MAROOCHY SHIRE COUNCIL PLANNING SCHEME POLICY NO. 5

Operational Works

Contents

1 Introduction

1.1 Purpose of the Policy

The Codes for Operational Works, Integrated Water Management and Reconfiguring Lots contained within the Planning Scheme guide development and the design and construction of works within Maroochy Shire. This policy is intended to provide applicants with the detailed standards that represent acceptable measures to meet the relevant performance criteria nominated in these codes.

This policy is to be used in conjunction with Maroochy Plan 2000, QUDM, Queensland Streets, Austroads Guides and relevant Australian Standards.

In some instances the Maroochy Plan 2000 uses acceptable measures that are different from those used in the above manuals, guides and standards and Consultants are advised to use the Maroochy Plan 2000 data in their designs.

This 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 Operational Works Code and the Integrated Water Management Code are reiterated below. These purpose statements identify the underlying 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 Operational Works Code

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

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

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;

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

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

1.1.1.2 Integrated Water Management Code

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

a) The efficiency of all elements of the water cycle is optimised, including reduction in potable demand, non worsening of stormwater peak discharges and runoff volume and maximisation of reuse opportunities;

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

c) Water cycle infrastructure is integrated with surrounding networks;

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

e) Development does not result in the deterioration of waterway environmental values (as defined in Volume 1 or declared under an environment protection policy or regulation pursuant to the *Environmental Protection Act 1994)* and water quality;

f) Development does not detract from the character and amenity of the locality;

g) Adverse impacts, including cumulative impacts, as a result of flooding are minimised and unacceptable risk[1] to people and property is not created;

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

1.1.1.3 Code for Reconfiguring Lots

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

(a) Movement networks for vehicles, public transport, pedestrians and cyclists are integrated, safe, convenient, cost-effective and sensitive to the environment in which they are provided;

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

(b) The local street system safely and conveniently provides for the functions of traffic flow, property access, vehicle parking, pedestrian and cycle movement and public transport;

(c) Opportunities for walking and cycling are increased through the provision of safe, convenient and legible movement networks to points of attraction within and beyond the development;

1.1.2 Code Elements Pertaining to the Policy

1.1.2.1 Operational Works Code

Element 1 Utilities
- A1.1-1.2 Water supply
- A1.1-1.2 Sewerage
- A1.5 Street Lighting

Element 2 Movement Networks
- A1.1, A2.1 & A8.1 Roadworks design and construction
- A3.1 & A4.1 Road Pavement design
- A5.1 Verge and Footpath Design and Construction
- A6.1 Bikeway design and construction
- A7.1 Speed Control Devices design and construction

Element 3 Public Parks Infrastructure
- A1.1 Public Parks Infrastructure design and construction

Element 5 Construction Management
- A3.1 Protection or relocation of existing utilities, road and drainage infrastructure
- A5.1 Waste minimisation, storage and servicing
- A6.1 Erosion and Sediment control
- A7.1 Construction standards to maintain integrity of assets

1.1.2.2 Integrated Water Management Code

Element 1 Water Quality
- A1.1 Water quality objectives

Element 2 Water Cycle Management
- A1.1 Integrated water management practices and infrastructure design

Element 3 Flooding
- A2.1(c) Flood immunity standards
- A2.2 (a) Location of certain infrastructure for flood immunity.

1.1.2.3 Code for Reconfiguring Lots

Element 4 Pedestrian and Cyclist Facilities
- A1.3 Internal (local) linear linkages

Element 6 (Public Parks Infrastructure)
- A1.3 Preliminary Works.

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 requires 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** **Appendix G**	 Compliance Certificate Plan Presentation Pre Start Meeting Form (W &S) Pre Start Meeting Form (R & D) On Maintenance Check Sheet Stencilled Asphalt Specification Bonding Agreement

Appendices

1.3 Definitions & Abbreviations

ABBREVIATION	DESCRIPTION
MSC	Maroochy Shire Council
DOWP	Development Operational Works Policy
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 Height 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 Polyethylene
IFD	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
MH	Maintenance Hole
MS	Maintenance Shaft
N	Nitrogen
NATA	National Association of Testing Authorities
P	Phosphorus
PASS	Possible Acid Sulphate Soils
PE	Polyethylene
PVC - M	PVC Modified
PVC - O	PVC Orientated
PVC - U	Unplasticised PVC
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
TMS	Terminal Maintenance Shaft
PVCU	Unplasticised PVC
vpd	Vehicles per day
WSAA	Water Services Association Australia

1.4 Funding Strategy

Applicants should demonstrate that there will be sufficient funding to adequately manage and maintain the network.

A number of sources of funds are available to apply to the asset management need. These sources include rates and charges, developer charges, government grants, etc. These funds do not always meet the need of asset management so it is necessary to identify the shortfall between funding and required expenditure.

Financial model constraints will establish the extent of under funding and may lead to a revision of levels of service, the design of the asset or the need to increase funding or provide other funding options.

Sinking fund or benefited area levy funding options, if proposed, are to be fully supported by documentation and financial modelling over the lifecycle of the proposed infrastructure. Council in no way accepts either of these options as a valid alternative to good asset management planning.

1.5 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;
- Cost; and
- Legislative compliance.

1.6 Plan Presentation

Representation of required plans both in hard copy and electronic format are detailed under **Appendix B**.

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 Operational Works and Integrated Water Management codes are 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 development assessment in Volume 1 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;
- Providing an assessment of flooding issues for the site;
- 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.

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. Five copies of engineering plans for the proposed works, (1 set to be A1 size and 4 sets to be A3 size);

3. One additional set of A1 size drawings for water supply and sewerage reticulation layouts;
4. 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;
5. An electronic copy of all design drawings will be required; including water, sewer, stormwater, roadworks, earthworks, street lighting, landscape, soil and water management plans.
6. An assessment of the compliance of the designs with the Code for Operational Works and the Code for Integrated Water Management (codes 2.5 and 2.7 in the Planning Scheme). 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;
7. 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).
8. Sufficient supporting calculations to enable the design parameters to be audited; eg Sidra, Storm, Vehicle turning paths, Lighting isolux diagrams, etc;
9. One copy of the Council's conditions of any earlier relevant development approval and concept plan on which the design was based;
10. A copy of records of any pre-submission discussions with Council and correspondence with other authorities;
11. A copy of the Construction Management Plan prepared for the proposed work;
12. A copy of the proposed Inspection and Testing Plan for the works and method of tracking;
13. The job specification to be used for the construction of the works shall be noted on the design plans;
14. Advice about the engineer engaged to supervise the proposed work;
15. Structural and geotechnical certification of design of miscellaneous structures including retaining walls over 1m in height, non-standard headwalls, drainage structures, reservoirs etc;
16. 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;
17. Design parameters and operating regimes for water supply and sewerage pump stations;
18. 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;
19. Landscape and streetscape layout with all supporting information defining water control and automatic systems. Details to include lifecycle costs and proposed maintenance program details;
20. Electrical and street lighting layout and details;
21. Hydraulic report;
22. Geotechnical report;
23. Staged Erosion and Sediment Control Plan; and
24. Public Park or Open Space details (if any).

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, Energex, Telstra and Queensland Transport for public transport;
5. Environmental considerations in accordance with legislation have been clearly evaluated;
6. Lifecycle of design components and on going maintenance details are clearly considered and disclosed for each asset type;
7. Aboriginal and cultural heritage requirements;

8. Contaminated land issues have been clearly assessed;
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.

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 to continue to deliver. To support this delivery, Council requires that during the design, a lifecycle approach be adopted that considers the ongoing asset management.

Council's management of its contributed assets and the requirements set down in the Planning Scheme and this Policy provide for levels of service to be met in the most cost-effective way. In particular, the purpose statement for the relevant codes in the planning scheme respectively include the requirements that:

- Infrastructure is provided in a manner that maximises resource efficiency and minimises whole of life cycle costs (Operational Works Code);
- Water cycle infrastructure is provided in a manner that maximises resource efficiency and minimises whole of life cycle costs (Integrated Water Management Code).

2.2.1.1

These purpose statements are also reflected in various performance criteria in those codes.

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 Operational Works and Integrated Water Management 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:

- Efficient maintenance and 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 asset of the operating life.

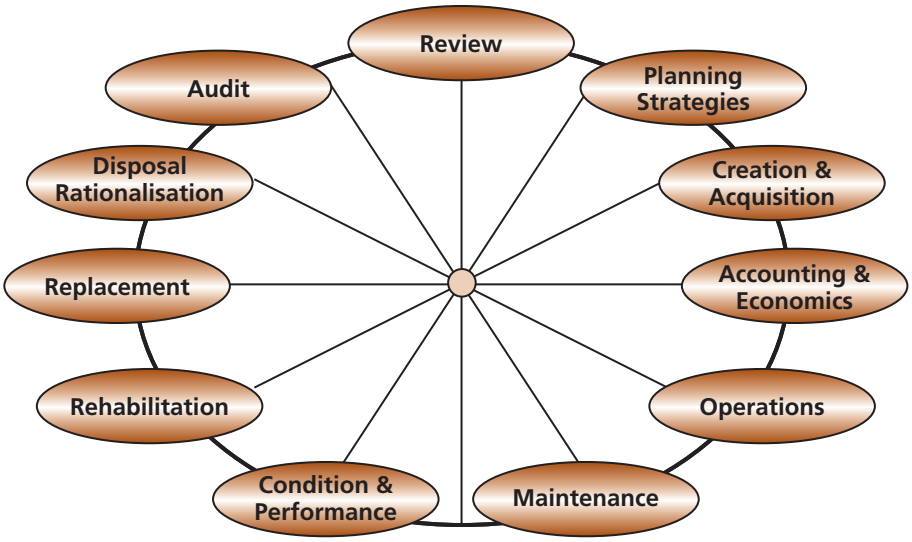
A lifecycle management plan should consider all management options and strategies as part of the asset lifecycle, from planning to disposal. The objective is to look at lowest long-term cost (rather than short term savings) when making asset management decisions.

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

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

Figure 2.1 on the following page illustrates the lifecycle of assets and associated asset management functions from planning for the need to create an asset through to its ultimate disposal plus audit and review of performance.

Figure 2.1 – Lifecycle Management Structure



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

This section is relevant to the assessment of compliance with performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works:

(1) Utilities

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 Services are provided in a manner which: **(a) ensures appropriate capacity to meet the current and future needs of the development site;** **(b) is integrated with and efficiently extends existing networks;** **(c) minimises risk to life and property;** **(d) minimises risk of environmental harm;** **(e) minimises whole of life cycle costs;** **(f) can be easily and efficiently maintained; and** **(g) minimises potable water demand and wastewater production.**	**A1.1** (a) Each site or lot is connected to Council's reticulated water supply and sewerage system[2]. Or (b) Where the site is in a Rural Precinct and not within Council's water supply or sewerage headworks planning areas, on site water supply and a system for waste water treatment and disposal is provided in accordance with Planning Scheme Policy No. 5 - Operational Works. Or (c) Where the site is in the Sustainable Rural Residential Precinct and is not within Council's water and sewerage headworks planning areas, an on site system for waste water treatment and disposal is provided in accordance with Planning Scheme Policy No. 5 - Operational Works[3]. **A1.2** Reticulated water supply and sewerage systems are designed and constructed in accordance with Planning Scheme Policy No. 5 – Operational Works **A1.3** Each site or lot is connected to an existing power supply and telecommunications network[4]. **A1.4** Other than in a rural precinct, electrical and telecommunications reticulation infrastructure is provided underground. **A1.5** Street lighting is provided in accordance with Planning Scheme Policy No. 5 - Operational Works.

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.

[2] *Applicants should note that the requirements of the Code for Integrated Water Management will also apply.*

[3] *Where on-site sewage treatment is permitted the management of sewage generated on-site must comply with the Plumbing and Drainage Act 2002, the On-Site Sewerage Code and Australian/New Zealand Standard 1547:2000 (on-site domestic wastewater management).*

[4] *Applicants should note that such connection will be subject to the approval of the relevant supply authority.*

3.1 Water Supply

Introduction

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.

The supplementary manuals have been developed to define the particular requirements of 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 Water Supply Code of Australia – WSA 03-2002;
- Supplementary Manual to the Sewerage Code of Australia – WSA 02-2002; and
- Supplementary Manual to the Sewage Pumping Station Code of Australia – WSA 04-2002 04-2005.

3.1.1 Relevant Code Requirements

This section relates to acceptable measures A1.1 (a), (b) and (c) and A1.2 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of a reticulated water supply system.

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

3.1.2 Standards

3.1.2.1 Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Water Supply Code of Australia – WSA 03-2002 to define the technical requirements of Council and the 'Water Agency' [1] in relation to the planning, design and construction of water supply systems.

[1] The Water Agency for the purposes of this policy is the. owner and administrator of water and sewerage assets

"Level of Service Impact Assessment Specification" is the framework by which the Water Agency may require information to assess development applications, due diligence requests or other information that may impact upon the Water Agency's ability to achieve the desired standard of service (DSS) for customers as defined in the Water Agency's current water supply and sewerage growth management strategies. The specification sets out information requirements essential to assess the existing and future effects on the performance and capacity of water assets including the identification of infrastructure needs, costs, and timings associated with deviation from population assumptions/sequencing underpinning the Water Agency's current long term infrastructure planning.

Water Meters

All new unit type development whether single or multi-storey are to be provided with individual water meters. The cost of the installation of the water meters will be borne by the developer and the water meters will be supplied by Council. Primary water meters should be located within the immediate Title boundary.

Council may request that in multi-storey strata title unit developments of three (3) storeys or more, individual meters shall be connected with remote reading counters located at the ground floor level or for two storey unit developments, all individual meters shall be located at the ground level above ground.

3.1.2.2 Part 1: Planning and Design

a) Pt 1 –1.5.2 Water Agency

Add to WSAA requirement:
For development proposals, the Water Agency may request that a water supply network analysis be undertaken to determine (a), (b) and (c).

b) Pt 1 – 2.1 System Planning Process

Add to WSAA requirement:
The designer shall liaise with the Water Agency prior to commencement of the design.

c) Pt 1 – 2.2 Demands

Replace WSAA requirement with: Water demands shall be determined in accordance

with Council's Level of Service Impact Assessment Specification.

d) Pt 1 – 2.2.3 Peak Demands

Replace WSAA requirement with:
The designer shall liaise with the Water Agency to obtain the peak demand factors.

e) Pt 1 – 2.3 System Configuration (a) & (b)

Add to WSAA requirement:
Where deemed necessary by the Water Agency, existing asbestos cement water mains shall be replaced along the full frontage of any proposed development site or where affected by any development works.

Replacement of existing water mains will be required in commercial and industrial and high density residential precincts where existing mains fronting any proposed development are less than 150mm diameter. Mains shall be replaced along the full frontage of the proposed development site prior to the placement of any site sheds or construction materials over or adjacent to the water main.

f) Pt 1 – 2.4.2 Network Analysis

Add to WSAA requirement:
The Water Agency will undertake, at the designer's expense an assessment, and establish any adverse impacts, of the proposed developments on the existing system using the Water Agency's hydraulic model.

The designer shall provide details of the proposed system development and demands to allow completion of this assessment. Alternatively, the Water Agency may require the designer to carry out this assessment. Network analyses are to include all pipes in the network model and comply with Council's Level of Service Impact Assessment Specification.

g) Pt 1 – 2.4.3 Operating Pressures

Add to WSAA requirement:
The minimum desirable service pressure shall be 220kPa at the water meter. The maximum service pressure shall be 800kPA.

h) Pt 1 – 3.2.2 Minimum Pipe Sizes

Add to WSAA requirement:
Pipe sizes shall not be less than DN150mm diameter for high density residential, commercial, industrial and rural residential precincts.

i) Pt 1 – 3.2.4 Fire Flows

Replace WSAA requirement with:
Fire flows shall comply with the requirements specified in 'Guidelines for Planning and Design of Urban Water Supply Schemes' Chapter 21A, 1997, Dept of Natural Resources and Mines. The water supply scheme must be capable of supplying the following fire flow demands above maximum hour demand: Commercial and Industrial Precincts – 30 litres per second at 12 metres residual pressure. Residential Precincts – 15 litres per second at 12 metres residual pressure.

j) Pt 1 – 3.7.2 Minimum Pressure Class

Replace WSAA requirement with:
The minimum pipe and fitting pressure class for reticulation mains shall be Class
16.

k) Pt 1 – 4.1.1 Design Tolerances

Add to WSAA requirement:
Horizontal alignment shall be referenced to GDA mapping co-ordinates.

l) Pt 1 – 4.3 Location of Water Mains

Add to WSAA requirement:Reticulation water mains shall generally be located within the road reserve on a 1.5 metre alignment from the property boundary.

In general, water mains are not to be constructed on private property, however, in instances where this is unavoidable it will be necessary to provide an easement of minimum 3.0 metres width registered for the benefit of the Council on the title of the land. The main is to be constructed centrally within the easement. A wider easement may be necessary in some instances, as determined by the Water Agency, to ensure adequate access for maintenance purposes.

m) Pt 1 – 4.3.2 Water Mains in Road Reserves

Add to WSAA requirement:
Mains shall be located to provide a minimum 0.5 metres horizontal clearance from existing or proposed footpaths. Landscape planting within 1.0 metre of Council water infrastructure or within a water easement shall be low growing when mature and be suitable approved varieties.

Consideration shall be given at land reconfiguration stage to ensure road reserves are of adequate width to provide required clearances between all services and improvements.

n) Pt 1 – 4.4 Shared Trenching

Replace WSAA requirement:
Water mains shall not be co-located with other services.

o) Pt 1 – 4.5 Duplicate Mains

Add to WSAA requirement:
Water mains are to be provided on both sides of the road in the case of divided carriage ways, commercial, industrial and high density residential precincts.

p) Pt 1 – 4.7 Connection of New Mains to Existing Mains

Add to WSAA requirement:
All works on the existing reticulation system shall be considered 'live works' and will be constructed by the Water Agency at the contractors cost. These works shall be clearly delineated on the 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 Water Agency approval.

q) Pt 1 – 4.8.3 Temporary Ends of Water Mains

Add to WSAA requirement:
Water mains shall be constructed across the full frontage of any property being developed.

r) Pt 1 – 4.9 Property Services

Replace WSAA Standard Drawings WAT – 1106, WAT – 1107 and WAT – 1109 with Council's Standard Drawings SCW 350, SCW 355 and SCW 360.

Add to WSAA requirement:
Ductile iron pre-tapped fittings and service pipework shall be installed by the developer at the time of lot reconfiguration in accordance with Council's Standard Drawing SCW 360. Conventional tapping bands may be utilized for pipe diameters where pre-tapped fittings are not available. Property service connections shall only be installed on reticulation mains with a diameter less than or equal to 300 mm. Property connections shall be installed in accordance with Council's standard drawings. Water service pipework shall be provided for the full length of access strips and access easements serving lots (25mm NB min).

Conduits shall be provided under all roads to carry water services to properties on the opposite side to the main. Conduits shall be as follows:

Neighbourhood and Hill Slope Residential Precincts – 1 x 100mm diameter conduit for every second lot;

Mixed Housing Precinct – 1 x 100mm diameter conduit for each lot.

Conduits shall be installed in accordance with Council's standard drawings and at an alternate position to power and/or telecommunication services.

Kerb markers shall be placed in accordance with Council's standard drawings. 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. Community title schemes shall be provided with a single service to the boundary of the property. All internal works will be privately owned and the responsibility of the body corporate.

Water meters shall be installed by the developer prior to survey plan release. The water agency will advise the type and supplier of the approved water meters. Meters shall be installed in accordance with Council's standard drawings SCW-350, SCW-355, SCW-360.

s) Pt 1 – 4.10.4 Clearance from Structures

Replace WSAA requirement with:
Other structures deemed satisfactory to be constructed over or adjacent to Council's water supply must be designed and constructed to protect the infrastructure from physical damage and to allow Council access when necessary.

t) Pt 1 – 5.4.2 Pipe Cover
Add to WSAA requirement:
Where site works either reduce the depth of cover below the minimum, or increase the depth of cover to invert above 1.5 metres, the water main shall be re-laid to maintain the required depth.
u) Pt 1 5.5.1 Geotechnical Considerations – General

Add to WSAA requirement:
Considerations to include the existence of acid sulphate soils (ASS) and possible acid sulphate soils (PASS). Refer to Vol. 4, 2.1.3 Code for Assessment and Management of Acid Sulfate Soils.

v) Pt 1 – 6.1.4 Installation

Replace WSAA Standard Drawings WAT– 1301, WAT – 1304 and WAT – 1309 with Council's Standard Drawings SCW 320, SCW 365 and SCW 330.

w) Pt 1 – 6.2.1.1 Stop Valves – General

Replace first paragraph of WSAA requirement:
When extending an existing water main, a stop valve may only be installed at the junction of the existing and new water mains if approved by the Water Agency.

x) Pt 1 – 6.2.3 Stop Valves for Reticulation Mains

Add to WSAA requirement:
Stop valves are required on each side of all mains crossing railway reserves, major roads and on mains traversing easements.

Valves shall be resilient seated, coated, o-ring stem sealed, anticlockwise closing class 16 and conforming to AS2638. The wedge shall be totally encapsulated in an approved synthetic rubber conforming to AS1646. The body shall be internally and externally coated with fusion bonded epoxy (FBE) or a thermoplastic polyamide such as Rilson Nylon 11. Valves shall be installed in accordance with SCW 320 and WAT 1207.

y) Pt 1 – 6.2.5 1 Stop Valves – Location and Arrangements – General

Add to WSAA requirement:
Stop valve locations shall be in accordance with Arrangement 1.

Zone valves shall be in accordance with Arrangement 3(b).

aa) Pt 1 – 6.3.2 Pressure Reducing Valves (PRVs)

Add to WSAA requirement:
PRVs shall be designed in accordance with Council's Standard Drawing SCW 330.

ab) Pt 1 - 6.4.1 Air Valves – Installation Design Criteria

Replace WSAA Standard Drawing WAT – 1302 with Council's Standard Drawings SCW 320 and SCW 325.

ac) Pt 1 – 6.7 Swabbing Points

Add to WSAA requirement:
Swabbing points will generally only be required on large diameter or lengthy transfer mains. The Water Agency will advise any requirements on a case by case basis.

ad) Pt 1 – 6.8 Hydrants

Add to WSAA requirement
Hydrants shall be installed as follows:
• Location – opposite common boundaries, generally installed at crests or sags and end of mains.

• Spacing – maximum 80 metres

• Orientation – spring hydrants shall be oriented with bolts parallel to the water main

• Hydrants comply with AS3952-1991 for DN80 spring hydrants and shall be fusion bonded epoxy (FBE) or thermoplastic polyamide (Rilsan Nylon 11) coated. All fasteners are to be 316 stainless steel.

ae) Pt 1 6.8.8 Hydrant Locations

Replace WSAA Standard Drawings WAT – 1300 with Council's Standard Drawing SCW 365.

Replace WSAA Standard Drawing WAT 1301 with Council's Standard Drawing SCW 320.

Replace WSAA Standard Drawing WAT 1302 with Council's Standard Drawings SCW 320, SCW 325.

af) Pt 1 7.2.2 (d) Composition of Design Drawings
Longitudinal sections are to be prepared for water mains 250mm diameter or larger.

Add to WSAA:
(e) Ensure all revision amendments are clouded.

3.1.2.3 Part 2 - Products and Materials

a) Pt 2 – 8.4 Product Standards and Specifications.

Add to WSAA requirement:
The following materials are approved for use in the construction of water reticulation and trunk main systems.

Diameter	Function	Material					
Material Description		Copper	PVC-O	PE	DICL	MSCL	PVC-M
WSAA Purchase Specification		AS3500	PS-210	PS-207	PS-234	PS-203	PS-209
DN-20 – DN50	Water Service	Approved	N/A	PE100B PN16	N/A	N/A	N/A
DN50 – DN100	Water Service	Approved	N/A	N/A	N/A	N/A	N/A
DN63	Water Main Cul de sac only	N/A	N/A	PE100B PN16	N/A	N/A	N/A
DN100 – DN150	Water Main	N/A	PN16 SN 10	N/A	PN35	N/A	PN16 SN 10
DN200 – DN300	Water Main	N/A	N/A	N/A	PN35	N/A	N/A
DN375 – DN750	Water Main	N/A	N/A	N/A	PN35	Note 1	N/A

DELETED

3.1.2.4 Part 3: Construction

a) Pt 3 – 10.2 Personnel Qualifications

Add to WSAA:
Pipe layers shall be accredited by the pipe manufacturer.

b) Pt 3 – 11.5.4 2 Traffic Management

Replace WSAA requirement with:

A traffic management plan shall be prepared for all projects.

c) Pt 3 – 15.1.4 Laying

Replace WSAA Standard Drawing WAT – 1101 with Council's Standard Drawing SCW 380.

d) Pt 3 – 15.2.3 Bending Pipe

Replace WSAA requirement with:
Cold bending of PE pipe to manufactures specifications is permitted. Cold bending of all other pipes is not permissible.

e) Pt 3 – 15.5 Thrust and Anchor Blocks and Restrained Joints

Delete WSAA Standard Drawing WAT– 1206.

Add Council's Standard Drawing SCW 310.

Add to WSAA:
Hydrant tees are to be restrained in accordance with socketed valve restraint standard. Refer WAT - 1207.

f) Pt3 – 15.6 Property Services and Water Meters

Replace WSAA Standard Drawings WAT– 1106 to WAT – 1109 inclusive with Council's Standard Drawings SCW 350, SCW 355 and SCW 360.

g) Pt3 – 15.11.1 Installation.

Replace WSAA Standard Drawings WAT-1301 to WAT – 1306 with Council's Standard Drawings SCW 320 and SCW 325.

h) Pt3 – 15.11.2 Valve Chambers for Large Diameter Mains

Replace WSAA Standard Drawings WAT – 1308 and WAT – 1309 with Council's Standard Drawing SCW 330.

i) Pt3 – 15.16 Location Markers

Replace WSAA Standard Drawing WAT – 1300 with Council's Standard Drawing SCW

365.

j) Pt 3 – 22 Connections to Existing Water Mains

Replace WSAA requirement with:
All works that may involve connection to or modifications of the existing water supply system shall be undertaken by the Water Agency at the applicant's expense. Water mains are considered to be live once accepted 'on maintenance' by the Water Agency.

No person, other than authorised Water Agency employees, shall operate any existing valve or draw water from any existing main without the authority of the Water Agency.

3.1.3 Specifications

All relevant details are applied under Water Services Association of Australia (WSAA) National Code.

3.1.4 Standard Drawings

WSAA Drawing Numbers		Remarks
All		The Water supply Code of Australia WSA 03 drawings detail a number of infrastructure options and arrangements. A number of these options are not compatible with current Council practice. The acceptance, modification or deletion of the WSAA drawings is set out below.
WAT-1100	Not adopted	Use SCW 385 – drawing under development
WAT-1101	Not adopted	Use SCW 380 – drawing under development
WAT-1102	Adopted	Valve to be directly off tee
WAT-1103	Adopted	Valve to be directly off tee
WAT-1104	Adopted	1.) 63 OD PE water mains in cul de sac heads only. 2.) 63 OD PE water mains to be looped using entire head of cul de sac.
WAT-1105	Adopted	
WAT-1106	Not adopted	Use SCW 350, MWD 355 and SCW 360.
WAT-1107	Not adopted	Use SCW 355
WAT-1108	Not adopted	Use SCW 360
WAT-1109	adopted	
WAT-1200	Adopted	
WAT 1201	Adopted	
WAT-1202	Adopted	
WAT-1203	Adopted	
WAT-1204	Adopted	
WAT-1205	Adopted	
WAT-1206	Not Adopted	
WAT-1207	Adopted	Hydrant tees are to be restrained in accordance with socketed valve restraints.
WAT-1208	Adopted	
WAT-1209	Adopted	
WSAA Drawing Numbers		**Remarks**
WAT-1210	Adopted	
WAT-1211	Adopted	
WAT-1212	Adopted	
WAT-1213	Adopted	
WAT-1214	Adopted	
WAT-1300	Not adopted	Use SCW 365
WAT-1301	Not adopted	Use SCW 320
WAT-1302	Not adopted	Use SCW 320 & SCW 325
WAT-1303	Not adopted	Use SCW 320 & SCW 325
AT-1304	Not adopted	Use SCW 320 & SCW 325
WAT-1305	Not adopted	Use SCW 320 & SCW 325
WAT-1306	Not adopted	Use SCW 320 & SCW 325
WAT-1307	Adopted	
WAT-1308	Not adopted	
WAT-1309	Not adopted	Use SCW 330
WAT-1310	Adopted	
WAT-1311	Adopted	
WAT-1312	Adopted	
WAT-1313	Adopted	
WAT-1400	Adopted	

WAT-1401	Adopted	
WAT-1402	Adopted	
WAT-1403	Adopted	
WAT-1404	Adopted	
WAT-1405	Adopted	
WAT-1406	Adopted	
WAT-1407	Adopted	
WAT-1408	Adopted	
WAT-1409	Not adopted	
Public Utilities – Typical Service Corridors and Alignments		Remarks
SEQ-R-100		Public utilities in Verges, Service Corridors & Alignments
SEQ R-101		Public Utilities – Typical Service Conduit Sections

3.2 Sewerage

3.2.1 Relevant Code Requirements

This section relates to acceptable measures A1.1(a), (b) and (c) and A1.2 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of a reticulated sewerage system

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

All on-site sewerage systems require relevant approval from Council. All applications are to comply with the Plumbing and Drainage Act (2002), Standard Plumbing and Drainage Regulation (2003), Australian New Zealand Standard-on-site domestic-wastewater management (AS/NZS 1547:2000), and Queensland Plumbing and Wastewater Code (Department of Infrastructure and Planning).

3.2.2 Standards

The key standards applied to water supply and sewerage reticulation is the Water Services Association of Australia (WSAA) National Codes. Council has applied supplementary details applicable to specific conditions outlined in the policy.

3.2.3 Design & Construction of Reticulated Sewerage

This policy shall be read in conjunction with, and take precedence over, the WSAA Sewerage Code of Australia – WSA 02-2002 to define the technical requirements of Council and the 'Water Agency' in relation to the planning, design and construction of reticulated sewerage systems.

Council generally does not support the construction of buildings over sewers.

3.2.3.1 Part 1: Planning and Design

a) Pt 1 – 1.4.2 Objectives of the Sewerage System

Add to WSAA requirement:

Sewerage system provisions to include:

• Extension of sewers to upstream property boundaries of development sites.
• Sewage pumping stations will not be approved where a reticulated gravity system could be provided.

b) Pt 1 – 2.3 – Planning Parameters

Replace WSAA loading rates with:
Average daily loading shall be determined by the product of the estimated EP draining to the point of design interest and the loading rate in L/EP/day. The equivalent population and loading rates shall be determined in accordance with the Maroochy Plan Planning Scheme Policy DC1, Tables 2(a) and Table 2(b).

c) Pt 1 – 3.2.2 – Traditional design Flow Estimation Method

Replace WSAA requirement with:

Design flows shall be determined in accordance with Council's Level of Service Impact Assessment Specification. .

d) Pt 1 – 4 – Detail Design

Add to WSAA requirement:
The minimum pipe size for sewer reticulation shall be 150mm diameter.

e) Pt 1 – 4.2.3 – Sewer Layout

Add to the WSAA requirement:

Where practicable all sewers are to be located as shown in the following table:

Table - Preferred Sewer Alignments

Location	Alignment
Roadway	On application
Footpath	On application – not usually favoured, except for commercial areas
Private Properties (side boundaries)	1.0 metre
Private Properties (rear and front boundaries)	1.5 metres

Alignment

Alignment

Sewers in lots with zero lot boundaries shall be located at the front of lots where possible.
Sewers in industrial precincts are to be located at the front of lots where possible. Sewers in commercial precincts should be located within the road reserve, where possible. Sewers are to be constructed to serve the entire area of each lot within the development site and are to be extended to the boundaries of the site to serve existing lots and potential development sites upstream.

Wherever possible, sewerage manholes shall be located on the high side of allotments.

In flat areas, sewers are to be designed to serve properties on both sides of the sewer.

Where sewers are located in road reserves, they shall be located on the opposite side to watermains, electricity and communications cables.

Sewers shall be constructed to serve the entire area of the allotment using a fall of 1:60 for the internal allotment drains allowing 300mm cover to top of pipe at head of drain.

Sewers shall be designed to follow the natural grade of the land.

f) Pt 1 – 4.2.5 – Easements

Add to WSAA requirement:
All sewers located within private property shall be contained within a minimum 3 metres wide easement. Sewers in excess of 3 metres deep shall be contained within a minimum 4 metre wide easement. Unless otherwise agreed with the Water Agency, sewers shall be located centrally in the easement.

g) Pt 1 – 4.3.4 – Public and Private Property

Add to WSAA requirement:
Maintenance structures on private property shall generally be 1.0 metre from side boundaries and 1.5 metres from front and rear boundaries and be a minimum of 0.5 metres clear of the property boundary.

Landscape planting within 1.5 metres of Council sewer infrastructure or within a sewer easement shall be low growing when mature and be suitable approved varieties.

h) Pt 1 – 4.3.5 – Changes in Direction Using a Maintenance Hole

Replace WSAA requirement with:

The maximum change in direction at a maintenance hole shall be 90 degrees unless otherwise approved by the Water Agency.

i) Pt 1 – 4.3.7 – Horizontal Curves in Sewers

Replace WSAA requirement with:

Horizontal curves in sewers are not permitted.

j) Pt 1 – 4.3.8 – End of Lines (NEW)

Replace WSAA requirement with:

Sewers are to be designed to terminate at a MH or TMH, except for branch lines less than 15 metres in length that serve no more than one lot.

k) Pt 1 – 4.4.4 – Clearance from Structures

Replace WSAA requirement with:
Buildings must provide at least 1.5 metres from the outermost projection of the structure to the nearest edge of any existing or proposed infrastructure.

Other structures deemed satisfactory to be constructed over or adjacent to Council's sewerage infrastructure must be designed and installed to protect the infrastructure from physical damage and to allow Council access when necessary.

Proposals to construct within 1.5 metres of infrastructure – 150mm diameter or less:

The Water Agency's consent is required to construct within 1.5 metres of water supply or sewerage infrastructure and will only be considered where it is demonstrated that clauses 1 or 2 below cannot be achieved:

1. The building or other structure is redesigned, or relocated to provide a minimum 1.5 metre horizontal clearance from the existing infrastructure to the outermost projection of the proposed structure.

Or

2. Existing infrastructure is relocated, with the approval of the Water Agency, to provide a minimum 1.5 metres horizontal clearance from the outermost projection of the proposed building or other structure.

Where it is demonstrated that clauses 1 and 2 cannot be achieved, the Water Agency may consider giving consent to construct within 1.5 metres of the infrastructure subject to any or all of the following requirements:

• Submission of a structural footing design prepared and certified by a registered professional engineer, demonstrating that the building or other structure does not impose any load on the infrastructure.

• Any footings of the building or structure which are within the zone of influence of the infrastructure are to extend below Line B (refer Figure 1) either with piers or a continuous footing located a minimum horizontal distance of 1.0 metre clear of the pipe.

• Replacement of the existing pipe work with DICL or an approved PVC-U pipe material to ensure a future life in excess of 50 years.

• Design of the building or structure to permit its easy removal for access to the Water Agency's infrastructure if required.

• A pre and post construction video inspection of the affected sewerage infrastructure.

• Lodgement of a security bond, as determined by Council under bonding requirements, to cover potential damage to the infrastructure as a result of the proposed building works.

• Construction of a maintenance hole immediately upstream and/or downstream of the structure.

• Completion of a Deed of Indemnity, by the property owner/s, legally indemnifying Council against any future structural failure, repair or reinstatement works.

• Payment of the prescribed application fee.

Proposals to construct within 1.5 metres of infrastructure larger than 150mm diameter:

For infrastructure larger than 150mm diameter, building within 1.5 metres of infrastructure is not permitted. The infrastructure is to be relocated or the building designed to provide a minimum 1.5 metre horizontal clearance from the outermost projection of the structure to the nearest edge of the pipe.

Proposals to construct 1.5 metres or greater from infrastructure:

The foundations of any structure, located 1.5 metres or a greater horizontal distance from water supply or sewerage infrastructure, but within Zone B (refer Figure 1) are to extend below Line B either with piers or a continuous footing.

There are no requirements for structures outside the zone of influence.

The following structures do not require consent from the Water Agency, however the design considerations of this policy still apply:

• Any structure located 1.5 metres, or greater horizontal distance, from water supply or sewerage infrastructure
• Any demountable fence
• Masonry fences up to 1.8 metres high, located on boundaries and constructed parallel to the sewer with a minimum horizontal distance from the fence foundation of 1.0 metre clear of the pipe;
• Retaining walls less than 1.0m high
• A single demountable lightweight garden shed with wall lengths of less than 3.0 metres, with lightweight roof and concrete floor no greater than 100mm thick. The shed shall be easily removable from the concrete pad.

Other Considerations

Where masonry fences greater than 1.0 metre high cross a sewer the fence shall be self supporting for a minimum of 1.0 metre either side of the sewer main.

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 holes or fittings shall be adjusted as required.

Council generally does not support the construction of buildings over sewers.

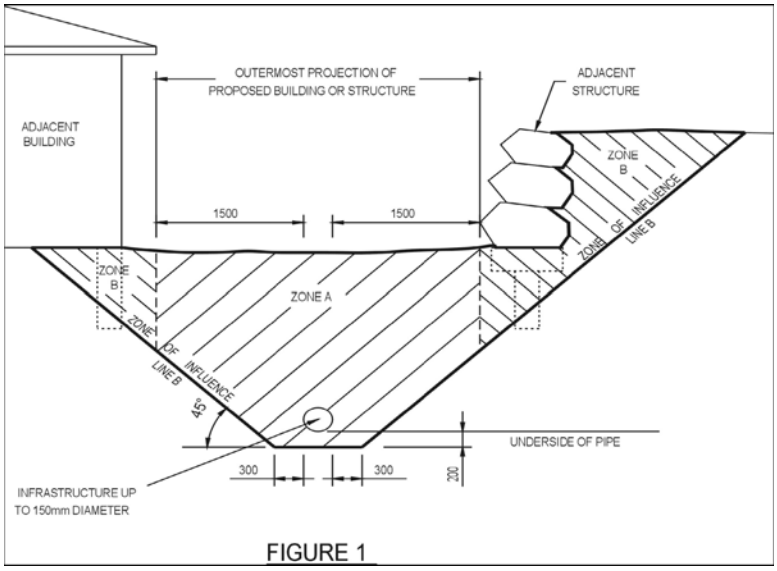


FIGURE 1

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 2.0m x 2.0m maintained around the sewer connection;
• A minimum horizontal clearance of 1.0m 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.

l) Pt 1 – 4.4.5 – Underground Structures and Services

Add to WSAA requirement:
Sewerage mains crossing stormwater culverts or pipes in excess of 225mm diameter are to be laid or replaced with PVC-U class 12 pipe for the full extent of the crossing plus 1.5 metres either side. Spigot ends of the class 12 pipe are to be chamfered to provide a smooth transition of flows.

A minimum horizontal separation of 1.0 metre shall be maintained between stormwater pipes greater than 225mm diameter, and any sewerage and water supply pipes.

Stormwater infiltration and filtration devices, and soakage trenches shall be located to provide a minimum 1.5 metres horizontal clearance to any sewerage infrastructure.

m) Pt 1 – 4.5.3 – Minimum Air Space for Ventilation

Replace WSAA requirement with:
Minimum air space in sewer mains shall be in accordance with Council's Level of Service Impact Assessment Specification.

n) Pt 1 – 4.5.7 – Minimum Grades for Self Cleansing

Replace WSAA table 4.6 with:

Minimum grades for reticulation sewers shall be as shown in the following table:

Diameter Minimum Grade

Diameter	Minimum Grade
150mm (up to 2 lots)	1 in 80
150mm (3 – 5 lots)	1 in 100
150mm general (6 or more lots)	1 in 150
225mm	See WSA02 Table 4.6
300mm	See WSA02 Table 4.6

Sewers shall not be upsized to take advantage of flatter grades.

o) Pt 1 – 4.5.8 – Minimum Grades for Slime Control

Add to WSAA requirement:
Unless otherwise agreed with the Water Agency, the minimum grade of sewerage mains of 300 mm diameter and greater shall ensure that a slime stripping velocity is achieved.

p) Pt 1 – 4.6.1 – Vertical Alignment of Sewers - General

Add to WSAA requirement:
Sewers shall not be in excess of 5.0 metres deep.

Junctions in excess of 3.0 metres in depth shall by 'Sugden' type.

q) Pt 1 – 4.6.2 – Long Section Design Plan

Replace first paragraph of WSAA requirement with:

Vertical alignments of sewers shall be shown on the longitudinal section of the design drawings.

r) Pt 1 – 4.6.3 – Minimum Cover Over Sewers

Add to WSAA requirement:
Additional sewer depth may be required in lots and footpaths where future access driveways could be constructed. In exceptional circumstances, a minimum 0.6 metres pipe cover may be approved in road reserves subject to construction in DICL or PVC-U Class 18 pipe from maintenance hole to maintenance hole.

s) Pt 1 – 4.6.4 – Lot Servicing Requirements

Add to WSAA requirement:
Where development is proposed on allotments currently serviced by combined house drainage systems, the applicant will be responsible to upgrade the system to current sewerage standards. This responsibility may extend to any affected adjacent properties.

The use of private sewage pump stations is not acceptable for any proposed development within Council's sewerage headworks planning areas.

t) Pt 1 – 4.6.5.4 –Depth of Connection Point
Replace part (b) and (d) of WSAA requirement with:

Sewer connections shall not be in excess of 1.5 metres deep. Replace WSAA Standard Drawing SEW– 1109 with Council's Standard Drawings SCW 125 and SCW 130.

u) Pt 1 – 4.6.7 – Vertical Curves

Replace WSAA requirement with:
Vertical curves are not permitted.

v) Pt 1 – 4.6.8 – Compound Curves

Replace WSAA requirement with:
Compound curves are not permitted.

w) PT 1 – 5.2 – Limitations of Connection to Sewers

WSAA Standard Drawings SEW – 1409 to SEW – 1411 inclusive are not adopted by Council.

x) Pt 1 – 5.3.1 – Methods of Property

Connection – General

Replace WSAA requirement with:
House drainage connections shall comply with Council's Standard Drawings and approved WSAA Standard Drawing.

Replace WSAA Standard Drawing SEW– 1107 with Council's Standard Drawings SCW 125 and SCW 130.

y) Pt 1 – 5.6 – Location of Connection Points

Add to WSAA requirement:
Connection points shall be located clear of driveways and a minimum of 1.0 metre inside the property boundary and otherwise in compliance with WSA02 Section 5.6.

For battleaxe allotments, where the sewer house connection lies within the access strip, sanitary house drainage is to be extended from the provided inspection opening along the access strip, at a minimum grade of 1 in 60, to a point 1.0 metre inside the main body of the lot prior to construction of the driveway.

z) Pt 1 – 5.7 – Y – Property Connections
Replace WSAA requirement with: Property connections shall be in accordance with Council's Standard Drawing SCW 125.

aa) Pt 1 – 5.8 – Length of Property Connection Sewers

Replace WSAA requirement with:
The maximum length of a house connection, measured from the reticulation sewer to the boundary of the property to be served, shall be 5.0 metres

ab) Pt 1 – 6.1 - Types of Maintenance Structures
WSAA Standard Drawings SEW – 1307 and SEW – 1315 are not adopted by Council

1 – 6.3.2

Replace WSAA requirement with:
For reticulation sewers, the maximum distance between any two consecutive maintenance structures shall be 90 metres, subject to the provisions of Clause 6.3.1. Plastic maintenance structures shall not be used at junctions of mains.

ac) Pt 1 – 6.5 - Special Considerations for Connection of New Sewers to Existing Sewers
WSAA standard Drawing SEW – 1502 is not adopted by Council.
Where pressure sewers discharge to a gravity system, the receiving structure shall be a plastic maintenance hole or approved alternative. Connection to the Council sewer system shall be by gravity only to a maintenance hole with an approved H2S gas inhibiting product. The two maintenance holes immediately downstream and one immediately upstream also be treated with an approved H2S gas inhibiting product.

ad) Pt 1 – 6.6.2 – Types of MH Construction

WSAA Standard Drawing SEW – 1307 is not adopted by Council.

ae) Pt 1 – 6.6.8 – Ladders, Step Irons and Landings

Replace WSAA requirement with:
Fixed internal access arrangements are not required in maintenance holes servicing sewers. Stainless steel safety bars and landings shall be provided in maintenance holes servicing sewers of 400mm diameter and greater.

af) Pt 1 – 6.6.9 – MH Covers

Add to WSAA requirement:
Bolt down metal access covers (water tight type) shall be specified on MH's located:

On all MH covers below the 1: 100 ARI flood level;
On all MH covers on sewers of 450mm diameter or greater;
On all MH covers within roadways;
On all MH covers designated by the Water Agency.

ag) Pt 1 – 7.2 – Boundary Traps

Replace WSAA requirement with:
Boundary traps are not required.

ah) Pt 1 – 7.3 – Gas Check MHs

Replace WSAA requirement with:
Gas check MHs are not required.

ai) Pt 1 – 7.9.2 Design Parameters for Emergency relief Structures (ERS).

Replace WSAA Standard Drawing SEW – 1412 with Council's Standard Drawing SCW 135.

aj) Pt 1 – 8 – Structural Design

Add to WSAA requirement:
Concrete encasement of sewerage mains is not permitted.

ak) (Part 1, Section 9.2.1) General

Add to WSAA requirement:
Design Drawings are to include:

Signed checking certification from an RPEQ.

al) (Part 1, Section 9.2.3) Sewers (Plans)

Add to WSAA requirement:

Design Drawings are to include:
- Clouding of all revision amendments;
- Clearly defined stage boundaries;
- Kerb and channel location;
- Proposed sewerage easements drawn;
- Where removal of trees is contemplated this shall be shown on plans;
- Size and location of other services located within 1.5 metres of sewerage infrastructure. Dimensioned clearances of services to the sewer main to be included;
- Finished surface level contours at intervals not greater than 0.5m;
- Existing surface spot levels at corners of proposed allotments;
- 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.

am) (Part 1, Section 9.2.4) Structures

Add to WSAA requirement:
Design Drawings are to include:

Structures are to be referenced to GDA mapping co-ordinates.

an) (Part 1, Section 9.2.5) Longitudinal Sections

Add to WSAA requirement:

Ensure all revision amendments are clouded;
- Cut and fill notated;
- Natural surface and proposed finished surface levels;
- Bedding and sewer foundation details;
- Pipe size, class and material;
- Existing and proposed services crossing the sewer main. Size, material and levels of these services to be included;
- 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.

ao) (Part 1, Section 9.2.6) Title Block Notation and Standard Notes

Add to WSAA requirement:
- Estate name (if known)
- Council Development Application number (if available)
- Drawing number and revision number.

ap) (Part 1, Section 9.3) Drafting Standards

Diameter	Function	Material								
Material Description		PVC-U	VC	GRP	CONCRETE PVC lined	ABS	PP	PE (note 6)	PVC-0	DICL **(Note 6, 8)**
WSAA Purchase Specification (note 9)		PS-230	PS-231	PS-232	-	PS-238	-	PS-207	PS-210	PS-234
Applicable Notes		1, 2,3,4	1,4	1,4,5	1,4	1,4,5	1,4	1,5	1,4,6,7	1, 4,6,7
DN 100	House connection	SN6	CS 34	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DN 150	House connection	SN8	CS 34	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 150	Sewer	SN8	CS 34	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 225	Sewer	SN8	MCN 160	N/A	N/A	SN 8	N/A	SN 8	PN 16	PN 35
DN 300	Sewer	Min Class 12	MCN 120	SN 10000	N/A	SN 8	SN 10	SN 8	PN 16	PN 35
DN 375 – DN450	Sewer	N/A	MCN 95	SN 10000	N/A	SN 8	SN 10	SN 8	N/A	PN 35
DN 525	Sewer	N/A	MCN 95	SN 10000	N/A	SN 8	SN 10	SN 8	N/A	PN 35
DN 600	Sewer	N/A	MCN 95	SN 10000	CLASS 3	SN 8	SN 10	SN 8	N/A	PN 35

Notes:
1. Pipe classes specified are minima only. The designer shall confirm pipe class suitability by structural analysis.
2. Class SN 8 is acceptable for sewers up to max. 3.0m depth. Sewers in excess of 3.0m deep to be constructed from PVC-U class 12 series 1 pipework.
3. Pipe to be solid wall type, maximum 3.0m lengths.
4. Rubber ring seal only.
5. Suitable for specific uses only, as approved by the Water Agency.
6. Allowable in sewerage pressure pipeline systems.
7. Sewerage pressure pipeline fittings shall be fusion bonded polymer encapsulated ductile iron cement lined.
8. DICL pipes shall be protected against chemical attack by an approved method such as Calcium aluminate cement mortar lining
9. WSSA Product Purchase Specifications are available to down load at www.wsaa.asn.au

Add to WSAA requirement:
Drawings are to be prepared in accordance with this Policy.

3.2.3.2 Part 2 Products and Materials

a) Pt 2 – 10.4.1 Product Standards
Add to WSAA requirement:

The following materials are approved for use in the construction of sewerage systems.

3.2.3.3 Part 3: Construction

a) Pt 3 – 12.2 Personnel Qualifications

Add to WSAA:
Pipe layers shall be accredited by the pipe manufacturer.

b) Pt 3 – 13.5.4.2 – Traffic Management

Replace WSAA requirement with:
A traffic management plan shall be prepared for all projects.

c) Pt 3 – 17.1.4 Laying

WSAA Standard Drawing SEW – 1103 is not adopted by Council.

d) Pt 3 – 17.7 Property Connection Sewers

Replace WSAA Standard Drawing SEW 1109 with Council's Standard Drawings SCW 125 and SCW 130.

e) Pt 3 – 17.8 – Dead Ends

Replace WSAA Standard Drawing SEW – 1109 with Council's Standard Drawings SCW 125 and SCW 130.

f) Pt 3 – 17.9 – Marking of Property Connection Sewers and Dead Ends

Replace WSAA Standard Drawings with Council's Standard Drawings SCW 130 and SCW 125.

g) Pt 3 –17.12 – Bored Pipes Under Roads, Driveways and Elsewhere

h) Pt 3 -18.1 – Maintenance Holes (MHs) - General

WSAA Standard Drawing SEW 1307 is not adopted by Council.

WSAA Standard Drawing SEW – 1400 is not adopted by Council.

i) Pt 3 - 19.1 – Maintenance Shafts (MS and TMS) and Inspection Openings (IO) – General.
Replace WSAA referenced standard drawings with SCW 160, SCW 125, SCW 130, SEW - 1314, SEW - 1316 and SEW – 1317.

j) Pt 3 - 19.2 – Sealing Caps

Replace WSAA Standard Drawing SEW – 1106 with Council's Standard Drawing SCW 125 and SCW130.

k) Pt 3 – 19.3 - Covers

Replace WSAA Standard Drawings SEW – 1106 and SEW – 1109 with Council's Standard Drawings SCW 125 and SCW 130.

l) Pt 3 – 20.6 – Concrete Embedment and Encasement

WSAA Standard Drawing SEW – 1400 is not adopted by Council.

m) Pt 3 – 22.4 – Air Pressure and Vacuum Testing of Sewers

Add to WSAA requirement:
Vacuum testing shall be undertaken on all sewers and maintenance holes.

n) Pt 3 – 22.6 – Deflection (Ovality) Testing of Flexible Sewers

Add to WSAA requirement:
Deflection testing shall be undertaken on all flexible sewers.

o) Pt 3 – 22.6.3 – Flexible Sewers

Replace with 22.6.4

p) Pt 3 – 22.7 – CCTV Inspection

Add to WSAA requirement:
CCTV inspection shall be undertaken on all sewers prior to 'on' and 'off' maintenance inspections.

q) Pt 3 – 24 – Connection to Existing Sewers

Replace WSAA requirement with:
All works that may involve connection to or modification of the existing sewerage system are known as 'live sewer works'.

Typical works include:
- new connections to existing maintenance holes, and sewers;
- connection of a new maintenance hole over an existing sewer or dead end;
- extension or relaying existing sewers;
- replacement of sewers;
- raising or lowering of existing maintenance holes;
- other works on existing sewers and maintenance holes.

'Live sewer works' shall be clearly identified on the drawings. All 'live sewer works' shall be undertaken by the Water Agency at the applicant's expense. Sewer mains are considered to be live once accepted 'on maintenance' by the Water Agency.

p) Pt 3 – 27 – Excavation or Filling over Existing Sewers
Where Water Agency approval is granted to alter the existing ground surface level over an existing sewer:

• house connections on the sewer are to be altered to the minimum depth capable of draining the entire property;
• maintenance holes affected by the works are to be altered as required.

3.2.3.4 Specifications

All relevant details are applied under Water Services Association of Australia (WSAA) National Code.

3.2.3.5 Standard Drawings

Table – standard Drawings

wsAA Drawing umbers		Remarks The Sewerage Code of Australia WSA Standard Drawings detail various infrastructure options and arrangements. A number of these options are not compatible with current MSC practice. The acceptance, modification or deletion of the WSA drawings is set out below.
SEW-1100	Not Adopted	Drawing under development
SEW-1101	Adopted	
SEW-1102	Not Adopted	
SEW-1103	Not Adopted	
SEW-1104	Not Adopted	Use SCW 125
SEW-1105	Not Adopted	Use SCW 160 - Drawing under development
SEW-1106	Not Adopted	Use SCW 125, SCW 130
SEW-1107	Not Adopted	Use SCW 125, SCW 130
SEW-1108	Not Adopted	Use SCW 125
SEW-1109	Not Adopted	Use SCW 125 and SCW130
SEW-1200	Adopted	
SEW-1201	Adopted	
SEW-1202	Adopted	
SEW-1203	Adopted	
SEW-1204	Adopted	
SEW-1205	Adopted	
SEW-1206	Adopted	
SEW-1207	Adopted	
SEW-1208	Adopted	
SEW-1300	Adopted	
SEW-1301	Adopted	
SEW-1302	Adopted	
SEW-1303	Adopted	
SEW-1304	Adopted	
SEW-1305	Adopted	
SEW-1306	Adopted	
SEW-1307	Not Adopted	
SEW-1308	Adopted	
SEW-1309	Adopted	
SEW-1310	Adopted	
SEW-1311	Adopted	
SEW-1312	Adopted	
SEW-1313	Adopted	
SEW-1314	Adopted	
SEW-1315	Not Adopted	
SEW-1316	Adopted	
SEW-1317	Adopted	
SEW-1400	Not Adopted	

SEW-1401	Adopted	
SEW-1402	Adopted	
SEW-1403	Adopted	
SEW-1404	Adopted	
SEW-1405	Adopted	
SEW-1406	Adopted with Modification	Excluding Option 2
SEW-1407	Adopted	
SEW-1408	Adopted	
SEW-1409	Not Adopted	
SEW-1410	Not Adopted	
SEW-1411	Not Adopted	
SEW-1412	Not Adopted	Use SCW 135
SEW-1500	Adopted	
SEW-150 1	Adopted	
SEW-1502	Not Adopted	

3.2.4 Design & Construction of Sewerage Pumping Stations

Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Sewerage Pumping Station Code of Australia – WSA 04-2005 to define the technical requirements of Council and the 'Water Agency' in relation to the planning, design and construction of reticulated sewerage systems.

This code shall be read in conjunction with Council's Standard Specification "Supply and Installation of Electrical Equipment for Pumping Stations". Where discrepancies exist the Council specification shall have precedence.

Refer to Tables of Standard Drawings for relevant adopted drawings.

Part 1: Planning and Design

a) Pt 1 – 5.2.6 Landscaping

Add to WSAA requirements:
Landscaping works require an Operational Works approval

b) Pt 1 – 5.3.2 Inlet MH design

Replace WSAA requirement with:
House overflow monitoring/telemetry equipment not required

c) Pt 1 – 5.4.2 Sizing

Replace WSAA requirement with:
The wet-well diameter shall be a minimum of 2.4m

d) Pt 1 – 6.6.5 Junction Boxes

Junction Boxes are not permitted

e) Pt 1 – 6.8.1 Pump Starters and Variable Speed Drives

Autotransformers are not permitted

f) Pt 1 – 7.3.1 Power and Control Cubicle

Aluminium/zinc coated steel sheet not permitted

g) Pt 1 – 7.3.2.4 Degree of Protection

The switching mechanism component shall be rated at a degree of protection of IP42.

h) Pt 1 – 8.3.1 Pumping Control

Interlock control is not required.

i) Pt 1 – 8.3.5 Pump Starts and Interlocks

Interlock control is not required.

j) Pt 1 – 10.11.2 Discharge Manholes

Add to WSAA:
Where pressure sewers discharge to gravity system, the receiving structure shall be a plastic maintenance hole or approved alternative. Connection to the Council sewer system shall be by gravity only to a maintenance hole with an approved H2S gas inhibiting product.

The two maintenance holes immediately downstream and one immediately upstream shall also be treated with an approved H2S gas inhibiting product.

k) Pt 3 – 21.4.6 (a) Mains Requirements

Item (a) is not required.

l) Pt 3 – 21.4.8.1 Underground Cable Installation

Method (b) is the required method.

m) Pt 3 – 21.7.2 Control circuit wiring

Replace WSAA conductor requirement with:
Use flexible PVC coated tinned 30/0.65 copper conductors of minimum size 1.5mm^2 with 250 V grade insulation.

Extra low voltage devices are coloured orange.

n) Pt 3 – 21.8.2 Conduits

Hot dip galvanised saddles are not permitted.

o) Pt 3 – 36.4.2.2 Low pressure air testing

Replace WSAA requirement with:
Vacuum testing is required for gravity sewers

3.2.5 Standard Drawings

Table of Standard Drawings		Remarks
SPS-1100	Adopted	
SPS-1101	Not Adopted	Use SCW 501 & 506
SPS-1102	Not Adopted	Use SCW 501 & 506
SPS-1103	Not Adopted	Use SCW 503 & 512
SPS-1104	Adopted	
SPS-1200	Not Adopted	Use SCW 501 & 506
SPS-1201	Not Adopted	Use SCW 501 & 506
SPS-1202	Not Adopted	Use SCW 501 & 506
SPS-1203	Not Adopted	Use SCW 501 & 506
SPS-1204	Not Adopted	Use SCW 501 & 506
SPS-1205	Adopted	
SPS-1300	Not Adopted	Use SCW 503, 508 & 509
SPS-1301	Not Adopted	Use SCW502
SPS-1302	Not Adopted	Use SCW 502, 503, 507, 508 & 509
SPS-1303	Not Adopted	
SPS-1304	Not Adopted	Use SCW 503, 508 & 509
SPS-1305	Not Adopted	Use SCW 503, 512 & 515
SPS-1306	Not Adopted	Use SCW 502, 503, 505, 508 & 514
SPS-1307	Not Adopted	Use SCW 502 & 507
SPS-1308	Not Adopted	Use SCW 516 & 519
SPS-1309	Not Adopted	Use SCW 502 & 507
SPS-1310	Adopted	
SPS-1400	Adopted	
SPS-1401	Adopted	
SPS-1402	Adopted	
SPS-1403	Adopted	
SPS-1404	Not Adopted	Use SCW 135
SPS-1405	Adopted	
SPS-1500	Adopted	
SPS-1501	Adopted	
SPS-1502	Adopted	
SPS-1503	Adopted	
SPS-1504	Adopted	
SPS-1505	Not Adopted	Use SCW 505 & 511
SPS-1506	Adopted	
SPS-1507	Adopted	
SPS-1508	Adopted	
SPS-1600	Adopted	
SPS-1601	Adopted	
SPS-1602	Adopted	
SPS-1603	Adopted	
SPS-1604	Adopted	
SPS-1605	Adopted	
SPS-1606	Adopted	

3.2.6 Design & Construction of Sewerage Pumping Stations

Usage

This supplementary manual shall be read in conjunction with, and take precedence over, the WSAA Sewerage Pumping Station Code of Australia – WSA 04-2005 to define the technical requirement of Maroochy Shire Council and Maroochy Water Services (the 'Water Agency') in relation to the planning, design and construction of reticulated sewerage systems.

This code shall be read in conjunction with Council's Standard Specification "Supply and Installation of Electrical Equipment for Pumping Stations". Where discrepancies exist the Council specification shall have precedence.

Refer to Tables of Standard Drawings for relevant adopted drawings.

Part 1: Planning and Design

a) Pt 1 – 5.2.6 Landscaping

Add to WSAA requirements:

Landscaping works require an Operational Works approval

b) Pt 1 – 5.3.2 Inlet MH design

Replace WSAA requirement with:

House overflow monitoring/telemetry equipment not required

c) Pt 1 – 5.4.2 Sizing

Replace WSAA requirement with:

The wet-well diameter shall be a minimum of 2.4m

d) Pt 1 – 6.6.5 Junction Boxes

Junction Boxes are not permitted

e) Pt 1 – 6.8.1 Pump Starters and Variable Speed Drives

Autotransformers are not permitted

f) Pt 1 – 7.3.1 Power and Control Cubicle

Aluminium/zinc coated steel sheet not permitted

g) Pt 1 – 7.3.2.4 Degree of Protection

The switching mechanism component shall be rated at a degree of protection of IP42.

h) Pt 1 – 8.3.1 Pumping Control

Interlock control is not required.

i) Pt 1 – 8.3.5 Pump Starts and Interlocks

Interlock control is not required.

j) Pt 3 – 21.4.6 (a) Mains Requirements

Item (a) is not required.

k) Pt 3 – 21.4.8.1 Underground Cable Installation

Method (b) is the required method.

l) Pt 3 – 21.7.2 Control circuit wiring

Replace WSAA conductor requirement with:

Use flexible PVC coated tinned 30/0.65 copper conductors of minimum size 1.5mm2 with 250 V grade insulation.

Extra low voltage devices are coloured orange.

m) Pt 3 – 21.8.2 Conduits

Hot dip galvanised saddles are not permitted.

n) Pt 3 – 36.4.2.2 Low pressure air testing

Replace WSAA requirement with: Vacuum testing is required for gravity sewers

Table of Standard Drawings		Remarks
SPS-1100	Adopted	
SPS-1101	Not Adopted	Use MWD 501 & 506
SPS-1102	Not Adopted	Use MWD 501 & 506
SPS-1103	Not Adopted	Use MWD 503 & 512
SPS-1104	Adopted	
SPS-1200	Not Adopted	Use MWD 501 & 506
SPS-1201	Not Adopted	Use MWD 501 & 506
SPS-1202	Not Adopted	Use MWD 501 & 506
SPS-1203	Not Adopted	Use MWD 501 & 506
SPS-1204	Not Adopted	Use MWD 501 & 506
SPS-1205	Adopted	
SPS-1300	Not Adopted	Use MWD 503, 508 & 509
SPS-1301	Not Adopted	Use MWD 502
SPS-1302	Not Adopted	Use MWD 502, 503, 507, 508 & 509
SPS-1303	Not Adopted	
SPS-1304	Not Adopted	Use MWD 503, 508 & 509
SPS-1305	Not Adopted	Use MWD 503, 512 & 515
SPS-1306	Not Adopted	Use MWD 502, 503, 505, 508 & 514
SPS-1307	Not Adopted	Use MWD 502 & 507
SPS-1308	Not Adopted	Use MWD 516 & 519
SPS-1309	Not Adopted	Use MWD 502 & 507
SPS-1310	Adopted	

Table of Standard Drawings		Remarks
SPS-1400	Adopted	
SPS-1401	Adopted	
SPS-1402	Adopted	
SPS-1403	Adopted	
SPS-1404	Not Adopted	Use MWD 135
SPS-1405	Adopted	
SPS-1500	Adopted	
SPS-1501	Adopted	
SPS-1502	Adopted	
SPS-1503	Adopted	
SPS-1504	Adopted	
SPS-1505	Not Adopted	Use MWD 505 & 511
SPS-1506	Adopted	
SPS-1507	Adopted	
SPS-1508	Adopted	
SPS-1600	Adopted	
SPS-1601	Adopted	
SPS-1602	Adopted	
SPS-1603	Adopted	
SPS-1604	Adopted	
SPS-1605	Adopted	
SPS-1606	Adopted	

3.3 Street Lighting

3.3.1 Relevant Code Requirements

This section relates to acceptable measure A1 .5 for performance criterion P1 in Element 1 (Utilities) of the Code for Operational Works. It sets out standards and potential information requirements for the provision of street lighting.

3.3.2 Standards

All works are to be designed and constructed to ENERGEX standard and approval. Lighting on declared roads is to be provided in accordance with the requirements and approval of the relevant State Government Department.

The 'Manuals' are to mean the ENERGEX Public Lighting Manuals i.e. 'Construction Manual' and 'Policy, Design and Equipment Manual'.

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

3.3.3 Specifications

Specifications applicable in accordance with Energex standard lighting requirements.

Lighting designs for roads are prepared in accordance with the Lighting Category as listed below on roads within all precincts, except Rural and Rural Residential precincts:

Lighting Category	Road Classification
V1	Motorway
V2	Urban Arterial Rural Highway Arterial Main Street
V5	Urban Controlled Distributor Rural Arterial Sub Arterial Main Street
P4	Major Collector Street Industrial Access Industrial Collector
P5	Minor Collector Access Street Access Place Laneway
In accordance with AS 1158.3.1-1999	Bikeway

In Rural Residential precincts

- street lighting is installed at intersections, curves, heads of cul de sacs and locations of potential hazard,
- streets with vehicle movements less than 2400 vpd may be lit with minor lamps,
- streets with vehicle movements greater than 2400 vpd shall be lit in accordance with the road classification in the lighting table (above).

In Rural precincts.

- intersections which have through traffic greater than 1000 vpd are lit with minor lamps,
- intersections which have through traffic greater than 3000 vpd are lit in accordance with the lighting table (above),
- street lighting is provided in accordance with the road classification and the vehicle movements per day where

  (a) the intersection is channelised,

  (b) the intersection has turn or passing lanes,

  (c) a location has a potential hazard,

  (d) a location has a high accident rate.

On roads with kerb and channel, the pole alignment is 0.7m behind the invert of the kerb (for Category P4 and P5 lighting only).

Street light poles are not located adjacent to water crossings.

Street light poles may be placed at a 1.0 metre offset from physically located conduits if no alternative layout is feasible and the access to the property is not affected.

Street light poles are placed on 0.3m alignment in the following circumstances:-

- at the property boundary of hatchet blocks with narrow road frontage, and in cul-de-sac where frontages are narrow.

When joining to existing installations, or extending subdivisional estates in stages, new lamps and brackets match, as near as possible, existing installations.

All major Lamps (as defined in Section 1 of ENERGEX's Policy, Design and Equipment Manual) are aeroscreen type.

Opal sphere lanterns are not used.

Post top and nostalgia lanterns for decorative use are used on P5 category roads (and lower).

Unless joining and conforming to existing lighting, the minimum length of outreach brackets on either a steel column or timber pole is 0.5m.

3.3.4 Standard Drawings

Standard drawings are defined under ENERGEX Public Lighting Manuals i.e. 'Construction Manual' and 'Policy, Design and Equipment Manual'.

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

3.3.5 Specific information requirements

The developer shall provide Council all required approvals and certification applicable from Energex.

4 Movement Networks

4.1 Purpose of this Section

This section is relevant to the assessment of compliance with performance criteria P1 – P8 in Element 2 (Movement Networks) of the Code for Operational Works:

Performance Criteria	Acceptable Measures
P1 Development sites are provided with external roadworks along the full extent of the frontage appropriate to the function and amenity of the road and including: **(a) paved roadway;** **(b) kerb and channel;** **(c) safe vehicular access;** **(d) safe footpaths and bikeways;** **(e) stormwater drainage; and** **(f) conduits to facilitate the provision of street lighting systems and traffic signals.**	**A1.1** Road works design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking*
P2 The reserve width, pavement, edging, street-scaping and landscaping support the intended functions and amenity of the road.	**A2.1** Road works design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P3 Road pavement surfaces: **(a) are sufficiently durable to carry wheel loads for parked and travelling vehicles;** **(b) ensure the safe passage of vehicles, pedestrians and cyclists;** **(c) ensure appropriate management of stormwater and maintenance of all weather access; and** **(d) allow for reasonable travel comfort**	**A3.1** Road pavement design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 -Operational Works.*
P4 Pavement edges control vehicle movements by delineating the carriageway.	**A4.1** Road pavement design and construction is undertaken in accordance with *Planning Scheme Policy 5 – Operational Works.*
P5 The verges and footpaths provide **(a) safe access for pedestrians clear of obstructions;** **(b) an access for vehicles onto properties;** **(c) an area for public utility services; and** **(d) provide for people with disabilities by allowing safe passage of wheel chairs and other mobility aids**	**A5.1** Verge and footpath design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P6 Bikeways provide safe and attractive cycle routes for commuter and recreational purposes	**A6.1** Bikeway design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking and Planning Scheme Policy No. DC2 Provision of Bikeways and Bicycle Facilities.*
P7 Measures intended to restrain traffic speeds and/or volumes[5]: **(a) avoid stop-start conditions;** **(b) provide for appropriate sight distances;** **(c) avoid increased vehicle emissions;** **(d) minimise unacceptable traffic noise to adjoining land uses;** **(e) maintain convenience or safety levels for cyclists and public transport; and** **(f) are integrated with landscaping and streetscape design.**	**A7.1** Speed control devices are designed and constructed in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*
P8 Constructed roads and paths must be designed to minimise environmental impact	**A8.1** Roadworks design and construction is undertaken in accordance with *Planning Scheme Policy No. 5 - Operational Works and Planning Scheme Policy No. 6 - Transport, Traffic and Parking.*

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.

5 Council will not accept the use of speed restriction techniques and devices in place of appropriate road design, in accordance with P7.

4.2 Roadworks, Design & Construction

4.2.1 Relevant Code Requirements

This section relates to acceptable measures A1.1, A2.1 and A8.1 for performance criteria P1, P2 and P8 (respectively) in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of roads.

4.2.2 Standards

4.2.2.1 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

4.2.2.2 Australian Rainfall and Runoff

4.2.2.2.1 Soil Erosion and Sediment Control for Queensland

4.2.2.2.2 EPP Water Policy

4.2.2.3 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

4.2.2.4 Queensland Urban Drainage Manual

4.2.2.5 Queensland Department of Main Roads Manuals

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

4.2.2.6 Queensland Streets

4.2.3 Specifications

4.2.3.1 Queensland Aus Spec Development

Specification List

Maroochy Shire Council have developed a regional specification in conjunction with the other following councils to develop a unified specification document:

- Maroochy Shire Council
- Noosa Shire Council
- Cooloola Shire Council
- Redcliffe Council
- Caboolture City Council
- Caloundra City Council
- Pine Rivers Shire Council

The following are sections covered under AUS-SPEC roads section, available on the Maroochy Shire Council web page.

Specification No.	Specification Title
CQS	Quality System Requirements
CQC	Quality Control Requirements
C101	General
C201	Control of Traffic
C211	Control of Erosion and Sedimentation
C212	Clearing and Grubbing
C213	Earthworks
C220	Stormwater Drainage - General
C221	Pipe Drainage
C222	Precast Box Culverts
C223	Drainage Structures
C224	Open Drains including Kerb & Gutter (Channel)
C230	Subsurface Drainage - General
C231	Subsoil and Foundation Drains
C232	Pavement Drains
C233	Drainage Mats
C241	Stabilisation
C242	Flexible Pavements
C244	Sprayed Bituminous Surfacing
C245	Asphaltic Concrete
C247	Mass Concrete Sub base
C248	Plain or Reinforced Concrete Base
C254	Segmental Paving
C255	Bituminous Microsurfacing
C261	Pavement Markings
C262	Signposting
C263	Guide Posts
C264	Non-Rigid Road Safety Barrier Systems (Public Domain)
C265	Boundary Fencing
C271	Minor Concrete Works
C273	Landscaping
C501	Bushfire Protection (Perimeter Tracks)
DQS	Quality Assurance Requirements for Design
D1	Geometric Road Design (Urban and Rural)
D2	Pavement Design
D3	Structures/Bridge Design
D4	Subsurface Drainage Design

Under some AUS SPEC specifications inclusion of Mainroads specifications have been applied.

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	

Identification Number	Title	Version	Interim Version
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
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

4.2.4 Standard Drawings

Drawing Number	Addendum	Description
MSC 00		Maroochy Shire Council Standard Drawing Index
MSC 01		Maroochy Shire Council List of Addendums
General		
MSC G-0001		Index of Standard Drawings - General
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
Tree Planting		
MSC G-0100		Tree Planting and Root Barriers
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		
MSC R-0001		Index of Standard Drawings – Road/ Street

The following drawings can be located on the MainRoads website

Guardrails			
Drawing number	**Addendum**	**Description**	
MR1338 1474		Installation of Guardrail	Steel Beam Guardrail - Installation and Setout
MR1339 1475		Installation on bridge approaches and departures	Steel Beam Guardrail - Installation on Bridge and Barrier Approaches
MR1341 1476		Installation for back to back guardrail	Steel Beam Guardrail - Terminal Components
MR1342 1477		Fabrication detail for bolts, nuts and washers	Steel Beam Guardrail - Posts and Blockouts, Soil and Bearing Plates, Slip Base Plate
MR1343 1478		Fabrication details for guardrail panels and panel components	Steel Beam Guardrail - W Beam Anchor Bracket - Delineation Unit - Post on Base Plate - Abraham Blockout

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		
MSC R-0050		Residential Driveway
IPWEAQ R-0051		Commercial Driveway Type A
IPWEAQ R-0052		Commercial Driveway Type B
MSC R-0056		Rural Driveway

Drainage		
MSC D-0001		Index of Standard Drawings – Drainage
MSC R-0001		Index of Standard Drawings – Road/ Street
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

4.2.5 Specific Information Requirements

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

Surfacing other than Bitumen for entry treatments

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.

The Maroochy Shire Council wish to avoid materials which may cause maintenance and operational work complications. It is provided 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 MSC in conjunction with the submission.

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

- Asphalt
- Stencilled Asphalt

a) Asphalt

For improved maintenance applications and long term surface management, asphalt surfacing is the preferred surfacing methods considered by Council.

b) Stencilled Asphalt

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

Other methods which are not considered as maintenance friendly methods:

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.

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.

d) 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 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/m2. At low points, the sand bedding layer for the pavers shall be drained back to the subsoil drain or the underground drainage system.

4.2.5.1 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

4.2.5.2 Signage

Signs shall be in accordance with the Manual of Uniform Traffic Control Devices.

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.

4.2.5.3 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.

4.2.5.4 Access and Driveways

Table - Access and Driveway Design Criteria

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)	25	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)	25	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, R0050 or R0056 with driveways meeting the natural surface level at the from the property boundary. The cross section of the verge should conform to Queensland Streets.

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

In addition to the other driveway location requirements of this Policy, the type, design and location of site access driveways must be consistent with the requirements of Planning Scheme Policy No. 6-Transport, Traffic and Parking.

4.2.5.5 Road Design Special Conditions

All roads within Urban and Rural Urban shall be AC sealed surfaces.

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

Carriageway crossfall for the traffic lanes on all sealed roads shall be 3% desirable grade.

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

4.3 Road Pavement Design

4.3.1 Relevant Code Requirements

This section relates to acceptable measures A3.1 and A4.1 for performance criteria P3 and P4 (respectively) in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of road pavement.

4.3.2 Specifications

Maroochy Shire Council has adopted the Regional AUS- SPEC specification series to be implemented in many cases as their key technical specification. Any adjustments shall be defined in the document. Other documents to be applied where AUS-SPEC does not satisfy the requirements of Maroochy Shire Council include the following:

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 be applied where relevant;

Bituminous Microsurfacing – MRS 11.13 (12/99)

4.3.3 Standards

Pavement Design Manual (AR&R)

Pavement Rehabilitation Manual (Mainroads)

Road Drainage Design Manual (Mainroads)

Manual of Uniform Traffic Control Devices

Guide to Pavement Markings (Mainroads)

4.3.4 Specific Information Requirements

4.3.4.1 General 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'. 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 applied 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 testing is subject to testing during construction, 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. All testing shall be in accordance with the Standard Civil Works Inspection and Testing Plan (CWITP) Section 2.5.

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.

4.3.4.2 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) – Australian Road Research Board

  Special Report No. 41 (1989) – A Structural Design Guide for Flexible Residential Street Pavements (95% Confidence Limit). (ARRB SR 41); (Figure 13.8.2(A);
- In excess of 5 x 10^5 ESA's – Queensland Department of Transport Pavement Design Manual.

For all new roads including road widening and reconstruction, pavement thickness must be determined in accordance with Fig 13.8.2(A) Austroads A Guide to the Design of New Pavement for Light Traffic or Department of Main Roads Pavement Design Manual for ESA's > 5 x 10^5 except that the minimum pavement thickness and number of design Equivalent Standard Axles (ESA's) for the various road hierarchies shall be in accordance with the table shown below:-

Street/ Road Type	No. of Lots	ESA's (2)	Min. Pav. Thickness (mm)	Min. AC thickness (mm) (6)	Min. Tot. Thickness (mm)	Min. Road Base (CBR) (4)	Min. Sub Course (CBR) (7)
Access Place/ Access Street	0-75	5 x 10^4	200	30	230	60	45
Collector Street	76-300	3.0 x 10^5	250	30	280	60	45
Trunk Collector	301-1000	2.0 x 10^6	250	30(1)	280	80	45
Industrial Access	120 or 12ha max	1.5 x 10^6	250	45(1)	295	80	45
Industrial Collector	300 or 30ha max	3.3 x 10^6	300	45(1)	345	80	45
Arterial	Use the Department of Main Roads Pavement Design Manual to determine design traffic ESA's and pavement structure. As a minimum, pavement thickness must be 300mm with a 45mm asphalt wearing surface.						
Major Arterial							

Notes:

1. 10mm primer seal required (assume thickness 5mm);
2. ESA's calculated in accordance with ARRB Special Report 41 AND AUSTROADS pavement design manual;
3. For staged development where construction traffic associated with subsequent stages will use pavements constructed in preceding stages, the design traffic loading must be increased to take account of that construction traffic.
4. Minimum base thickness to be 125mm Type 2.1 material for CBR 80 and 100mm Type 2.2 material for CBR60.
5. For rural roads, the road wearing surface may be reduced to a two coat bitumen seal.
6. Type of AC to be DG10 for 30 mm thickness and DG14 for 45mm
7. Upper subbase course to be a Type 2.3 material for min CBR 45.

For any relaxation to these requirements, a full mechanistic pavement design must be undertaken by a RPEQ experienced in pavement design in accordance with Austroads Pavement Design Manual. The design must address as a minimum the structural integrity and full life cycle costs, including ongoing maintenance, of the proposed pavement system.

4.3.4.3 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 = 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 Fig 13.8.2(A) Austroads DNPLT Manual.

Industrial and Commercial Developments

The 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.

4.3.4.4 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.

Design life for all granular pavement shall be 20 years.

4.3.4.5 Procedures during Construction

- 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 Planning Scheme Policy No 5 – Operational Works Section 8.4.

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.

4.3.5 Pavement Surfacing Requirements

Surfacing of all roads shall generally be with a dense graded asphalt. A bitumen chip seal (10mm aggregate) shall be used in conjunction with all asphalt surfacing.

Asphalt for subdivisional works shall be a BCC Type 2 mix (not included in MRD Standard Specifications Roads). Surfacing in suburban and rural residential, roads bounded by kerb and new subdivisions shall generally be asphalt. Asphalt 50mm thick and greater may be considered as part of the design pavement thickness. Surfacing below asphalt shall consist of 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.

4.4 Verge And Footpath Design And Construction

4.4.1 Relevant Code Requirements

This section relates to acceptable measure A5.1 for performance criterion P5 in Element 2 (Movement Networks) of the Code for Operational Works.

It sets out standards and potential information requirements for the design and construction of verges and footpaths.

4.4.2 Standards

Footpaths to be built to standard defined in MSC standard drawing.

Where the site (or part of the site) abuts a road or street subject to an approved streetscape improvement works program, frontage works are carried out in accordance with the streetscape improvement program for the full frontage of the site.

4.4.3 Specifications

Specification details defined on MSC standard drawing where applicable.

4.4.4 Standard Drawings

Footpath standard drawing outlined below is available from Maroochy Shire Council webpage:

Footpaths		
IPWEAQ R-0065	Yes	Concrete Strip Footpaths
Verge Construction		
MSC R - 0100		Public Utilities in Verges, Service Corridors and Alignments

4.4.5 Specific Information Requirements

Maroochy Shire Council advise that all operational work details shall advise of proposed footpath and bikeway details.

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 Council bikeway strategic plan.

4.5 Bikeway Design & Construction

4.5.1 Relevant Code Requirements

This section relates to acceptable measure A6.1 for performance criterion P6 in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of bikeways.

4.5.2 Standards

Bikeways to be designed and constructed in accordance with Councils Maroochy Shire Bikeways Plan Review 2003, Development Contribution Policy and AUSTROADS – Part 14 where applicable.

4.5.3 Specifications

CQS	Quality System Requirements
CQC	Quality Control. Requirements
C101	General
C211	Control of Erosion and Sedimentation
C212	Clearing and Grubbing
C213	Earthworks
C242	Flexible Pavements

4.5.4 Standard Drawings

Standard drawing outlined below is available from Maroochy Shire Council webpage:

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

4.5.5 Specific Information Requirements

Details provided in conjunction with Transport Traffic and Parking Code requirements.

4.6 Speed Control Device Design & Construction

4.6.1 Relevant Code Requirements

This section relates to acceptable measure A7.1 for performance criterion P7 in Element 2 (Movement Networks) of the Code for Operational Works. It sets out standards and potential information requirements for the design and construction of speed control devices.

4.6.2 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

4.6.3 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.

Regional AUS–SPEC available on Maroochy Shire Council web page.

4.7 Stormwater Drainage

4.7.1 Relevant Code Requirements

This section relates to Element 2 (Movement Networks) of the Code for Operational Works and Element 2 (Water Cycle Management) of the Code for Integrated Water Management. It sets out standards for the design and construction of conventional stormwater drainage systems, which typically do not address current requirements for improvements in stormwater quality. Such requirements may be met by implementing Water Sensitive Urban Design (WSUD). However, WSUD requires alternative approaches and construction methods to conventional stormwater drainage systems. The standards below relate to design and construction of conventional stormwater drainage systems, elements of which will continue to play a role in water sensitive drainage systems. Where water sensitive design elements are used within a drainage system, such elements should be designed in accordance with recognised guidelines (as outlined in Section 7 of this Policy) to provide levels of flood immunity and public safety similar to conventional systems.

4.7.2 Standards

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

- Queensland Urban Drainage Manual (QUDM);
- 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.

Inter-allotment 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 No. 4.6 - Sewer Reticulation for PVC-U pipes, and Specification No. 4.5 - Stormwater Drainage for RC and FRC pipes;
- Pipe materials are PVC-U sewer pipe minimum class SH; PVC-U drainage pipe PLASCOR or equivalent, of equivalent class to PVC-U sewer class SH; R.C. pipe class '1' rubber ring jointed; or F.R.C. pipe class 'X' rubber ring jointed;
- PVC-U 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 4.7.2 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;
- PVC-U 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.

Table 4.7.2 AS/NZ 3500.3 2003

Maximum Depth to Invert (mm)	Boxes - Internal Dimensions (mm)	FRC or RCP Systems
<600	450 x 450	600 mm diameter
>600 <900	600 x 600	900 mm diameter
>900 <1200	600 x 900	1000 mm diameter
>1200	900 x 900	1000 mm diameter
Minimum Wall Thickness	100	N/A

4.7.3 Reserves and Easements

Drainage reserves in accordance with QUDM Section 3.05 are generally required over all natural or similar stormwater flow paths traversing a development site unless specifically approved otherwise. Drainage reserves are to convey the 100 year ARI flood event with an allowance for freeboard, as outlined in QUDM Table 8.02. Easements are required for a constructed or modified waterways:

- With a catchment area of less than 5 ha in residential or commercial areas, or
- With a catchment area of less than 10 ha in industrial and rural residential areas.

Constructed waterways with larger catchment areas are to be placed within drainage reserves. In rural residential & rural areas, Council may agree to place flood prone land under a drainage easement instead of acquiring the land under a drainage reserve, as indicated in Code 8.2, Element 3.1, Part (c) of Maroochy Plan 2000.

Natural waterways are to be placed within drainage reserves. Drainage reserves are to be sized to include buffer widths required by Council's Waterways and Wetlands Code.

A drainage reserve will be required over all areas containing detention basins, gross pollutant traps, wetlands and other stormwater quality improvement devices and verges required to adequately serve or maintain these devices.

Easements in accordance with QUDM (Section 3.04) are required over all municipal drainage systems which traverse private property. All costs associated with the provision of an easement are to be borne by the applicant.

Where overland flow easements are proposed which allows for the passage of stormwater runoff or redirection of flow across the natural land surface such easements will prohibit any activities or works which may obstruct or impede the flow of stormwater runoff, unless prior approval is provided. Designs of overland flowpath must take into account future fencing that may be constructed across the easement. Any fences to be constructed across easements or along the easement boundary are to provide sufficient access for Council's maintenance or future construction, by either the provision of gates or removable sections that are wide enough to allow access. Fencing must be constructed to allow free passage of flow.

5 Public Parks Infrastructure

5.1 Relevant Code Requirements

This section is relevant to the assessment of compliance with performance criterion as defined in two (2) relevant codes defined by MSC.

a) P1 in Element 4 (Pedestrian and Cyclist facilities) of the Code for Reconfiguration of Lots:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 A network of pedestrian ways and cycle routes is provided having regard to: **(a) opportunities to link open space networks and community facilities, including public transport stops, local activity centres and schools;** **(b) likely trip purpose;** **(c) topography;** **(d) cyclist and pedestrian safety;** **(e) cost effectiveness;** **(f) likely user volumes and types; and** **(g) convenience.**	**A1.3** Internal (local) linear linkages are: (a) (i) provided in accordance with Map 1 of the Maroochy Public Parks Strategy if indicated on Map 1; or (ii) provided in suitable locations; and (b) at least 10 m wide, unless forming part of a road reserve; (c) capable of accommodating a combined walking/bicycle path; (d) connected to the local street network; (e) aligned along water courses or water bodies where relevant; (f) broken by access points at least every 100m; and (g) are capable of being maintained in accordance with Planning Scheme Policy No.5 – Operational Works.

b) P1 in Element 6 (Public Parks Infrastructure) of the Code for Reconfiguration of Lots:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 Public parks infrastructure6 is provided that: **(a) is accessible and equitably distributed in a manner appropriate to the proposed settlement or development;** **(b) contributes to the legibility and character of the development;** **(c) allows for a range of uses and activities;** **(d) is cost effective to maintain;** **(e) contributes to stormwater management, visual amenity and environmental care;** **(f) provides opportunities for rest and social interaction; and** **(g) facilitates safe connectivity between areas.**	Where land is provided: **A1.2** Preliminary works are undertaken free of cost to the Council and in accordance with *Planning Scheme Policy No. 5 - Operational Works* so that that the land is useable for its intended purpose.

This element is not relevant to the subdivision of existing or approved buildings.

Descriptions of the type of parks to be provided in the Shire are provided in Planning Scheme Policy DC5 – Public Parks Infrastructure or Infrastructure Charges Schedule for Public Parks Infrastructure.

c) P1 in Element 3 (Public Parks Infrastructure) of the Code for Operational Works:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 Parks are designed to support their intended function, amenity and recreational setting.	**A1.1** Public parks are conceptually designed to the desired standard of service as outlined in Planning Scheme Policy DC5 – Public Parks Infrastructure and designed and constructed in accordance with *Planning Scheme Policy No. 5 - Operational Works*.

[6] *Descriptions of the type of parks to be provided in the Shire are provided in Planning Scheme Policy DC5 – Public Parks Infrastructure or Infrastructure Charges Schedule.*

The following subsections set out the standards relevant to this acceptable measure, 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.

5.1.1 Standards

Refer to: Planning Scheme Policy DC5 - Public Parks Infrastructure

Maroochy Public Parks Strategy 2004

Maroochy Shire Council Parks and Open Space Landscape Standards Manual

Copies of this document are available by contacting Maroochy Shire Council's Parks, Bushland and Open Space Branch.

5.1.2 Specifications

Refer to: PM-MRS (Pacific Motorway Main Roads Specification) 11.16 Landscaping

Aus Spec C273 Landscaping

Copies of these documents are available by contacting Maroochy Shire Council's Parks and Open Space Branch

5.1.3 Standard Drawings

Standard drawings application to public parks infrastructure are as detailed in MSC document 'Landscape and Open Space Standards'.

5.1.4 Specific Information Requirements

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

Provision of additional maintenance costs as developer contributions over that defined as allowable under the Maroochy maintenance allocation. Details pertaining to the allocation of maintenance costs applied by MSC, shall be subject to the application proposed by each individual development. Evaluation shall be undertaken by MSC 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 MSC 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 performance criteria P3, P5, P6 and P7 in Element 5 (Construction Management) of the Code for Operational Works:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P3 Existing utilities, road and drainage infrastructure: • **continue to function efficiently; and** • **can be accessed by the relevant authority for maintenance purposes.**	**A3.1** Existing utilities, road and drainage infrastructure are protected and or relocated in accordance with the standards set out in Section 6.0 of Planning Scheme Policy No. 5 - Operational Works. **A3.2** The costs of any alterations or repairs are met by the applicant.
P5 Provision is made for: • **minimisation of waste material;** • **separation of recyclable material;** • **storage of waste and recyclable material;** • **collection of waste and recyclable material;** • **in a manner that minimises adverse impacts on the amenity and safety of surrounding areas.**	**A5.1** Waste minimisation, storage and servicing arrangements are made in accordance with Section 6.3 of Planning Scheme Policy No. 5 - Operational Works.
P6 Erosion and sediment control devices and techniques must prevent adverse impacts on the water quality of downstream stormwater drainage and natural systems.	**A6.1** Erosion and sediment control is undertaken in accordance with Section 6.4 of Planning Scheme Policy No. 5 - Operational Works.
P7 The integrity of assets to be delivered to Council is protected.	**A7.1** Construction is undertaken in accordance with the standards set out in Section 6.1 of Planning Scheme Policy No. 5 - Operational Works.

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.

6.1.1 Specific Information Requirements

In order to demonstrate compliance with the performance criteria or acceptable measures set out in element 5 of the Operational Works Code, Council require the preparation and submission of a 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
- Air quality
- Vibration criteria
- Control of dust;
- Waste management (through 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
- 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;

- 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.

6.2 Protection or Relocation of Existing Utilities Road & Drainage Infrastructure

6.2.1 Relevant Code Requirements

This section relates to acceptable measure A3.1 for performance criterion P3 in Element 5 (Construction Management) of the Code for Operational Works. It sets out standards and potential information requirements for the protection or relocation of existing infrastructure.

6.2.2 Standards

- Energex Standards (lighting and power)
- Individual utility protection requirements and guidelines

6.2.3 Standard Drawings

- Maroochy Water Standard Drawings
- Individual utility requirements

6.2.4 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 is disconnecting and reconnecting Public Utility Plant to individual landowners 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 24 hours 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.

6.2.4.1 Service Crossings

- Relocation of existing services shall be as defined by the utility authority.
- 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 Waste Minimisation and Storage

6.3.1 Relevant Code Requirements

This section relates to acceptable measure A5.1 for performance criterion P5 in Element 5 (Construction Management) of the Code for Operational Works. It sets out standards and potential information requirements for the waste management.

6.3.2 Standards

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

6.3.3 Waste Management Plan Template

A template is provided as a guide for the preparation of a Waste Management Plan in Planning Scheme Policy No. 10 - Preparation of Waste Management Plans.

6.3.4 Demolition, Construction and Use of Premises

The applicable sections of the table in the template for a Waste Management Plan (in Planning Scheme Policy No. 10) must be completed and submitted with applications to demolish a building or erect a building.

Completing this table will assist you to identify the type of waste that will be generated and in advising Council how you intend to reuse, recycle or dispose of the wastes generated.

If insufficient space is provided in the template please provide attachments.

6.4 Erosion and Sediment Control

6.4.1 Relevant Code Requirements

This section relates to acceptable measure A6.1 for performance criterion P6 in Element 5 (Construction Management) of the Code for Operational Works. It sets out standards and potential information requirements for the erosion and sediment control.

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P6 Erosion and sediment control devices and techniques must prevent adverse impacts on the water quality of downstream stormwater drainage and natural systems.	**A6.1** Erosion and sediment control is undertaken in accordance with Planning Scheme Policy No. 5 - Operational Works.

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

6.4.2 Standards

MSC are undertaken in accordance with specifications defined under section 6.4.3.

6.4.3 Specifications

- Regional Councils AUS-SPEC:

C211	Control of Erosion and Sedimentation

- 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

6.4.4 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

6.4.5 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 MSC 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.

6.5 Construction Standards to Maintain Integrity of Assets

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

6.5.1 Relevant Code Requirements

This section relates to acceptable measure A7.1 for performance criterion P7 in Element 5 (Construction Management) of the Code for Operational Works. It sets out standards and potential information requirements in relation to the maintenance of integrity of contributed assets.

6.5.2 Standards

Works are to be undertaken in accordance with the standards set out in sections 4 to 8 of this policy and with the procedures outlined in section 3 of this policy. Only undamaged and uncompromised assets are to be handed over to Council.

7 Integrated Water Management

7.1 Integrated Water Management

7.1.1 Introduction

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.

Maroochy 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 of stormwater runoff quality and quantity
- 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.

This section of the Planning Scheme Policy therefore provides the necessary guidance to achieve the requirements of the Integrated Water Management Code in the Maroochy Plan. It also outlines requirements necessary to demonstrate that compliance with the Code can be shown as part of the Development Application process. Figure 7.1 below identifies these elements and the management practices that may assist in achieving this

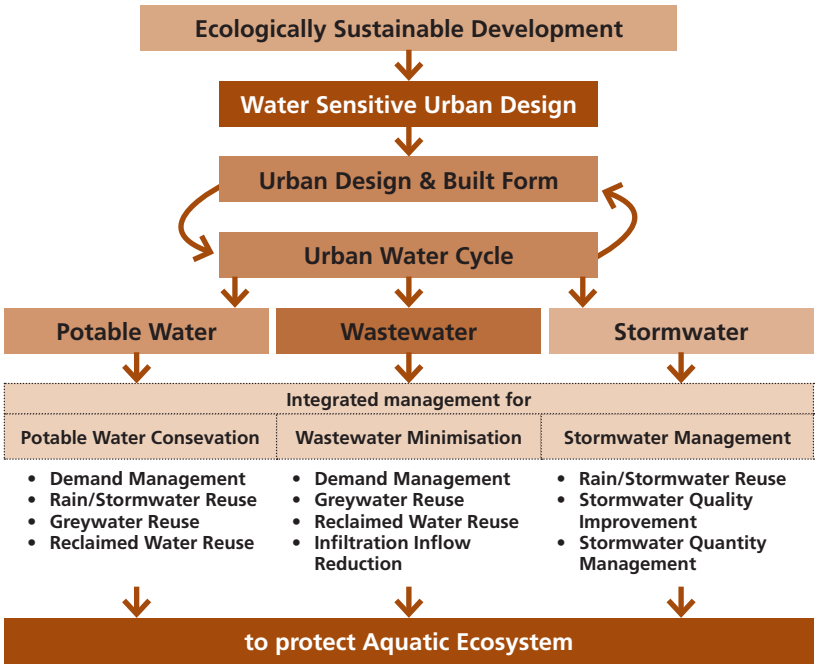


Figure 7-1 Integrated Water Management Elements and Practices (from Australian Runoff Quality, 2003)

7.1.2 Preparation of an Integrated Water Management Plan

To demonstrate that all Performance Criteria of the IWM Code have been addressed, the applicant may be required to 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 Quality Management Plan;
2. A Water Cycle Management Plan;
3. A Flood Assessment Report; and

Requirements for documentation to demonstrate compliance with each of the elements above is provided within the following sections (7.2-7.4) of this Operational Works Planning Scheme Policy.[7]

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.

7.1.2.1 Key Issues

The key issues to be addressed by the Integrated Water Management Plan via the Water Cycle Management Plan, Flood Assessment Report and Water Quality Management Plan 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). These issues should be addressed on the site, adjoining sites and downstream.

7.1.2.2 The Integrated Water Management Objectives

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.

7.1.3 Water Sensitive Urban Design

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

Maroochy Shire 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

7.1.4 References

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

- Maroochy Shire Council: Integrated Water Management Guidelines;
- 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

[7] *Further assistance in preparing these documents is provided in Council's Integrated Water Management Guidelines.*

- 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

Note that caution is advised in the use of these guidelines so that due regard is given to the climatic and hydrologic conditions of the Maroochy Shire Council region. The above list is not exhaustive, however it does identify a range of useful publications to assist in conceptual and detailed design of infrastructure complying with WSUD principles. The use of locally based guidelines by a recognised authority or agency would take preference to those developed regionally or nationally.

7.2 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 a 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 goals to be achieved by water quality management measures on site. 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.

For some developments, WQOs may be deemed to be satisfied if certain pollutant load reduction targets are met (See Section 7.2.4). For some developments, these load reduction targets will need to be met in addition to the WQOs[8].

[8] *Further guidance on the types of development required to meet either the load targets only or the load targets and WQOs is given in Council's Integrated Water Management Guidelines.*

7.2.1 Relevant Code Requirements

This section is relevant to the assessment of compliance with performance criterion P1 in Element 1 (Water Quality) of the Code for Integrated Water Management:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 **The environmental values and quality of receiving waters within or downstream of a development site are protected or enhanced.**	**A1.1** Water quality objectives identified in Planning Scheme Policy No. 5 - Operational Works are met.[9] Where a site includes or adjoins a buffer to a waterway or wetland established in accordance with the Code for Waterways and Wetlands, the water quality objectives are to be met prior to water entering that buffer.

7.2.2 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);
- Determine natural areas and other activities between the proposed development site and the estuary that may be impacted as a result of changed water quality. This step is required to broadly identify the suite of WQOs that will need to be considered.(See ANZECC/ ARMCANZ Australian Water Quality Guidelines 2000).

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 Maroochy 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 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:

[9] *For development involving more than 40% impervious area or more than 2000sqm total development area (excluding land that will not be disturbed during construction or subsequent use eg conservation areas, existing waterways), an Integrated Water Management Plan will be required to be prepared in accordance with Planning Scheme Policy No. 5 – Operational Works to demonstrate that the water quality objectives of the receiving waters would be met and that appropriate management practices can be implemented. For other development, the implementation of stormwater best management practices in accordance with the Planning Scheme Policy will be sought.*

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 Maroochy 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 Maroochy 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, including Rural Residential – total suspended solids, total nitrogen, total phosphorus, temperature, pH, dissolved oxygen, electrical conductivity 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 MSC related documents:

WQO Document Hierarchy List

1. Site Specific Studies (eg. detailed monitoring and interpretation completed for the site in question)
2. Maroochy 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 Maroochy 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/
5 National Guidelines (ie. ANZECC Australian Water Quality Guidelines – 2000) see: http://www.deh.gov.au/water/quality/nwqms/volume1.html

7.2.3 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. This 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.

Note that in most cases, WQOs are expressed as concentration ranges (or upper limits) 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. For ephemeral streams, the relevant value for comparison against WQOs is the median concentration during flow periods, defined as periods when streamflow is

above some small threshold value, typically not less than 1 L/s.

Note that 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)*

7.2.4 Pollutant Load Reduction Targets

For some developments, WQOs may be deemed to be satisfied if the following pollutant load reduction targets are met:

- 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. For some developments, these load reduction targets will need to be met in addition to the WQOs[10].

7.2.5 Demonstrating Compliance - Water Quality Management

7.2.5.1 Reduction of Directly Connected Impervious Area

The disconnection of impervious surfaces from the trunk drainage network is a primary objective of a successful stormwater management scheme. Disconnection of impervious areas can be accomplished through water sensitive urban design 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 may have synergistic benefits when used in combination with other management practices and may assist in achieving water cycle management targets, in addition to those set for water quality and flooding.

The proposed stormwater management strategy should ensure that no impervious area run-off discharges from the site without appropriate treatment. Wherever possible this treatment should include extended detention and/or infiltration to disconnect the impervious catchment from downstream waterways with the goal of reducing the frequency of discharges from small to medium rainfall events.

7.2.5.2 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), a **Water Quality Management Plan** 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 that shows 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.

[10] *Further guidance on the types of development required to meet either the load targets only or the load targets and WQOs is given in Council's Integrated Water Management Guidelines.*

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

1. Clear identification of pollutants of concern and their sources for both the construction and operational phases of development
2. Identification of 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 Plan**;
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. The Plan should demonstrate that sufficient access is available for maintenance purposes including any equipment necessary to undertake de-silting, weed removal and other maintenance activities;
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 7.2.5.3);
    - sewer overflows;
    - effluent reuse;
    - acid sulfate soils; and
    - bin and car washing areas;
17. Specify a water quality monitoring program where necessary;
18. 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.

7.2.5.3 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 sulfate 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 Water Body Management Report should be self-contained and succinct. The document is intended for use by Council's out-door supervisory staff.

The operation and maintenance of the water level control structures and how they affect the weed management strategy needs to be taken into account.

7.3 Water Cycle Management

7.3.1 Relevant Code Requirements

This section is relevant to the assessment of compliance with performance criterion P1 in Element 2 (Water Cycle Management) of the Code for Integrated Water Management:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P1 The design and management of the development integrates water cycle elements so that: • **potable water demand is reduced;** • **wastewater production is minimised;** • **stormwater peak discharges and runoff volumes are not worsened;** • **natural drainage lines and hydrological regimes are maintained as far as possible;** • **disconnection of impervious surfaces is maximised; and** • **reuse of stormwater and greywater is encouraged where public health and safety will not be compromised.**	**A1.1** Integrated water management practices and infrastructure are designed in accordance with Planning Scheme Policy No. 5 – Operational Works

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

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

Provisional targets have been developed and are set out below:

- Water demand reduction ≥ 20% compared to Maroochy Shire Council's 'business as usual'[11] case;
- Reduction in wastewater volumes ≥ 20% compared to Maroochy Shire Council's 'business as usual' case;

Substitute water sources supply ≥ 60% of the total water demand.

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

It is recognised that some developments, in particular high-rise residential, may have difficulty in achieving the target for substitute water sources without implementing in-house reuse of greywater. Any development proposing such a strategy would be required to demonstrate how the potential public health implications of in-house reuse are to be addressed. Alternatively, Council may accept a lower target for substitute water sources where it can be shown that all other practical measures to provide substitute water sources have been implemented.

7.3.3 Elements of a Water Cycle Management Plan

The following elements should all be addressed in a Water Cycle Management Plan for the site.

7.3.3.1 Reducing potable water demand

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

- Rainwater Tanks
- Greywater Recycling
- Water efficient appliances
- Pricing and/or incentive schemes
- Stormwater harvesting and reuse.

[11] *Further information on quantifying 'business as usual' conditions is given in Council's Integrated Water Management Guidelines.*

7.3.3.2 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.

7.3.3.3 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.

7.3.4 Sizing of Rainwater Tanks[12]

Where rainwater tanks have been identified as an element in a water cycle management plan, 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.

Some guidance on tank sizing and configuration as a substitute water source is given in Maroochy 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.

7.3.5 Standard Drawings

Drawings as shown in Figure 1 and 2 of Maroochy Water Services Guidelines for the Installation of Rainwater Tanks in Reticulated Water Service Areas show layouts and configurations of a typical rainwater tank installation for potable source substitution.

For other measures, the applicant is directed to the references outlined in Section 7.1.4.

7.3.6 Demonstrating Compliance – Water Cycle Management

7.3.6.1

Applicants will be required to prepare a Water Cycle Management Plan 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.

[12] *Additional information on the sizing of rainwater tanks is provided in Council's Integrated Water Management Guidelines.*

7.4 Flood Management

7.4.1 Relevant Code Requirements

This section is relevant to the assessment of compliance with performance criterion P2 in Element 3 (Flooding) of the Code for Integrated Water Management:

PERFORMANCE CRITERIA	ACCEPTABLE MEASURES
P2 For all floods up to and including the 100 year ARI: • **the safety of people on the site is maintained;** • **potential damage to property on the site is minimised; and** • **the functioning of essential services is maintained.**	**A2.1** (a) Development is sited on land that would not be subject to flooding during the 100 year ARI flood event. Or (b) There is no increase in the number of people living or working on the site, except where the premises are occupied on a short-term or intermittent basis (e.g. by construction / maintenance workers, certain agricultural and forestry workers). Or (c) Development complies with the standards for flood immunity set out in Planning Scheme Policy No. 5 – Operational Works **A2.2** Any components of infrastructure that are likely to fail to function or may result in contamination when inundated by flood water (e.g. electrical switchgear and motors, water supply pipeline air valves) are: (a) located in accordance with the standards for flood immunity set out in Planning Scheme Policy No. 5 – Operational Works; or (b) designed and constructed to exclude floodwater intrusion/infiltration. **A2.3** Infrastructure is designed and constructed to resist hydrostatic and hydrodynamic forces as a result of inundation by the 100 year ARI flood event.

The following subsections set out the standards referred to in these acceptable measures. Also identified are any specific information requirements for applications in relation to flooding.

7.4.2 Standards

In addressing Performance Criteria 2 for Flooding, the following information provides guidance in achieving the acceptable solutions A2.1 to A2.3

7.4.2.1 Flood Immunity for Uses and Lots

Drainage Deficiency Areas

Where a development is proposed in a Drainage Deficiency Area, as shown on Regulatory Map 1.5, allotments are to be filled to the levels nominated for the relevant area where the 100 year ARI flood level does not govern.

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

Public Parks

Drainage requirements and flood immunity requirements for parks outlined in Planning Scheme Policy No. DC5 Public Parks are to be provided as shown in Table 7.1 below.

7.4.2.2 Flood Immunity for Certain Infrastructure

Emergency Services

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

Mechanical and Electrical Works

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

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.

Farming Activities

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

Animal keeping and intensive animal husbandry are confined to areas above the 100 year ARI flood level.

7.4.2.3 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. 2.5m AHD to provide protection from storm surge events;

b. (i) 400mm above the 100 year ARI flood level or;

(ii) 600mm above the highest recorded flood level[13] which ever is greater.

c. Where in a Drainage Deficiency Area shown on Regulatory Map 1.5 application is to be made to Council to determine the required floor levels.

For all other building types:

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

- 2.5mAHD 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

- Where in a Drainage Deficiency Area shown on Regulatory Map 1.5 application is to be made to Council to determine the required floor levels.

And

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

7.4.2.4 Other Issues Requiring Consideration

Design Hydrology

Maroochy 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.

Local Drainage Design Capacity

Implementation of Water Sensitive Urban Design (WSUD) requires alternative approaches and construction methods to conventional stormwater drainage systems. Where water sensitive design elements are used within a drainage system, such elements should be designed in accordance with recognised guidelines (as outlined in Section 7.1.4 of this Policy) to provide levels of flood immunity and public safety similar to conventional systems, as outlined in QUDM. Details of design and construction standards for conventional stormwater systems, elements of which will continue to play a role in water sensitive drainage systems, are given in section 4.6 of this Policy.

[13] *Enquiries regarding Maroochy shire Council's historical flood records may be made through the customer service centre.*

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 Maroochy 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.

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.

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'.

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 Flood Assessment Report) 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.

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 Flood Assessment Report. For guidance applicants are directed to the Brisbane City Council's Natural Channel Design Guidelines for further guidance on Mannings 'n' and vegetation densities.

Table 7-1 Public Parkland 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 Level 1	**Drainage:** 'Soft' engineering constructions with natural filter to river.
Waterside Parks Level 2	**Drainage:** 'Soft' engineering constructions with natural filter to river.
Waterside Parks Local	**Drainage:** 'Soft' engineering constructions with natural filter to river.
Recreation Trails Shire Wide	**Drainage:** 'Soft' engineering constructions with natural filter to river.

7.4.3 Demonstrating Compliance – Flood Management

7.4.3.1 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 an 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.

7.4.3.2 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).

7.4.3.3 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)

7.4.3.4 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). No increase in peak discharge should be demonstrated for the 2, 5, 10, 20, 50 and 100 year ARI events. Impacts should be considered beyond the downstream boundary of the development to ensure that changes in the timing of runoff from the site do not bring the hydrograph peak closer to coincidence with the peak flow in adjoining catchments.

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 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; and
- 2 year ARI for open space and rural access flood immunity, and minor drainage system performance.

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

Water Body Management Report

A **Water Body Management Report** is to be provided for each and every constructed wetland or lake that forms part of the Integrated Water Management Plan for the site.

7.4.3.5 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:

a. Detail the extent of earthworks required. Pre and post development contours and other features on the site are to be provided.

b. 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.

c. 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.

d. 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.

8 Quality Control & Audit Inspections

Standard Civil Works Inspection and Testing Plan

The major inspections and their coverage are listed in the Standard Civil Works Inspection and Testing Plan (CWITP). The listings are not intended to be exhaustive and Council may require inspection and testing of other items.

During construction and up to the completion of works Council may conduct random audits and inspections, if considered necessary, with or without prior notification.

The Consultant must follow the plan, unless variations are approved and submit certification that the plan has been followed in accordance with the 'As-Constructed' submission documentation.

The following figures provide guidance on the obligations of supervising engineers and procedures for the construction, checking and hand over of works.

8.0 Construction Standards and Tolerances

Element Course	Minimum Thickness	Minimum Density Strength	Horizontal Alignment Tolerance	Vertical Alignment Tolerance	Thickness Tolerance	Shape/Slope Tolerance
General Earthworks Earthworks in Floodprone areas	N/A	95% See ITP	Limits on Plan	+100mm +100 -0	N/A	Min1:100 general and over any 10m down contours, No ponding over 50mm deep
Stormwater Pipes	N/A AS4058	Standard Drawings	+100mm	+25mm	N/A	Uniform pipe grade and +10% of design grade
Manholes/ Pits	In situ 150mm	32Mpa	Lateral +100mm Along line +300mm	+50mm With K & C + 25mm	+100mm – 0mm	Circular/Square/ Rectangular and Vertical +50mm
Subgrade	300mm	100% Standard Compaction	+100mm Road width +200mm -50mm	+25mm -50mm	N/A	Design cross fall +0.5%
Select Fill/ Subgrade Replacement	100mm	100% Standard Compaction Min CBR15	+100mm Road width +200mm -50mm	+25mm -50mm	+25mm	Design Crossfall +0.5%
Subsoil Drains	Width 225mm	N/A	+100mm	Min900mm Below kerb 1 mert	Width -25mm +100mm	Uniform pipe Grade 0.5%min
Conduits	Width 300mm	N/A	+300mm	Min700mm & max 1000 Below top of Kerb	Width -25mm	Uniform grade And straight
Markers	N/A	N/A	+100 from Conduit	N/A	N/A	N/A
Kerb and Channel	Invert 125mm	20Mpa	+100mm Raod width +200mm -50mm	+25mm	Concrete +20mm -10mm	15mm in 3m max And + 10% of Design grade No ponding greater than 5mm
Sub Base	100mm	100% Standard Compaction	+100mm Road width +200mm -50mm	+25mm	+50mm -20mm	25min in 3m max and no ponding Design crossfall +0.5%
Rock Retaining Walls Brisbane City Council	N/A	N/A	+100 mm	+ 100 +100 - 0 Flood Areas		Surface finish +100mm of Design slope No openings > 100m
Base	100mm	100% Standard compaction	+100mm Road Width +200mm - 50mm	+25mm	+25mm - 10mm	15mm in 3m max Crossfall + 0.5% Design

Element Course	Minimum Thickness	Minimum Density Strength	Horizontal Alignment Tolerance	Vertical Alignment Tolerance	Thickness Tolerance	Shape/Slope Tolerance
Surfacing (Compacted)	25mm Or design	92% Standard	+100mm	+25mm	+15mm -0mm	7mm in 3m max
			Road Width +200mm -50mm	+5mm 0mm from lip of Channel		Design Crossfall +0.5%
Road Verges	N/A	95% Standard Compaction	+100mm	+25mm	N/A	=10% of design crossfall
				+25 -0 from top of kerb		
Top soil And Grassing	75mm	N/A	N/A	+100mm	+25mm	As for General Earthworks
				Road verges +25mm		
Water Supply Pipelines	N/A	N/A	+50mm	+50mm -200mm	N/A	To manufacturers Specification
Sewerage Pipelines	N/A	N/A	+150mm	+25mm	N/A	5mm in 8.0m Max no ponding
Access chambers	N/A	N/A	+150mm	Finish lid 100 Mm Above FSL	N/A	Circular
Water Supply Fittings	N/a	N/A	+ 250mm	+ 25mm To FSL (Surface Fittings only)	N/A	N/A

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 MSC. • 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 by a 'Document Transmittal Form' • 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 record 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.

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
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 works for compliance with the approved design and for checking test results for compliance with this ITP.	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.
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 5000m^3 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 500m^3 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) 98% Trenches			

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
b. Rock Walls and Retaining Walls					
Location Level	Survey/ Measurement check	MSC 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	MSC Standard Drawing or other subject to Council approval	Critical locations and others as necessary		
Backfill	Visual	Granular	Each wall and minimum 1 check per $50m^2$		
c. Stormwater Drainage					
Location Structures	Survey/ Measurement check	MSC 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	MSC Standard Drawing	Each Line		
Manholes/Pits	Visual		Each		
Pipes	Visual	Straight and on line and grade	Each Line		
Backfilling - Quality	Visual/grading as required	Graded (max 75mm) or other subject to Council approval	Each line		
- Compaction	AS1289-5.1.1	95% Standard under roads	1 test per line at subgrade and one other test where subgrade cover exceeds 500mm		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
d. Allotment Stormwater Drainage					
Location of Structures	Survey/ Measurement check	MSC 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		
Bedding Material	Visual	MSC 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		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
Horizontal & Vertical Alignments	Survey				
Profile	String line or level survey	MSC 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	Proof rolling	No discernible movement	1 test per 100m carriageway or part thereof		
(b) for graded material	AS1289.5.2.1 and proof rolling	100% Standard and no discernible movement			
Profile and Depth	String line or level survey	MSC Table of Construction Standards & Tolerances	1 check per 20m		
g. Sub-soil Drains					
Pipe	AS2439 Part 1	MSC 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 100m^3 max		
Cleaning Joints & Markers	Visual	MSC Standard Drawing	Each		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
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	MSC Table of Construction Standards/ Tolerances	Each		
Backfilling	Visual	MSC Standard Drawings	Each		
i. Kerb and Channel					
Horizontal & Vertical Alignments	Survey/ Measurement check	MSC 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)	MSC Standard Drawings	1 test per 50m		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
j. Sub-Base Layer					
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	MSC 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		
Profile	String line or level survey	MSC Table of Construction Standards/ Tolerances	1 test per 20m max		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
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 200m^2		
Manholes	Appearance	Stormwater Drainage	Each		
Pipelines	Survey	Line and Grade	100m		
Backfilling	AS1289-5.1.1				
m. Surfacing					
Material Quality	Mix Analysis	As specified in AUS-SPEC or MRS relevant standards	Min. 1 test per 100 tonne or 1500m^2	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		AUS-SPEC			
Profile	String line or level survey	Standards/ Tolerances	As required		
n. Topsoiling and Grassing					
Sediment and Erosion Control	Visual	MSC Standards (AUS-SPEC)	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
Prior to Acceptance on Maintenance	As Constructed Drawings to be prepared and submitted to MSC 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

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
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	Visual	ENERGEX 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					

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
3. WATER RETICULATION					
a. Water Reticulation					
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 200m^3		
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		

ELEMENTS OF WORKS	TESTING REQUIREMENTS			SUPERINTENDENT RESPONSIBILITY	COUNCIL'S RESPONSIBILITY
	TEST	STANDARD	FREQUENCY		
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 conform 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 200m^3		
Maintenance Holes	Appearance - leak proof, smoothly benched and clean	Sewer Reticulation (WSAA)	Each		
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 Bonding

8.1.1 Purpose

The purpose of this section is to set out the circumstances and processes associated with Council requirements for:

- accepting security for proposed operational works prior to commencement of construction
- accepting security for completion of operational works prior to 'On Maintenance'

The security is required to protect the progress of works by the developer.

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

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

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

8.1.2 Process

The following processes shall be completed in relation to Bonding:

- Provide schedule of works, including maintenance, and value which are proposed to be bonded
- Substantiate proposed timing for the completion of outstanding works
- Complete Deed of Agreement
- Pay relevant fees
- Provide suitable security

8.1.3 Prior to Construction

Council may, with agreement of the applicant, request a construction security bond to facilitate and secure the duration of the works until uncompleted works bond can take affect.

The bond is to be accompanied by Council's Security Lodgement Form clearly identifying the purpose of the bond together with the Consulting Engineer's /Ecologist /Landscape Architect/ Environmental /Landscape Consultant certification of the value of the works.

The bond is to protect and assure the following:

- All works, including maintenance are carried out in accordance with approvals;
- Any safety or environmental incident is attended to 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.

8.1.4 Uncompleted Work Bonds

Council may, at the request of the Principal Consultant, agree to release the Plan of Subdivision prior to completion (On Maintenance) of development obligations subject to the following:

a) The plan of the development conforms to the conditions of the development approval.

b) The applicant has prepared and submitted to the Council, engineering drawings, landscape drawings, specifications and test results as required by the Council in the format requested by Council, in conformity with the development approval.

c) Note: Any amendments required during Bonding period and On Maintenance are to be carried out by the applicant and provided to the Council prior to Off Maintenance approval.

The applicant shall demonstrate:

a) 100% bulk earthworks to be completed and stabilised to Council's satisfaction

b) 100% water supply

c) 100% sewerage reticulation

d) 100% pump stations (if applicable)

e) 100% stormwater drainage

f) 100% structures – drainage, bridges, accesses:

g) majority of all approved subdivisional works have been satisfactorily completed

The applicant has provided to the Council:

a) A fully revised priced schedule of development works, including a confirmation of costs for proposed maintenance bond from original submission

b) A list of infrastructure assets (including landscape works) that are proposed to be handed over to Council (detail items to be completed)

c) Certification 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

d) Payment of prescribed non-refundable administration fee

e) Applicant has entered into a bond agreement (refer Appendix G) with the Council as detailed in the suitable options;

f) The applicant has provided security for the completion of the uncompleted works in the form as provided by the Council.

8.1.5 Special Conditions

The 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 referral agency as a condition of the approval, the Council shall specify the works to be completed prior to acceptance of the bond for compliance.

8.1.6 Maintenance Security Bond

A bond, being the greater of 5% of the contract value of the whole works or $10,000, is to be lodged with the Council to guarantee satisfactory maintenance of the works both:

- prior to commencement of work; and
- during the maintenance period.

For landscaping works (excluding rehab & WSUD) a bond, being the greater of 1.5 times the value of the 12 month maintenance works or $10,000, is to be lodged with the Council to guarantee satisfactory maintenance of the works.

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.

8.1.6.1 Subdivisional Uncompleted Works

In respect of engineering works relating to subdivisions (or reconfiguration of lots), an amount of 1.5 times the value of the uncompleted works at the time of the lodgement of the security.

In respect of vegetation rehabilitation, WSUD, wetlands, an amount of 1.5 times the value of the works and maintenance works for a three (3) year period is to be lodged with the Council to guarantee satisfactory performance of the works. The Bond is to be lodged with Council:

- Prior to commencement of work; and
- Prior to survey plan release (if applicable).

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

- Cash;
- An unconditional undertaking from a bank; or
- Such other security as the Council may approve.

8.1.6.2 Other Development Works (other than building works)

An amount of 2 times the value of the uncompleted works at the time of the lodgement of security.

8.1.7 Administration of Bonding

For Operational works, the applicant shall prior to the date of sealing the Plan of Subdivision carry out the following:

- Complete and execute the subdivisional works secured by the bonding agreement
- Ensure the works are accepted 'On Maintenance' by the Council in accordance with On Maintenance requirements or unless otherwise bonded.
- Provide a maintenance security deposit in accordance with allowable processes defined by the Council
- Prepare and submit to the Council final 'On Maintenance' 'As Constructed' plans in accordance with Council defined requirements.

8.1.8 Release of Bond

The Council may upon written request of the applicant:

- Reduce the security as the subdivisional works are constructed in accordance with the conditions of the subdivisional approval
- Release the security excluding the maintenance deposit where the applicant has fulfilled the provisions of the bonding agreement

- Release the maintenance security where the applicant has complied with requirements set out in Councils acceptance of 'Off Maintenance'
- 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 as stated above, 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

8.1.9 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, the General Manager, Planning and Development shall refer the request to the Review Board of the following officer, General Manager, Environmental Planning and Development, and any other two delegated officers where available or any other officer acting in their capacity.

The General Manager, Planning and Development shall advise the person who requests a review of the date of the committee meeting and their right to attend the Review Board.

The Board shall meet at the earliest possible date to review the decision of the delegated officer.

The Board shall consider the representations of the person requesting the review, of the persons who address the Committee and the advice of the delegated officer.

The Board shall have delegated authority from the Council to:

- Reaffirm the decision of the delegated officer with or without modifications
- Amend a decision of the delegated officer or
- Reverse the decision of the delegated officer

The General Manager, Planning and Development shall advise the person who has requested the review pursuant to the decision of the Board.

8.1.10 Construction Security Bond

Prior to construction of the works commencing the developer is required to lodge a security bond.

The 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, including landscape 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 and environmental incidents.

Any costs incurred by Council in responding to the above circumstances will be recovered from the Security Bond.

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 maintenance bond.

8.2 Plan Sealing

8.2.1 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.

8.2.2 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 Council and accepted 'On Maintenance', unless otherwise bonded; and
- all drawings detailing current 'As Constructed' data excluding outstanding bonded works have been approved by the Council.

8.2.3 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,
- in the case of a consultant acting on behalf of the applicant the consultant

c) accompanied by the consent in writing of the registered proprietor of the registered lessee of the land as the case may be

d) accompanied by checklist for endorsement of survey plans

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 Development Permit for Reconfiguration, the approval of the engineering requirements, drawings and specifications.

f) Accompanied by an approval of road names for any new roads being created prior to the application for Plan Sealing.

g) All fees and Development Contributions in accordance with checklist for endorsement of survey plans shall be paid

h) All contributions or infrastructure charges as detailed in a development approval, infrastructure agreement or infrastructure charges notice shall be paid

i) A electronic file containing an Autocad drawing file or a Civilcad DXF file containing only the allotment layout, street names and allotment numbers. The electronic file shall be accompanied by certification from the registered surveyor that the information provided is identical to that submitted to the Department of Natural Resources for registration.

j) Accompanied by a copy of the approved Flood Study. This Flood Study must be accompanied by a letter of certification from a RPEQ experienced in hydrologic/hydraulic engineering stating that the attached Flood Study is the latest study referenced and approved by Council's relevant Development Permits and incorporates all amendments.

Where a development is staged, the flood study and certification must be provided with every stage.

8.2.4 Plan Details

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

An electronic copy of the plan is to be supplied to Council in DWG format in accordance with the document 'Specification for the Supply of Digital Georeferenced Data'. Copies of this document are available from Council's Customer Service Centres.

The Council shall compare the plan of subdivision for sealing with the Council approved plan of subdivision.

The Council shall compare any new road names shown on the plans for subdivision sealing with the road name proposal approved by Council.

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 Council's satisfaction, sealing shall be carried out.

Council shall as part of the operation note its approval on the plan of subdivision. and shall return the plan of the subdivision to the applicant to be lodged at the office of the Registrar of Titles.

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.

8.3 As Constructed

8.3.1 General

This section of the Planning Scheme Policy details Council's Construction Guidelines for work that requires Council's approval with regard to its construction, compliance, and acceptance. The submission include:

- As Constructed Submissions
- Standard Civil Works Inspection and Testing Plan (CWITP) 'As Constructed' plans serve three 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' locations of underground services.
- Quantity: To provide record of quantity to understand scope of works for maintenance planning.

Information required for the checking function must be presented in a form which allows ready comparison between design and 'As Constructed' data by experienced engineering and landscape staff, whereas information required for the recording function must be presented in a form which allows ready and unambiguous interpretation and understanding by a wide range of users including engineers, parks managers, landscape architects, maintenance and trades persons, and the general public.

8.3.2 Prerequisites For Submission

It is Council's intention to expedite the approval and checking process by reducing the level of checking from rigorous detailed checking to checking on an audit basis. Compliance with these guidelines is essential. In particular, the following points should be strictly adhered to in the supervision of development works and preparation of 'As Constructed' drawings:

- Major departures[14] from approved designs should be approved by Council in writing before implementation and before submission of 'As Constructed' drawings. Refer also to the Statement of Compliance.
- Construction shall generally comply with the approved design (as amended above, if required), within the tolerances cited in the Planning Scheme Policy No. 5 – Operational Works or Council's standard specifications. Refer also to the Statement of Compliance.
- Where tolerances are not stated in the relevant Planning Scheme Policy or Council's standard specifications, tolerances shall be in accordance with the relevant Australian Standard and accepted engineering / landscape and horticultural practice.

14 *Major departures in this context means a change which varies the design intent.*

8.3.3 Submission For Approval

Except as specifically excluded below, every drawing included in the approved design, including stormwater calculation sheets and catchment plans, is to be submitted in certified 'As Constructed' form. It is the responsibility of the developer to ensure all requirements associated with the Council 'As Constructed' details are completed.

As Constructed details are required to help future works identify the real asset location and properties for future reference. Many details may differ during construction from that of the original design, and data records shall be maintained by the consultant during all phases of work.

As Constructed Submission Documentation

'As Constructed Submission Documentation' shall be forwarded to Council prior to the acceptance of the works 'On Maintenance'.

The 'As Constructed' Submission provides for the following activities:-

- Checking
- Recording
- Compliance and Acceptance
- Asset Data Capture and Recording
- Acceptance of works on maintenance

The 'As Constructed' information is to be presented in hard copy plans as well as an electronic format for use and direct transfer to Council's Geographic Information system (GIS) and Asset Management Systems.

8.3.3.1 Statement Of Compliance – Non-Complying Works

It is recognised that, despite the most diligent efforts of the consultant/applicant, some non-complying works may be discovered on review of the 'As Constructed' information.

The Statement of Compliance is intended to place responsibility for identifying and reporting non- conforming works with the consultant and to expedite Council checking and approval. The Statement shall:

- identify the nature and number of non-complying items;
- nominate the Consultant's proposals for rectification or Council acceptance; and
- provide Council with a fixed time frame for completion of the rectification works

It is expected that in many cases, a short, comprehensive and accurate Statement of

Compliance will enable Council to grant immediate 'On Maintenance' provided all other requirements have been satisfied.

8.3.3.2 Properties

Correct street names and lot numbers shall be shown on all relevant drawings.

8.3.3.3 Earthworks

Certification of design plan(s) require that sufficient levels are provided to show that works have been constructed in accordance with the approval and conform to the level of tolerances below:

- general cut and fill: + 100 mm
- in nominated flood free areas: + 100 mm /- 25 mm

8.3.3.4 Roadworks

Certification of design plan(s) is sufficient provided that 'As Constructed' grade and cross-sectional information is confirmed in areas where roadway overland flow capacities are critical.

Confirm that permanent street, warning, and regulatory signs are placed in accordance with the approved drawings and standard locations. Accurate survey is not required.

'As Constructed' pavement thickness and composition, including minimum CBR values for the pavement materials shall be noted on the longitudinal sections.

8.3.3.5 Stormwater Drainage – Minor and Major Flow Systems

Certification of design plan(s). Details are to be amended only where the tolerances below are exceeded:

- invert levels: + 25 mm, – 25 mm
- surface levels: per earthworks above
- structure locations: Lateral ±100mm along line ± 300 mm
- pipe diameters: note if varied from design
- pipe classes/types: note if varied from design

'As Constructed', departures from design, exceeding the above tolerances, will be accepted where the consultant/applicant can demonstrate and certify that the design intent is not compromised.

Only where the drainage systems have been constructed out of tolerance and they may be extended by future development either upstream or downstream; and in exceptional circumstances such as incorrect pipe sizes and major out of tolerance construction, shall the design calculation sheets be amended to reflect the 'As Constructed' performance of the systems.

8.3.3.6 Stormwater Drainage – Major Flow System

Amend levels and sections to critical overland flow paths in roadways, pathways and parks to 'As Constructed'.

Confirm that critical overland flow paths perform to approved design criteria. Critical overland flow paths are these where design storm flows approach flow path's capacity.

8.3.3.7 Stormwater drainage – Detention Basins

Crest and spillways shall be trimmed to a tolerance of +50 mm -25 mm. Crest levels, spillway levels, profile and volume shall be amended to 'As Constructed' values.

8.3.3.8 Interlot Drainage

'As Constructed' roof water longitudinal sections are not required. 'As Constructed' departures from design in excess of the tolerances nominated below will be accepted, if the Supervising Engineer/applicant certifies that Council's design criteria have been achieved.

Information required:

- Manholes/pits
  - Location (two ties)
  - surface level
  - invert levels
- Lines
  - dia., class, type
  - length
  - grade
  - alignment
- House connections
  - location (two ties)
  - surface level
  - invert level
- Tolerances
  - invert level: +25 mm, -25 mm
  - surface level: as per earthworks above
  - location: 1000 mm from design

provided that such deviation does not result in conflict or interference with any other existing

or proposed structure or service, including property boundaries.

8.3.3.9 Landscape Works

Certification of design plans require certification that landscape works, assets and infrastructure have been installed in accordance with approved specifications including but not limited to:

- Approved plan(s)
- Conditions of the Decision Notice
- Relevant environmental and horticultural standards such as Australian standards, national specifications and Council standard drawings.

8.3.3.10 'As Constructed' Documentation

Development works will not be accepted 'On Maintenance', or as practically complete, until the following documentation has been submitted to Council:

- As Constructed Plans – hardcopy and electronic
- Inspection and testing certification by the applicant(s)/supervising engineer
- Certification of all landscape works by qualified landscape architect, horticulturalist, environmental scientist, ecologist contractor, arborist.
- Certification of Foundation Conditions by the applicant(s)/supervising engineer (where applicable)
- All Operation and Maintenance Manuals eg: water supply and sewerage pumping equipment, Stormwater Quality Improvement Devices, Playground equipment, Wetland Management Reports, Landscaping
- 'As Constructed' data for electrical wiring diagrams for pumping stations, etc.
- Manufacturers details and maintenance procedure for GPT's
- Wiring diagrams for traffic lights
- Copies of test results on:
  - compaction of fill
  - subgrade CBR
  - CBR 15 material quality
  - CBR 15 compaction
  - subsoil drain filter media grading
  - base, subbase and subgrade replacement course material quality
  - base, subbase, subgrade and subgrade replacement course compaction
  - prime or primer seal spray and application rates
  - AC core tests
  - playground soft fall impact attenuation tests
  - soil for horticultural purposes
  - sewer vacuum tests
  - grading of sewer bedding
  - grading to water main bedding
  - water main pressure tests
  - water main water quality tests
  - any concrete testing required by the technical specifications
  - any other job specific testing carried out or required by Council if used.

Should any of the above test results fail to meet specification, the applicant is to include in the submission to Council, details of retesting/ rectification carried out.

The documentation should be presented in a logically assembled and bound document including a table of contents confirming completeness.

8.3.3.11 Plan Format

All plans are to be provided in signed hardcopy format and also in electronic format.

8.3.3.12 Legibility of Paper Plans

As all 'As Constructed' drawings are imaged, linework and lettering shall be of suitable thickness and clarity to be legible when imaged typically, 0.25 mm black lettering.

Numerical amendments are usually denoted as a diagonal line through the design value with the 'As Constructed' value noted adjacent. Other amendments are usually denoted by encircling with a notated cloud.

8.3.3.13 Electronic Plans

Electronic plans are to be supplied for the following:

- As Constructed Survey Plan of Lot layout and all civil works.
- Full set of amended approved design plans showing all as constructed changes.

All electronic plans are to be supplied to Council on either CD or by e-mail and must be accompanied by a 'Document Transmittal Form'.

All electronic data supplied in the form of Computer Aided Drafting (CAD) files must comply to the specifications in the document 'Specifications for the Supply of Digital Georeferenced Data'. Copies of this document are available from Council's Customer Service Centres.

8.3.3.14 'As Constructed' Drawings

'As Constructed' drawings for roadworks and drainage, are to be submitted on completion of the works.

It is strongly recommended that 'As Constructed' information be collected and checked as the works progress to identify construction errors as early as possible so that their rectification or the seeking of Council's approval for the change does not delay granting of 'On Maintenance'.

'As Constructed' drawings for water and sewerage reticulation mains will be prepared by Council Officers at the applicant's expense.

Prior to release of the plan of survey and/or acceptance of the works on-maintenance, the supervising engineer is to supply a DWG. Drawing file (at a scale of 1:500) of the final lot layout and any external works, including approved street names, lot numbers and landscaping, complete with the engineer's title description of the development. In the case of subdivisional works, the data is to be accompanied by written certification that the submitted information is identical to the RP plan lodged with Council for plan sealing. If the submitted RP plan is altered, a copy of the amended information in DWG Format, must be forwarded to Council within 7 days.

Development works will not be accepted 'On Maintenance' until such time as all of the 'As Constructed' drawings have been received, checked and approved.

8.4 On & Off Maintenance

8.4.1 General

This section defines the requirements to be applied prior to 'On Maintenance' approval and 'Off Maintenance' asset handover by the representatives from Maroochy Shire Council.

8.4.2 Acceptance of Works 'On Maintenance'

Council will accept operational works 'On Maintenance' on completion of those works to an acceptable standard, period of twelve months (for most issues) except where defined in activity register, 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
- submission of all 'As Constructed' documentation
- payment of any headworks or other contributions or charges specified in the development permit or levied by Council
- Submission of Engineer's certification that the works have been undertaken in accordance with the approved plans and specification and to Council's requirements.
- Submission of all test results required by the approved Inspection and Testing Plan
- Submission of location and AHD values of Permanent Survey Marks installed in the subdivision.
- Landscaping maintenance programs submitted.

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 Maroochy 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.

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

The applicant is responsible for maintenance works during the maintenance period and advising Council of any significant works.

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 24 hours, and signed until repairs can be undertaken. Advice 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 24 hours, the Council shall be able to complete required safety works and all costs be borne by the developer of concern from the security bond.

8.4.3 '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 Maroochy 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.

8.4.4 Acceptance of Works 'Off Maintenance'

On completion of the maintenance period the applicant may request release of the maintenance bond.

Prior to final acceptance of the works by Council 'Off Maintenance' it will be necessary for the works to be inspected.

Should the works require refurbishment due to an extended maintenance period, the cost shall be borne by the applicant (ie landscape areas have reached their useful life and require replacement).

The applicant is to be responsible for ensuring that all Council requirements are satisfied prior to requesting an 'Off Maintenance' inspection.

In the event of the works being unacceptable, a reinspection fee may be charged for subsequent inspections.

Following a satisfactory 'Off Maintenance' inspection the applicant is to submit a written request for acceptance of the works 'Off Maintenance' and release of the maintenance security bond.

The Council will upon confirmation that no outstanding accounts arising from the development are due to Council, confirm acceptance of the works 'Off Maintenance' and arrange for the release of the maintenance security bond.

Should the applicant wish to maintain the works beyond the maintenance period, a separate agreement shall be entered into between the Applicant and the Council.

APPENDICES

Appendix A: Compliance Certificate

MAROOCHY 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.

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 Maroochy Shire Council's Operational Works Policy 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 Maroochy 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) Maroochy 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 2.1.3 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, Maroochy 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 Maroochy 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 300mm 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
- Labelling 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: Prestart Meeting Notes

maroochy water services
A Business Unit of Maroochy Shire Council

Date: [Date]	Application No.: [insert]	No. Lots: [insert]
Development: [insert]		
Consultant: [insert]	Supervision By: [insert]	
Contractor: [insert]	Contact Ph No.: [insert]	
Contact Ph No.: [insert]	Council Inspector: [insert]	
OPW Approval Date: [Date]	Contract Start Date: [insert]	
Contract Price: [insert]	Extent of Works: [insert]	
Contract Period: [insert]	Sub Contractors: [insert]	
	Suppliers: [Insert]	

Item No.	Notes
	Present:
1	Construction plans and amendments as per OPW Decision Notice ☐
2	Insurances - Work Cover Public Liability
3	Sewer pipes to be used: Reticulation ..... Deeper than 3.0m ..... Stormwater crossings ..... Other .....
4	Sewer pipe bedding material:
5	Sewer access chambers to be used:
6	Sewer precast bases to be used:
7	Accredited pipe layer and licence number:
8	Water pipes to be used:
9	Water supply pipe bedding: ☐ Sand (DICL Main) ☐ Crusher Dust (DICL Main) ☐ 3mm washed screenings (PVC Main) ☐ Other Approved
10	Pre-tapped water connections (refer MWD 360)
	Construction Advice
	Construction to comply with relevant Maroochy Shire Council and WSAA Standard Drawings (available at http://www.maroochy.qld.gov.au >Council Specifications)
A	"On-maintenance" date will be the date that all infrastructure (roads, drainage, landscaping, water, sewer etc.) is accepted by Council
B	Minimum cover to sewer main: 0.90 m – allotments and footpaths 1.20 m roadways
C	**House connections:** Minimum 1m into property Maximum 1.5m deep PVC 100mm sand surround To be constructed with laying of sewer line
D	Ends of sewer lines and house connections to be marked by 2.0m conduit
E	Levels of existing services and connection points to be verified prior to commencing construction
F	Vacuum test sewers and manholes, Pressure test rising mains
G	Following satisfactory inspection, sewer access chamber covers to be sealed with approved medium
H	Hydrants and valves to be fusion powder coated
I	Water main alignment – 1.45 m from boundary (0.05m tolerance)
J	Minimum cover to water main: 0.60 m cover in footpath, (0.6m below top of kerb) 0.75 m cover under roads
K	Polythene sleeving D.I.C.L. pipe as per Tubemakers specifications
L	Hydrant and valve sets, surrounds, marker posts, road markings, cats eye, and stamped offsets to be provided.
M	Testing water main 1.0 MPa for reticulation mains.
N	Water mains must be flushed, chlorinated, pressure and bacterial tested prior to Council connecting to Council's system
O	Before release of plan of survey, all water supply and sewerage construction works shall be completed to an "on-maintenance" standard
P	Surveyors **preliminary** lot boundary DXF file to Maroochy Water Services for preliminary "as-constructed' plan preparation purposes.

Appendix D: Prestart Meeting Form (Roads and Drainage)

Appendix D: Prestart Meeting Form (Roads and Drainage)

Maroochy Shire Council

PRESTART MEETING NOTES

Date: [Date]	Application No.: [insert]	No. Lots: [insert]
Development: [insert]		
Consultant: [insert]	Supervision By: [insert]	
Contractor: [insert]	Council Inspector: [insert]	
Quality Control By: [insert]	A/Hrs Phone: [insert]	
OPW Approval Date: [Date]	Contract Start Date: [insert]	
Contract Price: [insert]	Extent of Works: [insert]	
Contract Period: [insert]	Sub Contractors: [insert]	
Works Hours: 7.00am – 6.00pm, Monday to Saturday (not including Sunday or Public Holidays)	Suppliers: [Insert]	

Item No.	Notes
	Present: [name] [name] [name] [name]
1. a	**Workplace Health and Safety** *Public Liability & Workers Compensation - [Consulting Engineer]* are to ensure that *[Contractor]* have adequate and current Public Liability and Workers Compensation Insurance and forward a copy of the documentation to Council.
b	*Appointment of Principal Contractor - [name]* are to formally advise Maroochy Shire Council of the appointment of principal contractor for the work.
c	*Site Induction* – this pre-start meeting acts as site induction for Council Inspectors.
2. a	**Traffic Control / Traffic** *Management Plan Required - Yes* - Traffic Management Plan is required for works that affect normal traffic flow and is to show the proposed general arrangement to manage the traffic and to indicate the typical signing to be used for various stages of the work. NB all signing to be in accordance with the August 2003 edition of MUTCD. No - General signing of the works activity is required for public safety.
3.	**Spoil Off Site / Import of Fill** - [insert]
4.	**Existing Services** - [insert]
5.	**Parks / Landscaping** - [insert]

Item No.	Notes
6.	**Geotechnical Consultants** *[insert]* will provide the testing for the works.
7.	**Line & Level Control During Construction** - *[name]* will control the construction survey.
8. a	**As Constructed Information** As Constructed Plans to be prepared by *[name]*.
9.	**Tree Removal Permit** - [insert]
10.	**Disposal of Trees** - [insert]
11.	**Dust / Smoke / Mud Control** - Work is to be undertaken in a manner that will not cause dust, smoke or mud nuisance
12.	**Blasting Details** - No blasting is scheduled. If encountered a Maroochy Shire Council Permit is required
13.	**Connection Details –** Standard details only apply.
14.	**Protection of Adjacent Properties** - [insert]
15.	**Reinstatements** - [insert]
16.	**Erosion Control Plan** - [insert]
17.	**Other Approvals** - [insert]
18.	**Design Alterations** - [insert]
19.	**Other Issues** - [insert]
20. a b c d e	**Inspections Required** Subgrade/QA Preseal 'On Maintenance' Bond / QA / As Constructed 'Off Maintenance' Final inspection

Item No.	Notes
General	
1	*[insert name]* advise that power is on standard alignment.
2	Vee lock (or similar) fittings are to be used for signs in concrete or paved areas. Anti theft bolts are required on all signs.
3	Maroochy Shire Council Catchpits are to be constructed to IMEAQ pits as shown on Drawing D-0063 or D-0069 and be: (a) Lip in line (b) Have maximum of 125 mm opening
4	*[insert name]* advises that metal kerb adaptors will be used.
5	Construction of concrete footpath is to be undertaken in a manner that assures that the maximum performance under loads. Any breakage will be examined for adequacy of foundation, quality of concrete mix and placement.
6	Concrete truck washout is to be controlled on site.
7	Concrete testing – K & C other concrete.
8	EMP Requirements: - Fencing of protected areas - Matters affecting construction
9	Re proof rolling of subgrade on Expansive clay / soil.
10	Re measurement of CBR – CBR test are to be taken on the weakest material in the zone 00 – 600 mm below the subgrade level.
11	Roofwater pits in excess of 750mm depth shall have internal dimensions of 900mm x 600mm. Refer to Maroochy Shire Council Standard Drawing D-0050 and also Table 5.18.5 in QUDM.
12	Use File No. OPW[insert] on all future correspondence.
	Other Comments

Appendix E: On Maintenance Check Sheet

MAROOCHY SHIRE COUNCIL

'ON MAINTENANCE' INSPECTION CHECKLIST

Development Name: _____

Development Location: _____

ITEM	VERIFICATION (Yes / No / NA)	COMMENT
STORMWATER DRAINAGE SYSTEM		
(a) 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 • CCTV report provided		
(b) 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.		
(c) 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		
ALLOTMENT DRAINAGE		
(a) 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		
EARTHWORKS / SITE WORKS		
(a) Sediment / erosion control measure maintained.		
(b) All batter slopes stable and no distress exhibited.		
(c) 80% grass cover achieved.		
(d) Street tree planting is satisfactory.		

ITEM	VERIFICATION (Yes / No / NA)	COMMENT
WATER RETICULATION		
(a) No visible signs of trench subsidence.		
(b) Valves and hydrants have been inspected and are satisfactory, ie: • No leaks • Valve and hydrant markings • No damage		
SEWERAGE RETICULATION		
(a) No visible signs of trench subsidence.		
(b) Pipework has been visibly inspected and is satisfactory, ie: • Alignment satisfactory • Clear of silt and debris (flushed) • No ponding • Pipework not oval or compressed		
(c) MH and TMH / structures have been visually inspected and are satisfactory, ie: • Benching no signs of cracking, spalling OK • No weeping or infiltration • No ponding or disposition of solids		
ROADWORKS		
(a) Road pavement has been visually inspected and is satisfactory, ie: • No damage to AC surface • No ponding • Clear of siltation and debris		
(b) Kerb and channel has been visually inspected and is satisfactory, ie: • No excessive cracking or distress to concrete works • No ponding • Service conduit markers OK • No differential settlement or dislocation of pavement surface and concrete kerb and channel		
(c) Linemarking and road signage satisfactory.		
(d) If entry treatment applied, satisfactory finish applied		
MISCELLANEOUS		
(a) Footpaths and concrete works satisfactory.		
(b) Bikeways and associated works satisfactory.		
(c) Street name signage satisfactory.		
(d) Alternative pavement surfacing is satisfactory.		
(e) House numbers painted in layback kerb for every 1 in 3 allotments.		
OTHER MATTERS		
(a) Specific matters in relation to the site. (b) As Constructed details provided; (c) Public Utility certificates provided; (d) Test results in accordance with ITP provided (e) On maintenance programmed works provided		

Inspecting Engineer's Signature: _____ RPEQ No: _____

Name: _____

Consulting Engineer: _____ RPEQ No: _____

Date: _____

Appendices

Appendix F: Stencilled 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 Maroochy 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). *Refer annexure*.

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

Note: Approval is issued by Principal Engineer Strategic Infrastructure Management, Urban Management Division.

Type 2 Treatment (High Friction Surfacing System)

General

High Friction Surfacing system

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

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 20° Celsius.

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

Table 3.A.1 – Binder Material Tests

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

Note: Approval is issued by Principal Engineer Strategic Infrastructure Management, Urban Management Division.

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 G: Bonding Deed

DATE: _____

NAME OF APPLICANT

and

MAROOCHY SHIRE COUNCIL

BONDING DEED

MAROOCHY SHIRE COUNCIL
Department of Planning and Development

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 MAROOCHY 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 the Director Planning and Development, Manager Planning and Subdivision, Manager Building & Plumbing Services, the Manager Strategic Services & Business Units, Manager Maroochy Waters, Team Leader Development Services, Team Leader Subdivision Services, Senior Technical Officer (Network Investment) Maroochy Water, Manager Administration Planning & Development, Team Leader Administration Planning & Subdivision Services and the Team Leader Administration Building & Plumbing Services 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 Councils 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 Maroochy Shire and includes its successors and assigns;

'**Development**' has the meaning given to it by the *Integrated Planning Act 1997*;

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

'**Planning scheme policy**' means the Planning Scheme Policy No. 5 - Operational Works;

'**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:

(a) 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

(b) 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.

(c) 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

MAROOCHY SHIRE COUNCIL

_____

DELEGATED OFFICER
being the proper officer to affix such seal

THE COMMON SEAL of XX)

was hereunto affixed by) _____

_____ a Director and)

_____ a Director)

authorised and in the presence of)

_____

A JUSTICE OF THE PEACE

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.