BACTERIOLOGICAL TEST

Council shall undertake bacteriological testing on all new mains and charge the Contractor a fee for the service.

Should the bacteriological test fail twice, the Contractor shall disinfect the mains at his cost.

19.5.3 SATISFACTORY BACTERIOLOGICAL TEST

The acceptable range for the heterotrophic count shall be 0 – 100 cfu/mL

20.1 DISINFECTION – GENERAL

The disinfection agent shall be a sodium hypochlorite solution or other approved chlorine bearing agent. The dosing rate shall be 20 mg/L with a contact time of 24 hours. The agent shall be added as a water solution to the chlorination point immediately downstream of the stop valve, where the new main connects to the existing main.

22.1 CONNECTIONS TO EXISTING MAINS

All works on the existing reticulation system shall be considered as "live works" and will be constructed by Council at the Contractors cost. The installation details shall comply with Section 4.7 of this document.

23.1 RESTORATION, GENERAL

Restoration shall be carried out progressively as each section of the Works is completed.

The excavated and disturbed area shall be stabilised to minimise wind and water erosion of the restored area.

24 WORK AS-CONSTRUCTED DETAILS

Recording and certification of "As-Constructed" works shall comply with Section 7.3 of this document

12 PART 4 STANDARD DRAWINGS

The following table indicates the appropriate use of WSCOA standard drawings

Miriam Vale Shire's status of WSCOA Drawings is per the following key.

Use	Use as Miriam Vale Shire Council standard practice (with amendment if necessary as indicated in the Table below)
Not to be Used	The WSCOA drawing is not to be used for design or construction purposes.

Topic	WSCOA Drawing	WSCOA Status
PIPELINE LAYOUT		
Design Layouts, Typical Locality Plan	WAT-1100	
Design Layouts, Typical Site Plan	WAT-1101	IMEAQ Std Drwg R-1010
Typical Mains Construction, Reticulation Main Arrangement	WAT-1102	Thrust blocks shall comply with WAT-1205, WAT-1206 and WAT-1207. Direct tapping of mains is not permitted. All nuts and bolts to be 316 stainless steel
Typical Mains Construction, Distribution and Transfer Mains	WAT-1103	GRP and steel mains not approved
Typical Mains Construction, DN63 PE Cul-de-sac Arrangement	WAT-1104	Maximum No of connections – 8 Maximum length of PE main – 40 m.
Typical Mains Construction, Connection to Existing Mains	WAT-1105	
Property Services, Single Service Main to Meter	WAT-1106	
Property Services, Split Service Main to Meter	WAT-1107	
Property Services, Connection to Main	WAT-1108	

Property Services, Above Ground Meter Assembly Arrangement	WAT-1109	Tracer wire and marker tape required on non-metallic service connections
EMBEDMENT / TRENCHFILL AND RESTRAINTS		
Soil Classification Guidelines and Allowable Bearing Pressures for Anchors and Thrust Blocks	WAT-1200	
Embedment & Trenchfill, Typical Arrangement	WAT-1201	
Standard Embedment, All Pipe Types	WAT-1202	
Special Embedment, Inadequate and Poor Foundation	WAT-1203	Not adopted
Special Embedment, Concrete, Geotextile and Cement Stabilised Systems	WAT-1204	
Thrust Block Details, Concrete Blocks	WAT-1205	Minimum Factor of Safety of 2.5 for design of blocks
Thrust Blocks Details, Timber and Recycled Plastic Blocks	WAT-1206	Timber and recycled plastic thrust blocks are only acceptable for temporary works.
Thrust and Anchor Blocks, Gate Valves and Vertical Bends	WAT-1207	
Restrained Joint System, DN100 to DN375 Mains	WAT-1208	Water Agency approval required for use of restrained joint systems.
Trench Drainage, Bulkheads and Trench Stops	WAT-1209	
Trench Drainage, Typical Systems	WAT-1210	Refer to comments for WAT-1209 Granular trench bedding drainage to be discharged to drainage lines at all low points along

		alignment.
Buried Crossings, Under Obstructions	WAT-1211	Place scour bend immediately before first bend where the main deflects under the creek
Buried Crossings, Major Roadways	WAT-1212	Subject to Water Agency endorsement
Buried Crossings, Railways	WAT-1213	
Buried Crossings, Bored & Jacked Encasing Pipe Details	WAT-1214	
INSTALLATION PRACTICES / STRUCTURES		
Valve & Hydrant Identification, Identification and marker Posts	WAT-1300	
Typical Valve & Hydrant Installation, Valve Arrangement	WAT-1301	
Typical Valve & Hydrant Installation, Hydrants and Air Relief Valves	WAT-1302	Air Vent to be 100 SHS with pressed steel cap, SS insect gauze. Water Agency to provide details.
Typical Surface Fitting Installation, Gate Valve Surface Boxes, Non Trafficable	WAT-1303	
Typical Surface Fitting Installation, Gate Valve Surface Boxes, Trafficable	WAT-1304	
Typical Surface Fitting Installation, Hydrant Surface Boxes Trafficable	WAT-1305	
Typical Appurtenance Installation, Scour Arrangements	WAT-1307	
Typical Appurtenance Installation, Valve Chambers	WAT-1308	
Typical Appurtenance Installation, Pressure Reducing Valves	WAT-1309	
Aerial Crossings, Aqueduct	WAT-1310	
Aerial Crossings, Aqueduct Protection Grille	WAT-1311	
Aerial Crossings, Bridge Crossing Concepts	WAT-1312	
Flanged Joints	WAT-1313	

FABRICATION DETAILS		
Typical Steel Pipe Jointing, Butt Welding of Joints	WAT-1400	
Typical Steel Pipe Jointing, Rubber Ring Joint Spigot Bands	WAT-1401	
Typical Steel Pipe Jointing, Welding Pipe Collars	WAT-1402	
Typical Steel Fabrication, Bends	WAT-1403	
Typical Steel Fabrication, Access Openings for Pipes ≥ DN750	WAT-1404	
Typical Steel Fabrication, Dismantling and Flexible Joints	WAT-1405	
Typical Steel Fabrication, Valve Connection Bypass	WAT-1406	
DI Installation, Valve Bypass Arrangement DI and GRP Pipe	WAT-1407	
Joint Corrosion Protection, Cement Mortar Lined Steel Pipe DN300 to DN1200	WAT-1408	
Hydrant Installation Fittings	WAT-1409	

Annexure A
Authorised Products – Water Supply

Item	Requirements	Authorised Manufacturer
Pipe		
PVC	Series 2 Type M & O PN 12	Iplex Tyco Vinidex
DICL	K9 Rubber Ring Jointed Bitumen Coated	Crevet Tyco
PE	PN 12	Iplex Vinidex PPI
Copper		Port Kembla Copper
Fittings		
DI Bends, Tapers, Tees, Branches & Pretapped Connectors	Thermally Bonded Polymeric Coating PN 16	Tyco Crevet Vinidex
DI Mechanical Couplings	Thermally Bonded Polymeric Coating PN 16	Tyco Crevet AVK

Resilient Seated Gate Valves	Thermally Bonded Polymeric Coating PN 16	Tyco AVK Vinidex
Hydrants	Thermally Bonded Polymeric Coating DN 80 Removable Top Cap & Internal Assembly	Tyco AVK Crevet Gatic/Milne Toowoomba Foundary
CI Boxes & Covers	AS 3750.4	Tyco Iplex Gatic/Milne Tellam Crevet
PE Mechanical Fittings		George Fischer Philmac Plasson
Tapping Bands	Gunmetal – positive stops Stainless Steel Bolts	Tyco Gatic/Milne RMC
Ferrules, Ball Valves, Stop Cocks		Tyco Gatic/Milne RMC
Meters – 20 & 25mm		Elster RMC
Meters – 32 & 40mm		Elster
Single Check Detector Check Valves	Thermally Bonded Polymeric Coating	Tyco
Marker Tape		Boddington Tapex
Tracer Wire	2mm 316 stainless steel 7/19 construction cable	
PE Sleeving for DI Pipe		Tyco Crevet

APPENDIX H

Miriam Vale Shire Council
Sewerage Standards

This document sets out the requirements for the design and construction of sewerage for acceptance by Miriam Vale Shire Council as donated assets.

The Sewerage Code of Australia (SCOA) is not reproduced in this document. The document can be obtained from the following organisations:

Water Services Association of Australia	Standards Australia
469 Latrobe Street	1 The Crescent
Melbourne Victoria 3000	Homebush NSW 2140

Council's amendments to the SCOA are set out below. Part and Section references are those given in the SCOA. Where no reference is made to a Section in the SCOA, the Section applies in full without amendment.

If conflict is considered to exist between the SCOA and an amendment the matter shall be referred to Council for resolution.

13 The sewerage requirements are applicable to the majority of situations. However, variations may be necessary to meet special circumstances or to overcome other problems not addressed in the requirements. Whenever the proposed design varies in anyway from the requirements the proposed variation shall be authorised by the Council.

14 PART 0: GLOSSARY OF TERMS, ABBREVIATIONS AND REFERENCES

The following definitions from the SCOA are reproduced below for the assistance of readers of this document.

Water Agency	Miriam Vale Shire Council
Concept Plan	A package of information provided to the Designer by the Water Agency to enable appropriate planning and design of major sewerage system components to be performed.
Constructor	An individual, corporation or legal entity including any contractors and sub-contractors that is accountable at law for delivery of Works under a specific contract or development agreement.
Developer	A person, organisation, local government authority or government authority (other then the Water Agency) responsible for provision of sewerage.
Designer	Person(s) or firm responsible for a design output. Such person or firm may be accountable to a Project Manager or other person having responsibility under a contract or otherwise.
Works	All those Works being sewers, maintenance structures, pumping stations, pressure mains and accessories and shall include valve chambers and storage facilities as shown on the Design Drawings and include any part of the Works.

15 PART 1: PLANNING AND DESIGN

1.3.3 DESIGN RESPONSIBILITIES

'The Designer shall be a Registered Professional Engineer of Queensland'.

1.4.3 DESIGN OUTPUT – AMEND TO READ

The Design Drawings and Specification may comprise elements of Parts 2, 3 and 4 of this Code.

2.3 PLANNING PARAMETERS

The design unit flow rate shall be 250 l/ep/d.
The ep density is to be based upon the design populations for particular developments listed in the Infrastructure Charges.

3.2 FLOW ESTIMATION

Flow estimation assumptions shall be given in the Concept Plan.

4.1 DETAIL DESIGN PROCESS

For multi-unit developments where each unit has a separate footprint and may qualify for a freehold title, the sewer services to each unit shall comply with the requirements of this Standard.

4.2.2 DESIGN ACCURACY

Horizontal alignment shall be referenced to the Australian Map Grid Coordinate system GDA 94.

4.2.3 SEWER LAYOUT

Sewer reticulation shall be arranged to minimise the length of sewer in private property by locating sewers within the road reserve wherever possible. Such sewers shall be located parallel to and 1.75 metres from the front property boundary.

Sewers shall run parallel to and 1.5 metres from the property boundary when located within private property. The tolerance on the alignment of the centre of the pipe shall be ±0.1 m.

Sewers shall cross property boundaries as near as possible to 90 degrees, and where possible should be designed such that not more than one sewer and one MH are located within any one allotment.

Easements are generally required for sewer lines in private properties.

Curved sewers shall not be used.

4.2.5 EASEMENTS

Easements shall be provided where sewers are laid in private property. The easements are to be 3 metre wide and centred over the sewer alignment.

4.2.6 DISUSED SEWERS

Works to be undertaken on sewers and maintenance structures that are no longer required is dependent on the location of the sewer and shall comply with the following requirements:
Existing or Future Buildings lots - break-up and removal of the sewer and MHs from site, or crush the sewer and removal of the MHs from site. In each case the trench shall be backfilled and compacted to the standard required for the building site.
Under Roadways - break-up and removal of the sewer and MHs is preferred. Where this is not practicable, the sewer shall be filled with 5 MPa sand/cement grout and the MHs removed. In either case, the works shall comply with the road authority requirements.
Public Open Space - sewers shall be plugged at each MH. MHs shall be broken down to 600 mm below ground level and filled to the existing surface level. The works to be undertaken on disused sewers and MHs shall be recorded as part of the "As-Constructed" details.

4.3.2 ROADS, RESERVES AND OPEN SPACE

Wherever practicable, sewers shall be located in the sewer allocation on the high side of the road reserve.

Where there is a significant advantage in placing the sewer in another utility allocation, written approval of the relevant utility is required before using this allocation.

Sewers laid in the road carriageway shall be located on an alignment of 1.75 m from the Property Boundary, as per IMEAQ Std Drwg R-1010.
Wherever practicable, sewers in drainage reserves shall be laid parallel and adjacent to the drainage system and clear of grassed waterways to minimise the effect of pipe bedding material on ground water movement.

Wherever practicable, maintenance structures shall be located outside the road pavement except in grass swales, where the maintenance structures shall be located outside the swale.

In the last line of the clause in the Code, change reference from Clause 6.2 to 6.3.

4.3.4 PUBLIC AND PRIVATE PROPERTY

Easements shall be provided where public sewer line is to be laid in private property.

Offset alignments from residential property boundaries shall comply with the following:
- side boundary of property 1.0m
- rear boundary of property 1.5m

Building over or near sewers is to comply with Section 4.4.4 of this Manual.
Sewers shall cross retaining walls as close as practicable to right angles.
Where the sewer crosses under a retaining wall, a certificate from a registered professional engineer shall be provided for the structural integrity of the sewer.
Where the sewer crosses under a boulder retaining wall, a concrete bridging slab shall be placed over the sewer and a certificate from a registered professional engineer shall be provided for the slab design and the integrity of the sewer.

4.3.7 HORIZONTAL CURVES IN SEWERS

Curved sewers shall not be used.

4.4.3 CLEARANCE FROM TRANSMISSION TOWERS AND POWER LINES

Where the distance between a metal sewer and a power line or transmission tower falls within the distances stated in the Code, a report on the procedures to be adopted for the construction and maintenance of the sewer shall be provided by an RPEQ.

4.4.4 CLEARANCE FROM STRUCTURES

The minimum distance between a sewer and the outermost projection of a building, structure or piered footing shall be 1.5m. No structural loading shall be allowed with the zone of influence defined in Figure 1.

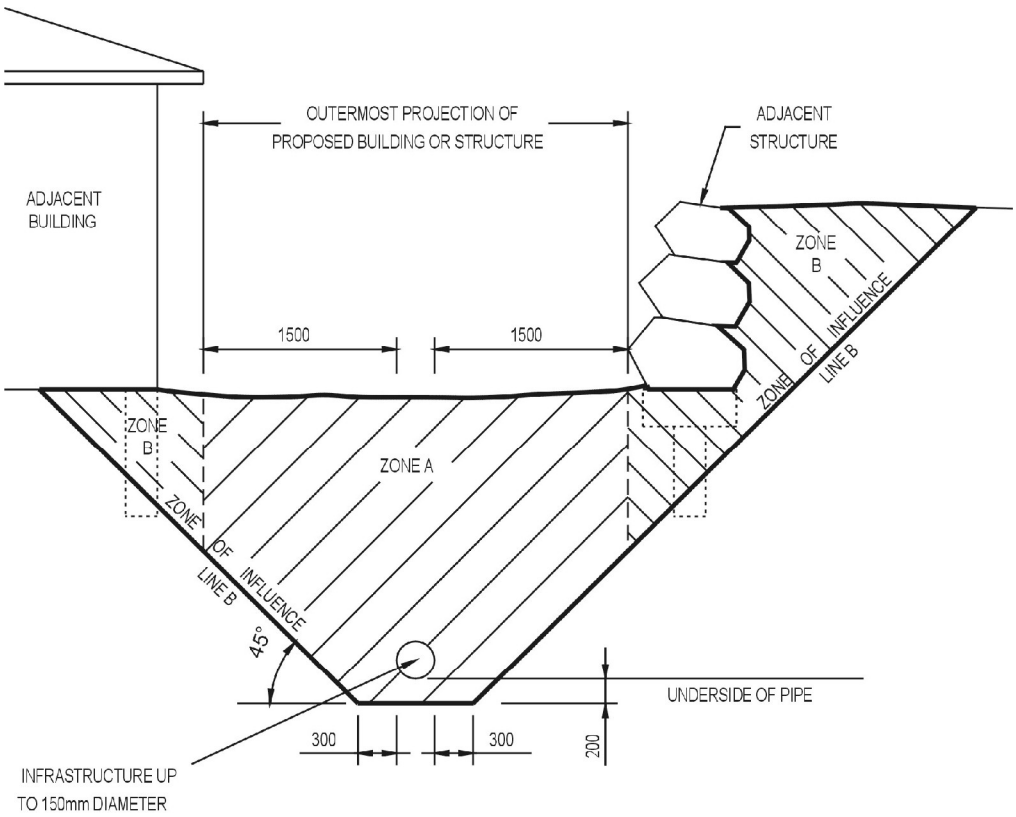

FIGURE 1

The minimum horizontal distance between sewers and mature trees less than 5 m in height shall be 1.5 m. For trees larger than 5 m in height, the minimum horizontal clearance shall comply with the written recommendations of a qualified arborist.

4.4.5 UNDERGROUND OBSTRUCTIONS & SERVICES

The location of all existing services shall be confirmed with the appropriate Authority prior to the commencement of any excavation work.

The Water Agency takes no responsibility for the accuracy of any 'as constructed' information.

4.4.5.2 CLEARANCE REQUIREMENTS

Sewers shall always cross under water mains with a minimum vertical clearance of 400mm.

4.5.3 MINIMUM AIR SPACE FOR VENTILATION

Select option B. The flow depth at the Design Flow (PWWF) shall not exceed 70 % of the Diameter.

4.5.5 MAXIMUM EP FOR RETICULATION SEWERS

Sewers shall be sized to carry the design flow without exceeding the 70% flow depth. The maximum EP figures in Table 4.4 shall not apply.

4.6.1 VERTICAL ALIGNMENT OF SEWERS

Sewers and property connections shall be constructed at the shallowest practicable depth, while ensuring that the critical factors described in the clause are achieved.

4.6.4.2 SERVICED AREA REQUIREMENTS FOR RESIDENTIAL LOTS

For single residential lots, the property connection shall service the total area of the lot. For "battle axe" blocks the serviced area may be considered to start at the end of the access way.

4.6.6.4 LARGE FALLS AT MHS

No internal drops are permitted in a DN 900 MH. A maximum of one internal drop is permitted in a DN 1200 MH. Table 4.10 does not apply.

4.6.7 VERTICAL CURVES

Curved sewers are not permitted.

4.6.8 COMPOUND CURVES

Compound Curves are not permitted.

4.7.3 EXTERNAL CORROSION

PVC sewers shall not be used in ground likely to be contaminated with hydrocarbons.

5.3 PROPERTY CONNECTIONS

Only details shown on WAT 1106 shall be used. Separate inspection openings (IO) to surface shall be provided for each service connection and must be located 1.5m within each property boundary.
The IO shall be able to be rodded. There is to be a 45^0 junction off the sewer with a 45^0 bend to a vertical IO. The IO is to be bought to within 300mm of surface in undeveloped sites and marked in accordance with SEW-1109.

5.3.3 BURIED INTERFACE METHOD

This method is not approved by the Water Agency.

5.4 MAXIMUM DEPTH OF PROPERTY CONNECTION

The maximum depth to invert of a property connection for a single residential lot shall be 1.5m.
Where the sewer is 1.5 to 3m deep, a vertical riser (jump up) or ramped connection is required.
A maximum of two single residential connections may be installed with a vertical riser or ramped connection.
For multi- residential, commercial and industrial developments, the maximum depth to invert of the property connection shall be 3 m.
No connections shall be specified to sewers at depths greater than 3 m. In such cases, connections shall be made to a maintenance structure or to a higher level secondary sewer.

5.5.2 MULTIPLE OCCUPANCY UNITS

The whole multiple occupancy lot shall be regarded as a single occupancy lot that is served by a single point of connection.
Section 4.1 of this standard shall also apply.

5.6 LOCATION OF CONNECTION POINTS

Property connections shall comply with Section 4.4.4 of this standard.

5.6.2 DEVELOPED LOTS

The property connection point shall not be greater than 3.5m from the downstream boundary.

5.8 LENGTH OF PROPERTY CONNECTION SEWERS

The maximum length of a property connection sewer shall be 25m.

6.2 LOCATION OF MAINTENANCE STRUCTURES

The centre of MHs (MH) within allotments shall be located 1.5 metres from the boundary crossed by the sewer line. MHs in footpaths should be located in line with the property boundary wherever possible.

Terminal maintenance shafts may be used where the length of the line from the downstream MH is less than 45 metres, provided not more than two property connections are made in the line.

6.3 SPACING OF MAINTENANCE STRUCTURES

The maximum distance between maintenance structures shall be 90m.

6.4 SPECIAL CONSIDERATIONS FOR LOCATION OF MAINTENANCE STRUCTURES

Maintenance structures shall be located to comply with Section 4.4.4 of this manual.

6.6.3 DESIGN PARAMETERS FOR MHS

Stub lines shall terminate between 1 m and 1.5 m from the MH with an approved cap.

The minimum MH diameter shall be 1050mm for pipes up to 225mm diameter, and 1500mm for pipes greater than 225mm diameter or where the change of direction for a sewer line is greater than 100 degrees. Where two internal drops are contained in the MH the diameter of the MH shall be 1500mm.

The minimum depth of a MH with a 600mm diameter round lid, measured from the top of the MH to the deepest invert shall be 900mm.

The minimum depth of MHs with an internal diameter greater than 1050mm, measured from the top of the MH to the deepest invert shall be 1200mrn.

Rectangular lids shall not be used on MHs.

In MHs deeper than 6m landings and ladders shall be provided.

6.6.4 PROPERTY CONNECTIONS INTO MHS

Where the sewer line is located outside the allotment being serviced, the oblique junction shall be located so that the property connection can be laid as directly as possible i.e. 90 degrees to a point 1.0 metre inside the front and side boundaries, or the rear and side boundaries as appropriate.

'Not more than two bends shall be installed in a property connection.'

Invert levels of property connections at the boundary shall be shown on the plans and long sections of the Design Drawings.

"Y"' connections shall not be used.

6.6.8 LADDERS, STEP IRONS AND LANDINGS

Step Irons are not to be installed.

7.6.2 NEAR-HORIZONTAL BOREHOLES

In sub paragraph (A) change reference Table 6.1 to Table 7.1

7.8.1 INVERTED SYPHONS

Inverted syphons shall not be used.

8.2 PRODUCTS AND MATERIALS

UPVC sewers may be used in residential, commercial and light industrial areas except where there is the possibility that the sewer flow or surrounding ground may contain hydrocarbons.

9.2 DESIGN DRAWINGS, GENERAL

Design Drawings shall comply with Miriam Vale Shire Council Planning Scheme Policy No.1 – Appendix B

9.3.2 RECORDING OF AS-CONSTRUCTED INFORMATION

As-Constructed drawings shall comply with Section 8.4 of the Miriam Vale Shire Council Planning Scheme Policy.

PART 2: PRODUCTS AND MATERIALS

10 PRODUCTS AND MATERIALS OVERVIEW

As this area is reasonably remote, the types of materials utilised in sewer mains shall be limited such that the availability of spares is maximised and the inventory of spares carried by repair crews and Council stores is minimised. Only the following Pipeline Systems (Refer Table 10.1) shall be used - PVC.

Gibault Joints

Gibault joints shall be long barrel type with stainless steel (Grade 316) fasteners. Gibault joints used below RL5.0 or in the presence of actual or potential acid sulphate soils shall be protected by application of petrolatum mastic and tape wrap.

Pre-Cast Concrete MHs

Pre-cast manholes shall be CSR Humes Wedge Ring or approved equivalent.

Stabilised Sand

Stabilised sand shall contain a minimum of 4% cement by weight.

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17 PART 3: CONSTRUCTION

12.2 PERSONNEL QUALIFICATIONS

The Plumbing and Drainage Regulation 2003 requires that the work be carried out and supervised by a licensed drainer.

During any construction activity at least one person on site must have completed a pipe laying training course appropriate to the type of pipeline under construction and have documentary evidence of current accreditation for the type of pipe being installed.

The pipe laying training courses appropriate for various pipelines are:

Pipeline	Course	Training Contract
PVC	Flexitec PVC Pipe Installation	Partec Mt Gravat TAFE Ph (07) 3849 7878
PE	Welding of PE – Electro-fusion	Partec Mt Gravat TAFE Ph (07) 3849 7878

13.5.1.1 CONTRACTOR'S WPH&S OBLIGATIONS

Where the Contractor plans to undertake an excavation in which Council will carry out works, the Contractor shall comply with all the requirements set out hereunder.

Under State Workplace Health and Safety Legislation, any worksite excavation of 1.5 metres or deeper shall have a Workplace Health & Safety Plan prepared. A Contractor preparing an excavation, in which Council will carry out work, shall prepare a Workplace Health & Safety (WPH&S) Plan.

Should a Workplace Health & Safety Plan not be prepared and not presented on site prior to commencement of Council work, or the control measures do not meet the requirements, Council workers will leave the site and the Contractor will be liable for the costs of loss of Council time. Work will not recommence until such time as Council has received that payment and the appropriate control measures are in place.

For the purposes of this requirement, a Contractor shall include any person or organisation that contracts (either directly or through a third party) with Council to construct new or improve, existing sewerage reticulation services or sewerage maintenance structures.
Council will also prepare its own Workplace Health & Safety Plan as a separate document to that which the Contractor shall provide. The Contractor continues to be responsible for the construction site but to the extent of any inconsistency between the contractor's and Council's WH&S Plans, the Council requirements shall prevail.

Items listed below are a guide only for the measures that Council will be checking as part of their Workplace Health & Safety Plan.

- Erect road signs as per Manual for Uniform Traffic Control devices to alert oncoming traffic.
- Locate underground services in accordance with Queensland Government WH&S Underground Services Health & Safety Guide.
- Check for the presence of overhead power lines in the vicinity of the working area and if present record the risks shall on the work plan.
- Erect barricading to secure the site from unauthorised access, especially children.
- Ensure Contractor/asset owner excavation over 1.5m WPH&S Plan has been sighted by Council employees.
- Proprietary shoring
  - attach specifications to plan
  - type/model
  - Non-proprietary shoring details
  - Benching
  - Battering
  - Obtain geotechnical advice for all excavations 3 m and deeper.
- Plant operators certificate of competency has been sighted.
- Where the depth of the excavation is 2.4 m or deeper, a minimum of 900 mm edge protection will be installed around the excavation.
- Ensure spoil is placed at least 600 mm from the side of the excavation to minimise falling debris.
- Ensure that adjacent structures: eg fences, light poles, telephone boxes are supported.
- Ensure ladder will be in position to access the excavation.
- Ensure the access ladder extends at least 1 m above the top of the excavation.
- Ensure ladder is secured.
- Place combustion engines outside and as far away as practicable from the excavation to prevent the excavation being contaminated by toxic fumes.
- Site specific induction for excavations over 1.5 m shall be given by the Principal Contractor or someone on their behalf.
- Council officers shall be informed of the person to whom hazards are to be reported to.
- Has the excavation been deemed a confined space?

Any queries on this issue are to be referred to the Water Agency for clarification.

13.5.3 DISUSED/REDUNDANT SEWERS

Refer to Section 4.2.6 of this manual.

14 PRODUCTS AND MATERIALS

All pipe materials and fittings to be used in the sewerage network shall be authorised by the Water Agency. A list of the authorised items is included in Appendix A of this manual.
Where items are required but not included in the Authorised Product list they shall be referred to the Water Agency for appraisal.

15.2 LIMITS OF EXCAVATION

Where a sewer or property connection sewer is located in rock and has the potential to be extended, the excavation shall be extended 1.0m.
Where excavation exceeds the required depth by more than 200mm, the excavated material shall be replaced with stabilised sand to the required level.

17.1.4 PIPE LAYING & JOINTING

Where house connections are provided, necessary sections of the trench shall be left unfilled until the position of the junction and the end of the property connection have been recorded by the Constructor for 'as constructed' purposes.

Where property connections are provided to MHs, a rocker pipe shall be provided as SEW-1302.

17.2.3 TO 17.2.5 CURVES

Curves are not permitted.

17.5 TRENCH STOPS

Use only where specified on the Design Drawings or where an underground water path is encountered during construction. Trench stops may be omitted where a sub soil drainage system is provided

17.5 BULKHEADS

Use only where specified on the Design Drawings or where an underground water path is encountered during construction.

17.9 MARKING OF PROPERTY CONNECTION SEWERS AND DEAD ENDS

Each property connection and dead end shall be marked using identification tape and a hardwood peg.

17.11 MARKER TAPE AND TRACER WIRE

Marking tape and tracer wire shall be laid above buried non-metallic pipes along the top of the
embedment zone or at 1 m below the surface; whichever is the higher.

17.12 BORED PIPES UNDER ROADS, DRIVEWAYS ETC

Proposed methods and materials for bored pipelines shall be approved by BW before commencement of boring.
Hydraulic continuity in the trench shall be provided by the installation of 50mm conduit under the pipeline before final grouting. Filter cloth shall be wrapped and secured around each end of the conduit.

20.2 EMBEDMENT MATERIAL

Embedment material for water mains and water services shall be 5 to 7 mm single sized aggregate. This is considered to be self compacting.

21.1.2 TRENCH FILL MATERIAL

Trench filling material shall consist of the best material from the trench excavation, free from organic matter, with particle size not exceeding 75mm and can achieve the required compaction.

A layer of geo-fabric is to be placed between the embedment material and backfill material.

For trenches in the roadways and footpaths, fill material shall be in accordance with the requirements of the road owner.

20.3.4 COMPACTION REQUIREMENTS

The Contractor shall be responsible for all compaction testing and shall arrange for thetesting to be carried out by a NATA certified Test Laboratory.

Prior to commencing work the Contractor shall prepare a testing plan showing the number oftests and depths in each zone where tests are to be carried out.

The Laboratory shall randomly select test locations in each zone. The Water Agency may direct the Laboratory to undertake additional tests in any zone. The test locations shall be uniformly distributed over the works.

Test Frequency

Testing shall not be clustered within a zone or at boundaries of a zone.

In deep trenches where more than 1 layer is to be tested, the test locations shall, whererpracticable, be staggered from those layers above or below by at least 5 m for watermains and 2 m for water services.

Compaction Certificates

Prior to the issue of the Certificate of Practical Completion, the Contractor shall submitthe individual compaction test records and a Certificate of Compliance from the NATATest Laboratory confirming that the tests have been completed in accordance with thetesting plan and that the specified compaction has been achieved.

Non-Compliance of Compaction testing

If the compaction tests fail, the Contractor shall remove and re-compact the fill from allareas that fail the test. The compaction tests shall be repeated at the Contractors' costuntil satisfactory compaction levels are achieved.

22.2 VISUAL INSPECTION, ABOVE GROUND

In addition to the above ground inspection, all sewer lines shall be subject to internal visual inspection by means of lights and/or mirrors. The lines shall be straight and a full circle of light shall be visible at the far end. No ponding shall be visible in any part of the sewer.

22.4 AIR PRESSURE AND VACUUM TESTING OF SEWERS

Sewers and manholes are to be vacuum tested.

22.7 CCTV INSPECTION

All sewers shall be subject to CCTV inspection. Results are to be submitted on CD or DVD.

25.1 RESTORATION, GENERAL

Restoration shall be carried out progressively as each section of the Works is completed.

The excavated and disturbed area shall be stabilised to minimise wind and water erosion of the restored area.

18 PART 4 STANDARD DRAWINGS

The following table indicates the appropriate use of SCOA standard drawings

Status of SCOA Drawings is per the following key.

Use	Use as Miriam Vale Shire Council standard practice (with amendment if necessary as indicated in the Table below)
Not to be Used	The SCOA drawing is not to be used for design or construction purposes.

Topic	SCOA Drawing	SCOA Status
PIPELINE LAYOUT AND CONNECTION DETAILS		
Typical Locality & Site Plan	SEW-1100	Use offsets as per IMEAQ Std Drwg R-0101 and 4.3.4
Connection, Sewer in Road Reserve	SEW-1104	IOS to be located on property - as per option in note 5 of drawing Buried interface (connection point) not adopted.
Connection, Sewer in Easements and Inside Property	SEW-1105	Buried interface (connection point) not adopted.
Connection, IO Interface Method	SEW-1106	There is to be a 45^0 junction off the sewer with a 45^0 bend to a vertical IO. The IO is to be bought to within 300mm of surface in undeveloped sites and marked in accordance with SEW-1109.
Connection, Buried Interface Method	SEW-1107	Not to be used
Topic	**SCOA Drawing**	**SCOA Status**
EMBEDMENT / TRENCHFILL AND SUPPORT SYSTEMS		
Special Embedment, Support Using Piles	SEW-1204	Not to be used
ACCESS STRUCTURES		
MH, Sewers ≤ DN300, Precast Types P1 & P2	SEW-1300	Mastic joints not to be used. Step Irons not to be used.
MH, Step Irons and Ladders	SEW-1307	Not to be used

SPECIAL CROSSINGS / STRUCTURES ARRANGEMENTS		
Buried Crossings, Syphon Arrangement	SEW-1400	Not to be Used
Aerial Crossings, Aqueduct	SEW-1404	See SEW-1405
Aerial Crossings, Aqueduct Protection Grille	SEW-1405	Substitute Aluminium Pool Fencing for hot dipped galvanised steel grille shown in drawing
Water Seal Arrangement, Main Trap	SEW-1409	Not to be Used
Water Seal Arrangement, MH System	SEW-1410	Not to be Used
Water Seal Arrangement, Twin MH System	SEW-1411	Not to be Used
CONNECTIONS TO EXISTING SYSTEM		
Insertions & Repair Systems, Insertion of Junctions	SEW1501	Saddle not to be used

Appendix A
Authorised Products – Sewerage

Item	Requirements
Pipe	
PVC	Plain Wall – RRJ DN 100 – SN 10 DN 150 and above – SN 8
DICL	K9 Rubber Ring Jointed Bitumen Coated
PE	PN 12
Fittings	
PE Maintenance Shafts	Poo- Pit
Resilient Seated Gate Valves	Thermally Bonded Polymeric Coating PN 16
CI Boxes & Covers	AS 3750.4
PVC Fittings	

Item	Requirements
PE Fittings	Electrofusion couplings to be long socket type
Marker Tape	
Tracer Wire	2mm 316 stainless steel 7/19 construction cable
Low Pressure Sewerage Pump Station	Minimum retained volume of effluent Pump and motor not to be in direct contact with th Brownout protection.

APPENDIX I

Miriam Vale Shire Council
Water Supply and Sewerage Requirements
for
Non-Defined Water and Sewerage Areas

This document sets out the requirements for the provision of water supply and sewerage in areas that are not in the Defined Water and Sewerage Areas for Miriam Vale Shire Council.

1 Scope

1.1 All habitable buildings in non-defined water and sewerage areas are covered by this standard.

2 Water Supply

2.1 Rainwater tanks are to be provided in accordance with Appendix J. The minimum capacity to be provided is listed in the following table:-

Class of Building	Example of Building	Minimum Rain Water Storage Requirement	
		Single Storey	Multiple Storey
1a	Single detached house	22,000 litres	22,000 litres
1b,2,3,5,6,7,8,9	All other habitable buildings	The greater of 22,000 litres or 73.3 X Roof Area in square metres	

2.2 The design water requirements shall be 150 l/ep/d.

2.3 The ep density is to be based upon the design populations for particular developments listed in the Infrastructure Charges.

2.4 For commercial developments, water quality shall meet the Australian Drinking Water Guidelines.

3 Sewerage

3.1 On-site treatment and disposal systems are to be designed in accordance with AS/NZ 1547, the Queensland Plumbing and Wastewater Code, and the Guidelines for the Use and Disposal of Greywater in Unsewered Areas. Where these are superseded, then the latest regulation, standard or code shall be used.

3.2 Soil classification and permeability tests are to be carried out by a NATA registered soil tester. Tests are to be carried out in the proposed Land Application Area.

3.3 An Investigation and Design Report covering the items listed in Appendix A is required for each proposal.

4 Installation

The Plumbing and Drainage Regulation 2003 requires that the work be carried out and supervised by licensed personnel.

Appendix A – Requirements for Investigation and Design Reports for On-Site Wastewater Treatment and Disposal

1. Site Investigation-

a) Options available as to site conditions in terms of systems and cost.
b) Clients intentions to install dams, bores etc.
c) Soil profile x 2, one at each end of the L.A.A. indicating the position of test holes.
d) Permeability test x 1 taken in the L.A.A. indicating position of test hole.

Soil and permeability tests must be conducted by an N.A.T.A. registered soil tester. Certified copies of the soil investigation and permeability tests are to be provided

2. Design

a) Calculations per AS&NZS 1547 & Qld Plumbing and Wastewater Code
b) Name & Model of Treatment Plant
c) Model Approval Number / Chief Executive Approval of Treatment Plant
d) Maintenance Schedule of Treatment Plant
e) Guidelines for use and maintenance of facility

3. Plans

a) Site plan showing distances of L.A.A from boundaries, bores, buildings, dams, pools, creeks,etc
b) Floor plan of building structure.
c) Elevations of building structure,
d) Detail plan and cross-section of L.A.A. and bed or trench dimensions, including construction notes, pipe spacings, materials, bunding/drains
e) Provision for flushing if irrigated
f) Provision of inspection ports in beds etc
g) Size of pump if pumped discharge ie, head and flow rate
h) Signage

4. Information Required

a) 1 copy of report addressing Items 1. and 2.
b) 3 copies of plans

18.1.1.1

APPENDIX J

POLICY FOR RAINWATER STORAGE TANKS

Intent of Policy

The intent of this policy is:

- to supplement Council's reticulated water supply by 50 litres/EP/day using stored rainwater and to manage rainwater collected in domestic tanks in a way that maximises the efficiency of the storage, intended use and quality of water supplied from these tanks.

Policy

Rain Water Storage Requirements

Reticulated Water Service Area

Every habitable building within the Shire which is proposed to be connected to a reticulated water supply shall provide rain water storage to supplement the reticulated supply.

The **Desirable Capacity** of rain water storage tanks shall be calculated at 6,875L/EP.

Table 1 below indicates the **Minimum Capacity** of rainwater tank storage to be provided:-

Class of Building	Example of Building	Minimum Rain Water Storage Requirement	
		Single Storey	Multiple Storey
1a	Single detached house	22,000 litres	22,000 litres
1b,2,3,5,6,7,8,9	All other habitable buildings	The greater of 22,000 litres or 73.3 X Roof Area in square metres	

Note: Class 4 buildings are typically care-taker units within commercial buildings and their water storage requirements are considered to be included in the storage requirement for the commercial building.

The **Installed Capacity** of rainwater tanks shall be greater than or equal to the **Minimum Capacity**.

Proponents of Class 1b, 2, 3, 5, 6, 7, 8 and 9 buildings will be required to contribute additional water supply headworks charges for any shortfall between the **Desirable Capacity** and the **Installed Capacity** of the tank that is proposed.

The method for the calculation of any additional water supply headworks charges shall be in accordance with the following:

A = Equivalent Persons represented by storage shortfall
= (**Desirable Capacity** - **Installed Capacity**) ÷ 6875L/EP
B = Water Supply Headworks contribution per EP
C = Rainwater storage supplement factor = 0.25

Additional headworks contribution required for shortfall = A x B x C

Note: The rainwater storage supplement factor is based on the desirable proportion of the overall water supply provided by rainwater ie 50 litres/EP/day out of a total supply of 200 litres/EP/day = 0.25.

Non Serviced Areas

The **Minimum Capacity** of rainwater tank storage to be provided is the same as the minimum required in a reticulated water service area.

However, it should be noted that this amount of storage is not indicative of a reliable water supply. In non serviced areas, it is the responsibility of the developer to provide to Council through provision of written documentation that a reliable water supply can be provided. As a minimum this water supply shall provide 150 litres/EP/day based on the full occupancy of the development throughout the year. For Commercial Developments, a reliable water supply shall be one with a failure rate not exceeding 2%. Water Quality standards shall meet the National Health and Medical Research Council (NHMRC) Guidelines for Drinking Water Quality in Australia.

Rain Water Tank System Management

General for all Tank Systems

1. All pipes and fittings connecting rainwater tanks to the roof, household fixtures and stormwater system must be installed by a licensed plumber in accordance with plumbing and building standards.

2. The materials and installation methods used in the collection, storage, and reticulation of rainwater shall be the same as potable water and comply with the relevant Australian Standards. They shall also comply with AS/NZS 3500 1.2 Section 4.2.5. Alternative Water Supplies. (Note signage and marking of distribution pipes.)

3. Where downpipes charging rainwater tanks create water traps, pipes shall be:

   (a) Laid to grade.

   (b) Have provisions for flushing.

   (c) Be screened to prevent mosquito breeding.

4. Self cleaning rainwater heads and first flush devices shall be installed with a minimum diversion of 15litres/100m^2 of roof area.

Tank Systems for Class 1 Buildings in Reticulated Water Service Areas

1. Rainwater storage tanks shall be connected to all hose cocks, water closets and the cold water supply to the washing machine.

2. Rainwater tanks shall be provided with a back-up supply from Council's reticulated town water supply. The back-up shall ensure all fixtures retain a water supply as long as Council's reticulated supply remains available. The supply backup system shall be installed with:

   (a) A connection at the pump with an appropriate backflow prevention valve, and an automatic changeover in the event of no rainwater or electrical interruptions

   or

   (b) Provide for the charging of the rainwater tanks to a maximum of 20% of the tank capacity. This backup connection shall be provided with an air gap complying with the requirements of Section 8 and Table 4.3 of AS/NZS 3500.1. The air gap shall be readily visible to inspection.

3. Water restriction notices shall apply to garden taps that are connected to the rainwater tank.

Tank Systems for Class 2, 3, & 4 Buildings in Reticulated Water Service Areas

1. Rainwater storage tanks shall be connected to all hose cocks, water closets and the cold water supply to washing machines.

2. Rainwater tanks shall be provided with a back-up supply from Council's reticulated town water supply. The back-up shall ensure all fixtures retain a water supply as long as Council's reticulated supply remains available. The supply backup system shall be installed with an appropriate backflow prevention valve and an automatic changeover to utilise Council's reticulated supply in the event of no rainwater or electrical interruptions. No charging of the storage tank shall be permitted from the reticulated supply.

3. Water restriction notices shall apply to garden taps that are connected to the rainwater tank.

Fixed Sprinkler/Irrigation Systems for all Buildings in Reticulated Water Service Areas

Fixed sprinkler/irrigation systems may be installed. All Fixed sprinkler/irrigation systems shall utilise a separate storage tank, pump, and irrigation system with no interconnection to or charging from the mains water supply.

The capacity of any storage installed for these purposes shall not be considered by Council to be included in the **Installed Capacity** providing rainwater to hose cocks, water closets and the cold water supply to washing machines.

Tanks supplying fixed sprinkler/irrigation systems may be charged only by:

- the overflow from the rainwater storage tank providing rainwater to hose cocks, water closets and the cold water supply to washing machines and/or
- from rainfall runoff from a separate building (garage, shed, etc.) and/or
- from a private bore.

Council shall be notified if a fixed sprinkler/irrigation system is installed or proposed. These shall be inspected and placed on a register. Signage, indicating "Fixed Sprinkler/Irrigation" or similar shall be displayed at the front of the property, clearly visible from the street.