

TWEED SHIRE COUNCIL

DEVELOPMENT DESIGN SPECIFICATION

D7

STORMWATER QUALITY

VERSION 1.5

SPECIFICATION D7 – STORMWATER QUALITY

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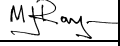




CITATION

This document is named “Tweed Shire Council, Development Design Specification D7 - Stormwater Quality”.

ORIGIN OF DOCUMENT, COPYRIGHT

Prepared in house by Tweed Shire Council.

VERSIONS, D7 STORMWATER QUALITY

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original Version		1 July 2003	
1.2	Amendments to referenced standard drawings Correction large subdivisions & housing developments > 5ha Correction AQUALM Water Quality Variable for Total N from Urban Catchment Correction Table 2, Pollutant Loadings for Total Phosphorus & Total Nitrogen Delete all references to DCP41	D7.03, D7.11-2.2; D7.11-3.2, D7.13.2, D7.13.3. All occurrences of ref to DCP41.	1 June 2004	
1.3	Updated for 4 th Edition of Managing Urban Stormwater Soils and Construction, and AS/NZS 3500.3:2003. Table 7.11-WS: - inclusion of rainwater tanks, swales and bioretention trenches; reduce concession for site impervious percentage and filter strips; place threshold on wetland sizing concessions. Integrated Water Cycle Management encouraged.	All references. D7.02, D7.04, D7.07, D7.10. D7.11, D7.11-2.12, D7.11-2.12 (Table 7.11-WS). D7.A2 Clause 2.2 “Application of Soil Loss Class”	1 August 2005	
1.4	Update references to TUSQMP to apply contemporary treatment measures and water quality objectives in accordance with Water By Design (Healthy Waterways Partnership, SEQ) Update reference and source documents Delete AQUALM modelling guidelines. Amend MUSIC modelling guidelines Delete Deemed to Comply measures for large subdivisions Move DA and CC SWMP and ESCP requirements to Annexure B	D7.01, D7.07A, D7.10 D7.03, D7.09, D7.11 D7.13 D7.11-2.2 D7.06, Annexure B	1 May 2015	
1.5	Add TUSQMP Waterway Stability Objective	D7.07A, D7.09	2 Sept 2016	

DEVELOPMENT DESIGN SPECIFICATION D7

STORMWATER QUALITY

GENERAL

D7.01 SCOPE

1. This specification prescribes stormwater quality measures to be adopted for development requiring consent under the *Environmental Planning and Assessment Act 1979*. It also details requirements for approval of carrying out stormwater drainage works in accordance with s68 of the *Local Government Act 1993*.

Development covered by this specification includes any land development or use which may impact on the quality of runoff and drainage discharging from the site or to any natural or artificial waterway or water body. It includes, but, is not limited to construction, operation and use of:

- (a) Subdivisions
- (b) Buildings, structures and surrounds
- (c) Earthworks, dams, lakes, roadworks and drainage works
- (d) Trenches, pipelines
- (e) Development site works (access roads, car parks, landscaping, drainage works, pedestrian facilities, fencing etc)
- (f) Extractive industries
- (g) Mining

2. Works, operations and landuse covered by this specification must comply with the provisions and stormwater quality standards of the *Tweed Urban Stormwater Quality Management Plan (TUSQMP)*, except where specified and approved by TSC. This specification complements the TUSQMP by detailing standards and prescribed water quality treatment measures that are deemed to comply with the TUSQMP and contemporary best practice. The stormwater objectives provided in this specification apply to new development in Tweed Shire unless there is a catchment specific stormwater objective provided in the TUSQMP or an associated catchment specific study.

3. Land development causes changes to the quantity, flow rate and quality of stormwater discharged from a site. This specification addresses stormwater quality requirements.

In most cases the overall form of land development will be driven by stormwater management concepts that precede commitment to other uses.

Two stages of land development are addressed.

- (a) The short term construction phase where soil disturbance and construction activity greatly increases risk of soil erosion and
- (b) The long-term occupational phase where construction is complete and the land is being operated and used for the purpose it was developed.

Works requiring development consent under the EP&A Act and stormwater drainage works approval under s68 Local Government Act

Relationship to TUSQMP

Stormwater quality management, construction and occupational phases

In some situations these phases will overlap e.g. Staged development, residential development where the subdivision is complete (occupational phase) but dwellings are still in the construction phase.

- | | | |
|----|--|--|
| 4. | The Plumbing Code of Australia (as a deemed-to-satisfy provision) requires stormwater drainage for class 1 - 10 buildings to comply with AS/NZS 3500.3:2015 (Plumbing and drainage – Stormwater drainage). Section 7.51.3 of this standard addresses stormwater quality by the requirement that “ <i>Arresters shall be installed to remove contamination, generally silt, oil, or both, from stormwater prior to discharge to the stormwater drainage network.</i> ” For stormwater quality treatment this specification requires measures that replace the requirements in AS/NZS 3500.3:2015 Clause 7.51.3. | <i>Building Code of Australia and AS/NZS 3500.3:2003 requirements for stormwater drainage</i> |
| 5. | This specification details in Annexure B the information (relating to stormwater quality), required to accompany development applications and construction certificate applications. | <i>Information required with applications</i> |
| 6. | In addition to compliance with this specification, the potential impact of residual pollutants on sensitive receiving environments must be considered. Further investigation of residual and cumulative impacts of stormwater discharge into waterways may be required in accordance with the TUSQMP. | |

D7.02 AIMS

- | | | |
|-----|---|---|
| 1. | Implement the principles of Integrated Water Cycle Management and Water Sensitive Urban Design | <i>IWCM and WSUD</i> |
| 2. | Minimise erosion and discharge of sediment, pollutants and nutrients into the stormwater system. | <i>Minimise pollution</i> |
| 3. | Ensure development and subsequent use of land does not have significant detrimental effects on downstream receiving waters | <i>Effects on ambient receiving waters</i> |
| 4. | Encourage land development design that significantly minimises stormwater pollution and minimises the need for and cost of special water quality control devices. | <i>Design</i> |
| 5. | Prescribe measures to control stormwater quality during the construction phase | <i>Construction</i> |
| 6. | Prescribe requirements for stormwater quality control during the occupational phase | <i>Occupation</i> |
| 7. | Protect the public (including the travelling public) by ensuring all water quality treatment devices and features do not cause a safety risk and comply with the provisions of the <i>Work Health and Safety Act 2011</i> . | <i>Safety</i> |
| 8. | Promote retention and enhancement of natural watercourses, aquatic habitat and riparian vegetation | <i>Retain natural watercourses</i> |
| 9. | Encourage management procedures in the occupational phase (such as litter reduction practices) that reduce the creation of stormwater pollutants and nutrients. | <i>Reduction pollution at source</i> |
| 10. | Prescribe requirements for the operation, maintenance and regular cleaning of stormwater control devices. | <i>Operation procedures</i> |

D7.03 REFERENCE AND SOURCE DOCUMENTS

In cases of conflict or contradiction, unless otherwise specified, the provisions of this Specification will prevail over all reference documents and prevail over all Tweed Shire Council Standard Drawings.

(a) Council Publications

- Tweed Urban Stormwater Quality Management Plan, 2016
- D5 - Stormwater Drainage Design
- C211 - Control of Erosion and Sedimentation
- C273 - Landscaping

(b) NSW State Legislation

- Environmental Planning and Assessment Act 1979
- Local Government Act 1993
- Protection of the Environment Operations Act 1997
- Fisheries Management Act 1994
- Fisheries Management (General) Regulation 2010.
- Policy and Guidelines for Aquatic Habitat Management and Fish Conservation
- Water Management Act 2000
- Soil Conservation Act 1938

(c) Federal Authorities

- AMCORD 1995

(d) State Authorities

- Landcom
 - "Managing Urban Stormwater - Soils and Construction" 4th Edition March 2004
- State Environmental Planning Policy No.14 - Coastal Wetlands.
- NSW Environmental Protection Authority
 - "Managing Urban Stormwater - Council Handbook (Draft 1997)
 - "Treatment Techniques" November 1997
- Assmac
 - "Acid Sulphate Soils Manual", 1998
- The Institution of Engineers, Australia - Queensland Division
 - "Soil Erosion and Sediment Control for Queensland Construction Sites", June 1996.
- Water By Design (SEQ Healthy Waterways Partnership)
 - Water Sensitive Urban Design Technical Design Guidelines for South East Queensland 2006
 - Bioretention Technical Design Guidelines 2014
 - MUSIC Modeling Guidelines, 2010
 - Deemed to Comply Solutions 2010
 - Construction and Establishment Guidelines 2009
 - Developing Design Objectives for Urban Development in South East Queensland (2007)

(e) Standard drawings that apply to this section;

S.D. 101	Stormwater Pollution Removal Pit
S.D. 102	Trash Rack & Sediment Basket Details
S.D. 501	Erosion & Siltation Prevention Devices - Sheet 1
S.D. 502	Erosion & Siltation Prevention Devices - Sheet 2

(f) Australian Standards

AS 1289	- Methods of Testing Soil for Engineering Purposes
AS/NZS 1547:2012	- On-site Domestic - Wastewater Management
AS/NZS 3500.3:2015	- Plumbing and drainage – Stormwater drainage

D7.04 PLANNING & DESIGN PRINCIPLES

1. Planning and design of land development is to be based on water quality objectives to ensure there are no significant adverse stormwater impacts on upstream or downstream land, watercourses and receiving waters.

**General
Principles**

- (a) Existing natural watercourses and riparian vegetation (with appropriate buffer strips) are to be retained and restored. Replacement of natural watercourses with artificial drains or pipes is to be avoided.
- (b) Land use development design will have regard to landform and drainage of the site, the physical characteristics and limitations of soils (including identification of actual and potential acid sulphate soils) and likely impacts on stormwater quality. Water sensitive design principles shall be adopted.
- (c) The principles of integrated water cycle management and water sensitive urban design are to be adopted where practical. Designs shall ensure stormwater runoff discharged from development sites conforms with Council's water quality criteria in accordance with this specification.
- (d) Plans submitted with a development application must be sufficiently detailed to allow the feasibility of stormwater quality management proposals to be assessed.
- (e) Plans submitted with a construction certificate must contain all appropriate engineering drawings, operation / cleaning / monitoring / action / maintenance schedules.
- (f) Where development is proposed to be staged, the DA must provide details of proposed staging of stormwater quality management proposals.

**ICWM and
WSUD**

2. **Plans Required.**

The following stormwater quality plans are required to accompany development applications and construction certificate applications (refer to Annexure B for details):

Development Applications

- (a) Preliminary Erosion And Sediment Control Plan (ESCP-P) for the construction phase of development
- (b) Preliminary Stormwater Management Plan (SWMP-P) for the occupational or use stage of the development.

Construction Certificate Applications

- (a) Erosion And Sediment Control Plan (ESCP) for the construction phase of development
- (b) Stormwater Management Plan (SWMP) for the occupational or use stage of the development.

**ESCP and
SWMP required
with DA and
Construction
Certificate
applications**

3. Where it is practical, water quality features are to be designed into the land development site rather than rely on special end of pipe devices to strip pollutants and nutrients from stormwater prior to discharge. Typical water quality features that can be designed into the site development include use of porous pavements, directing runoff over filter strips or grass swales in landscaped areas, utilising landscaping as an integral part of stormwater quality management, maximising use of infiltration where compatible with the soil type, and stormwater reuse. These features can be complemented by site management practices which minimise creation of stormwater pollutants and nutrients and provide for appropriate operation, cleaning and maintenance of water quality control devices.
- "At Source"
Water quality features to be designed into land development**
4. To treat stormwater to the required standard, end of pipe stormwater treatment devices are to be used where additional treatment is required. The treatment devices proposed should take into account the likely pollutants and ease/cost of maintenance.
- "End of pipe"
devices for additional treatment**
5. CODE OF PRACTICE FOR SOIL AND WATER MANAGEMENT ON CONSTRUCTION WORKS
- Unless otherwise authorised by Council, all ESCPs must adopt and incorporate the *Code of practice for soil and water management on construction works* contained in Annexure A of this specification and all land development shall comply with its requirements.
- Code of practice for soil and water management on construction works**

D7.05 DESIGN GUIDELINES, INCORPORATING PRINCIPLES OF THIS PLAN

- (a) Where practical developments should incorporate the following design guidelines into the layout and management of stormwater for the site:
- (i) preserve existing ecosystems and topographic natural features, and restore natural watercourses, aquatic habitat and riparian vegetation
 - (ii) use water catchments as the basis of subdivision planning
 - (iii) maximise stormwater reuse and recycling
 - (iv) minimise surface runoff by use of porous pavements
 - (v) maximise dispersion of runoff by grading impervious hardstand areas to direct surface runoff to grassed (filter strips) or landscaped areas
 - (vi) utilise surface depressions for onsite detention
 - (vii) provide grass swales adjacent to roads and driveways instead of kerb and gutter or underground stormwater systems (refer note below)
 - (viii) pass surface runoff over grassed filter strips prior to collection in concrete drains
 - (ix) divert roof runoff from street drainage systems by maximising use of infiltration for runoff disposal and ground water recharge, where soil type is compatible.
 - (x) incorporate stormwater management into landscaping, use landscaped areas for filtering runoff, swale drains, wetlands, retention, detention and infiltration
 - (xi) adopt management procedures that minimise generation of stormwater pollution (e.g. litter, packaging, stockpile management)
 - (xii) use bunded, impervious areas where contaminants are used or stored to prevent contaminated water from entering stormwater system. Collect and dispose of contaminated water as trade waste to sewer (as appropriate)

- (xiii) if the above means are insufficient to achieve acceptable quality, incorporate end of pipe devices (GPTs, litter baskets or racks etc) to improve stormwater discharge

Note: Road side swales are not preferred as a substitute for kerb and gutter

- where on street parking is required, unless cars can be excluded from swale area
- on roads serving small lots with numerous driveways
- where longitudinal gradients are <1% or >5%

D7.06 DELETED

D7.06A DESIGN STORM EVENTS

1. Except where specified in this document, the minimum design storm for construction phase erosion and sediment control devices and occupational phase stormwater quality control devices is the 3 month ARI event. ***Design storm event***
2. Analysis by Gold Coast City Council has established that the rainfall intensity in this region for a design ARI of 3 months is 0.50 of the 1 year ARI intensity. The reduction of intensity (from 1 year to 3 months) will also reduce the runoff coefficient by around 20% resulting in Q3 months being approximately 40% of Q1 year. ***Runoff from ARI 3 month storm***

For the purpose of this specification, in construction and occupational phases, Q3 months shall be deemed to be 40% of Q1 year.

Note: For the Tweed Shire area, this amends the proposition in Landcom and EPA manuals which seem to be based on low rainfall areas and suggest that Q3 months is 25% of Q1 year.

3. Where practical all devices should be located off stream with flows above the design ARI storm being bypassed. ***Major events***
4. All devices shall be designed to incorporate measures such as overflow structures and high flow bypasses to cater for the 100 year ARI storm, to ensure no erosion, scouring or structural damage to the device and no remobilisation of previously captured pollutants.

D7.07 DELETED

D7.07A WATER QUALITY OBJECTIVES

1. Construction phase erosion and sediment control measures must achieve the following water quality objectives (WQOs) for site runoff up to the design storm event: ***Construction Phase WQOs***
 - (a) Maximum suspended solids concentration in stormwater does not exceed 50mg/l
 - (b) pH is in range 6.5 - 8.5

2. Occupational phase stormwater quality control measures must achieve the WQOs in Table D7.07-WQO for site runoff mean annual pollutant loads

Occupational Phase WQOs

The WQO's in table D7.07 are based on Water By Design's "Water Sensitive Urban Design Objectives for Urban Development"

Council may impose alternate water quality objectives on specific development sites if the receiving water body is subject to an adopted management plan or program that makes such recommendations.

Table D7.07-WQO - Tweed Shire Council Water Quality Objectives	
Pollutant	Minimum reductions in mean annual load from unmitigated development (%)
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	90%

Note 1: These WQOs supersede those contained in Section A5.4.7 of Development Control Plan Section A5 - Subdivision Manual.

Note 2: When a constructed wetland is adopted as the primary treatment device in a treatment train the TSS and TN objectives may be relaxed to 75% and 40% respectively as per appendix D of the TUSQMP 2015.

3. All development covered by the scope of this specification must demonstrate compliance with the WQOs in 1 and 2 above for the construction and operational phases.

4. Occupational phase stormwater management plans must demonstrate compliance with WQOs in one of two ways:

Demonstrating Compliance

a) Incorporating MUSIC stormwater quality modelling, in accordance with D7.13.

b) Adoption of appropriately designed and constructed "deemed to comply" measures in accordance with D7.11.

5. A Waterway Stability Management objective applies where run-off from or within the site passes through or drains to unlined channels, waterways (non-tidal) or wetlands. Where applicable, development will be required to limit the post-development peak 1 year ARI event discharge within the receiving waterway to the predevelopment 1 year ARI (60 minute) event discharge.

Waterway Stability Management

CONSTRUCTION PHASE

D7.08 SOIL AND WATER MANAGEMENT ON CONSTRUCTION SITES - EROSION AND SEDIMENT CONTROL

1. The construction phase includes the period from initial site disturbance until the time all construction is complete, all disturbed areas have been full revegetated and all permanent water quality control features have been installed and become occupational. The construction phase may overlap the occupational phase, particularly in staged developments. Stormwater quality works in the construction phase are focused on erosion and sediment control. **Construction phase,**
2. The aims of erosion and sediment control are: **Erosion and Sediment Control**
 - (a) Limit/minimise the amount of site disturbance
 - (b) Isolate the site by diverting clean upstream "run on" water around the development
 - (c) Control runoff and sediment at its point source rather than at one final point
 - (d) Stage ground disturbance/earthworks and progressively revegetate the site where possible to reduce the area contributing sediment
 - (e) Retain topsoil for revegetation works
 - (f) Locate sediment control structures where they are most effective and efficient
3. Soils and water quality management during the construction phase of development is to be in accordance with above aims, the Erosion and Sediment Control Plan approved by the Construction Certificate and *Annexure A - Code of practice for soil and water management on construction works* **To be in accordance with aims, approved ESCP and Code.**
4. The primary reference manual for soils and water quality management during the construction phase of development is Landcom's publication "*Managing Urban Stormwater - Soils and Construction*" 2004, the secondary reference manual shall be "*Soil and Sediment Control - Engineering Guidelines for Queensland Construction Sites 1996*" The Institute of Engineers, Australia, Queensland Division. **Landcom Publication**

OCCUPATIONAL PHASE

D7.09 PERMANENT WATER QUALITY CONTROL FEATURES & DEVICES

1. The occupational phase occurs after development construction is completed (or partially completed) and the land is occupied and/or used for the purpose it was developed. The occupational phase may overlap the construction phase, particularly in staged developments **Occupational phase**

2. Unless stated otherwise, for the occupational phase of development references in brackets refer to
- (Ref 1, Section No.) - EPA publication *“Managing Urban Stormwater - Treatment Techniques, November 1997”*.
- (Ref 2, Chapter No.) - Water By Design (Healthy Waterways Partnership) Water Sensitive Urban Design Technical Design Guidelines for South East Queensland 2006.
- (Ref 3, Section No.) - Water By Design (Healthy Waterways Partnership) Bioretention Technical Design Guidelines 2014
- All devices are to be designed and sized in accordance with these reference manuals unless otherwise directed by this specification.
3. Unless otherwise specified in D7, all stormwater quality control features and devices are to be located on the site to be developed, retained in private ownership and operated by the owner/occupier.
4. Where land is to be subdivided by strata or community title, stormwater quality treatment devices are to be located on common land and operated, regularly cleaned and maintained by the body corporate.
6. In development (such as in subdivisions) where eventual ownership will be dispersed, it will be necessary to locate water quality devices in land to be dedicated to the public, such devices shall conform with the following additional criteria
- (a) The type, number and location of devices shall be selected to ensure minimum long-term asset ownership costs.
 - (b) Devices shall be located in reserves or easements benefiting Council.
 - (c) Devices shall be located for easy cleaning and maintenance access by vehicles and personnel.
 - (d) Devices located off street are to be provided with sealed access and manoeuvring areas (located on easements) for cleaning/maintenance vehicles and equipment
 - (e) Best quality materials and construction methods shall be used to ensure maximum life expectancy of device components.
 - (f) Litter racks, baskets and metal components in contaminated or corrosive areas shall be fabricated from stainless steel. Use of other non-corrosive materials will be subject to Council approval.
 - (g) Litter racks and non-proprietary GPTs shall be designed for self-cleansing and automatic movement of litter to storage bins. Litter/gross pollutant storage bins shall be constructed of reinforced concrete and designed for convenient access and cleaning by mechanised means (e.g. excavator, backhoe, suction truck).
 - (h) Where access for cleaning is required by means of hatches, doors or lids they shall be constructed in high strength/lightweight materials with lockable/easy opening fastening devices
 - (i) All devices shall be designed to minimise risk to operators and the public and shall be in accordance with the requirements of the Work Health and Safety Act 2011. A person-proof fence shall enclose devices, where there is risk to the public or where the operation of the device is at risk from interference from the public.
- Reference manuals, standards & design criteria**
- Devices on private property**
- Devices on strata common land**
- Water quality treatment devices in the public realm**

- (j) The sizing of devices shall be increased (where necessary in excess of the size obtained using the references used in this specification) to ensure cleaning out is required on average no more than 6 times per year
7. Constructed wetlands are to be designed in accordance with Ref 2, Chapter 6. General configuration is to contain the following basic components in series from upstream to downstream: **Constructed wetlands**
- (a) Inlet zone (as well as inlet structures (high flow bypass), to contain litter rack for final removal of litter and gross pollutants)
 - (b) Deep water zone (to remove sediments - gravel, sand, silt)
 - (c) Macrophyte zone (to remove fine pollutants and nutrients)
 - (d) Outlet zone
- and around the edges:
- (e) Littoral zone (edge water plants, bank protection, maintenance access)
8. In addition to the requirements of Ref 2, Chapter 6, constructed wetlands in Tweed Shire are to conform to: **Design criteria for constructed wetlands**
- (a) Appropriate length: width ratio to avoid short circuiting of flows and maximise hydraulic efficiency.
 - (b) Surface area sizing - wetlands are to meet or exceed the minimum treatment area (excluding areas for maintenance access, landscaping, fencing etc.) as determined by MUSIC modelling in accordance with D7.13
 - (c) Provide perimeter all weather maintenance access road
 - (d) Wetland to be enclosed in security fence where there is a risk to the public
 - (e) Wetlands are to be designed to ensure that trapped pollutants are not remobilised in storm events of up to Q100.
 - (f) Constructed wetlands, and all permanent open water bodies, shall incorporate measures to discourage the breeding of cane toads. This may be dense planting of sedge grasses in the littoral zone or permanent 'cane toad fencing'. Temporary cane toad fencing (may be sediment control fencing) will be required during the establishment phase.
 - (g) Constructed wetlands must be protected from sediment build-up during the construction and/or house building phases of development using one of the methods outlined in Water by Design's Construction and Establishment Guidelines 2009 section 4.5
9. Infiltration trenches and basins (Ref 2, 7) shall be designed in accordance with the following design criteria **Infiltration**
- (a) Infiltration area is to be sized with a safety factor of 2 (this is to allow for long-term deterioration in infiltration rate).
 - (b) Runoff entering infiltration trenches/basins shall be pre-treated to remove sediment and gross pollutants.

- (c) The infiltration rate for infiltration devices shall be determined as follows
 - (i) Conduct percolation tests on the site in accordance with Appendix G of AS/NZS 1547:2012, On-site Domestic-wastewater management,
 - (ii) if the above yields a result <6m/day, this rate may be used for design.
 - (iii) if the result is >6m/day, the rate for design may not exceed 6m/day unless this rate is confirmed by independently determining the coefficient of permeability of the soil in accordance with AS 1289.6.7.3. Notwithstanding these tests, the maximum infiltration rate that may be used for design purposes is 12m/day.
- (d) For water quality treatment, as a minimum requirement, trenches are to be sized to accommodate the ARI 3 month design storm and infiltrate this storm within a 24 hour period (with a safety factor of 2), before surcharging occurs
- (e) Where infiltration trenches/basins are to be used for disposal (as opposed to treatment) of runoff, sizing will depend on volumetric objectives.
- (f) Where practical, infiltration trench surcharge (from storm events with runoff greater than trench capacity) is to be directed onto grass filter areas on the site and graded so that it discharges to the street (or interallotment drain) in un-concentrated, overland sheet flow.

10. Bioretention basins and swales shall be designed in accordance with Ref 3. Bioretention devices are to be used in preference to proprietary treatment devices, where topography and urban design permits. In addition to the requirements of Ref 3, bioretention basins and swales shall:

Bioretention systems

- (a) Bioretention systems must be protected from sediment build-up during the construction and/or house building phases of development using one of the methods outlined in Water by Design's Construction and Establishment Guidelines 2009 section 3.7

11. Where the waterway stability management objective is applicable, developments must provide detention with storage capacity and discharge control to limit the post-development peak 1-year ARI event discharge within the receiving waterway to the pre-development peak 1-year ARI (60 minutes) event discharge.

Waterway Stability Management

The methods outlined in table 2-3 of Water by Design's Water Sensitive Urban Design - Developing Design Objectives for Urban Development in South East Queensland (2007) shall be used to demonstrate compliance.

D7.10 WATER QUALITY AND TREATMENT STANDARDS

Tweed Urban Stormwater Quality Management Plan (TUSQMP) defines acceptable performance criteria for stormwater quality treatment in the occupational or use phase of development. Since April 2000, when the first TUSQMP was published, considerable research on water quality parameters and treatment efficiencies has been undertaken in South East Queensland by the Healthy Waterways Partnership. Version 1.4 of this specification adopted updated water quality objectives for Tweed Shire based on accepted "best practice" removal efficiencies of water sensitive urban design treatment trains. Treatments in accordance with the "deemed to comply" provisions of this specification are deemed to comply with these criteria.

Water quality treatment standards

Where modelling is to be used to determine if developments comply with stormwater quality performance criteria, the rainfall data sets and modelling parameters to be used shall comply with D7.13, in order to demonstrate compliance with Council's water quality objectives in table D7.07-WQO.

D7.11 "DEEMED TO COMPLY" STORMWATER QUALITY TREATMENT FOR THE OCCUPATIONAL PHASE OF DEVELOPMENT*Deemed to Comply solutions*

The following water treatment measures are deemed to comply with the performance criteria in the *Tweed Urban Stormwater Quality Management Plan* and Council's water quality objectives.

7.11-1. PARKING AREAS, DRIVEWAYS & OTHER HARD STAND AREAS*Parking areas, driveways, hard stand areas*

The following measures are required

- (a) Litter baskets or pits (Ref 1, 4.1) or litter racks (Ref 1, 4.2) are to be installed to ensure all gross pollutants and litter greater than 50mm are retained.
- (b) Porous pavements (Ref 1, 5.7) are to be used, where possible, to maximise infiltration
- (c) Where practical and consistent with other land use requirements, grassed swale drainage (Ref 2, 2) is to be used in preference to pipes or hard lined channels.
- (d) Where possible, stormwater is to be disposed of by infiltration (Ref 1, 5.5 and Ref 2, 7)
- (e) For remaining stormwater - oil, sediment, nutrients and pollutants are to be removed by means of
 - (i) Filter strips (Ref 1, 5.1) providing 9 minute average residence time, or
 - (ii) Bioretention swales and/or basins (Ref 3) with a minimum filter media area of 1.5% of the contributing catchment, or
 - (iii) Proprietary treatment devices in accordance with D7.12.

7.11-2. SUBDIVISIONS*Subdivisions***7.11-2.1 SMALL SUBDIVISIONS (Residential <50 lots or Other <5ha)***Small subdivisions <50 lots or < 5ha*

The following measures are required

7.11-2.11 Road and street drainage, gross pollutants

Where consistent with other land use requirements, grassed swale drainage (Ref 2, 2) is to be used in preference to pipes or hard lined channels.

Note: Swales are not preferred as a substitute for kerb and gutter

- (a) where on street parking is required, unless cars can be excluded from swale area
- (b) on roads serving small lots with numerous driveways
- (c) where gradients are <1% or >5%

Litter and gross pollutants greater than 50mm are to be retained by means of litter baskets or pits (Ref 1, 4.1) or litter racks (Ref 1, 4.2). These devices are to be sized to require cleaning on average not more than six times per year, based on a yield of 1cu.m/ha/year.

Whilst a sufficient number of litter/gross pollutant collection devices shall be provided to ensure all road stormwater is screened for litter and gross pollutants, the number of devices shall be minimised. Where practical, devices will be located downstream of entry pits at locations servicing a minimum 50 lots.

7.11-2.12 Sediment and nutrient pollutant removal

Where swale road drainage is adopted under 2.11, additional treatment for sediment and nutrient pollutants can be achieved by provision of bioretention swales (Ref 2, 3 and Ref 3).

Where conventional piped road drainage systems are adopted, bioretention basins (Ref 2, 5 and Ref 3) are the preferred end of pipe treatment for sediment and nutrient pollutants. In lieu of modelling, the deemed to comply bioretention filter media area shall be 1.5% of the contributing catchment

Council will also accept stormwater management designs that comply with Water by Design's *Deemed to Comply Solutions 2010*

In areas where the provision of bioretention swales or basins has been demonstrated within the development application to be unfeasible or impractical, proprietary treatment devices may be installed to remove sediment, and oil/grease from stormwater. Many proprietary devices also remove and contain gross pollutants and litter; hence they are commonly referred to as gross pollutant traps (GPTs). Provided a GPT meets the performance standards of D7.11-2.11, separate litter baskets are not required in the road drainage system.

The number of devices shall be limited to minimise long-term asset ownership costs.

Refer to D7.12 for design requirements for proprietary treatment devices.

Devices shall be designed with easy access for maintenance and cleaning out by mechanical plant.

Inlet devices are required to ensure flows in excess of the design storm are bypassed around the treatment device (to eliminate risk of remobilisation of captured sediments)

7.11-2.2 LARGE SUBDIVISIONS (Residential >50 lots or Other >5ha)

Large subdivisions stormwater management shall be designed in accordance with Water by Design Guidelines, incorporating best management practices, and supported by comprehensive stormwater management plans

MUSIC modelling, in accordance with section D7.13 shall be submitted to demonstrate compliance with the water quality objectives specified in section D7.07A

For the purposes of concept design for large subdivisions, a nominal 5% of contributing urban catchment area should be set aside in appropriate locations for stormwater quality treatment facilities, to be refined later with detailed design of an appropriate treatment train, and associated MUSIC modelling.

**Large
subdivisions
>50 lots or >5ha**

7.11-3. RESIDENTIAL DEVELOPMENTS - MULTI DWELLING HOUSING, RETIREMENT VILLAGES, COMMUNITY TITLE RESIDENTIAL DEVELOPMENT

Multi dwelling housing, retirement villages

7.11-3.1 Housing Development <50 Dwelling Units or <5ha

<50 dwelling units or < 5ha

Requirements are as for 7.11-2.1. The provisions of 7.11-2.11 apply to internal road and street drainage. All stormwater quality treatment devices must be located on property owned by the proponent and operated, regularly cleaned out and maintained in accordance with schedules submitted to and approved by Council.

7.11-3.2 Housing Development >50 Dwelling Units or >5ha

>50 dwelling units or >5ha

Requirements are as for 7.11-2.2. The provisions of 7.11-2.11 apply to internal road and street drainage. All stormwater quality treatment devices must be located on property owned by the proponent and operated, regularly cleaned out and maintained in accordance with schedules submitted to and approved by Council.

7.11-3. Recreation areas, golf courses >1ha

Proposals for recreation areas, playing fields and golf courses etc. larger than 1 ha must specify establishment, operational and source control procedures that, combined with stormwater runoff treatment, result in net pollutant export from the property (via surface runoff and/or disposal to ground water table) that does not exceed the water quality objectives in Table D7.07-WQO

Applications must demonstrate they can comply with the above by modelling in accordance with D7.13. Such modelling shall consist of source modelling to estimate likely pollutant loads and control modelling to estimate the ability of proposed control measures to reduce pollutant loads. The rainfall data set to be used in modelling shall be in accordance with D7.13.

SPECIAL REQUIREMENTS

D7.12 PROPRIETARY STORMWATER TREATMENT DEVICES

7.12.1 Sizing of Proprietary Treatment Devices

Proprietary devices, Downstream Defender, Humeceptor, Ecosol Unit, etc.

Where other stormwater treatment measures are found to be unfeasible or impractical and proprietary stormwater devices such as Rocla Downstream Defender, Humeceptor, CDS Unit, Ecosol Unit or the like are to be used as a substitute the following "deemed to comply" minimum sizing guidelines will apply:

For pollutants generated from exposed catchment areas:

Sedimentation Tank Capacity 9m³ per impervious hectare. This volume is to be calculated as the volume of the settling tank, below exit invert and includes sediment storage volume, but, excludes oil storage volume.

Oil Storage Capacity 2m³ per impervious hectare.

For pollutants generated from undercover or basement areas:

Combined sediment tanks and oil storage capacity to retain no less than 0.5m³ per 1000m² of undercover / basement area.

The minimum retained volume of any treatment device is 0.75m³.

7.12.2 DELETED

7.12.3 Maintenance of Proprietary Treatment Devices

Maintenance

Devices shall be designed with easy access for maintenance and cleaning out by mechanical plant. It is a condition of approval for private devices that they be adequately maintained, with evidence of cleaning required to be submitted annually to Council. All captured pollutants must be disposed at an approved landfill.

D7.13 MUSIC MODELLING

7.13.1 Tweed Standard Rainfall Data Set

Rainfall data set for MUSIC modelling

For the purpose of ensuring consistency when modelling proposed developments to determine annual stormwater pollutant loads per hectare, development proponents must use the Tweed Standard Rainfall Data Set, available from Council's website. The data set has 6-minute rainfall readings for the 1973 - 1984 period.

7.13.2 DELETED

7.13.3 MUSIC Modelling Parameters

Parameters to be used in MUSIC model

Stormwater pollution modelling using MUSIC software is to use the following standard criteria.

- (a) The Tweed Standard Rainfall Data Set
- (b) MUSIC model parameters are to be in accordance with Water by Design (SEQ Healthy Waterways Partnership) MUSIC modelling guidelines 2010

7.13.4 Tweed Shire Water Quality Objectives

Water Quality Objectives

Using the above parameters, MUSIC modelling shall be used to demonstrate that the subject development achieves, as a minimum, the water quality objectives in Table D7.07-WQO.

ANNEXURE A

CODE OF PRACTICE FOR SOIL AND WATER MANAGEMENT ON CONSTRUCTION WORKS

(Source: Derived from "Appendix M: Model Code Of Practice For Soil & Water Management on Urban Lands" of "Managing Urban Stormwater, Soils and Construction", Landcom 4th Edition 2004, and "Soil and Sediment Control - Engineering Guidelines for Queensland Construction Sites 1996" The Institute of Engineers, Australia, Queensland Division, and amended for Tweed Shire conditions.)

D7.A1 General

- 1.1 Stormwater quality works in the construction phase are focused on erosion and sediment control.

The aims of erosion and sediment control are:

- (a) Minimise soil erosion and exposure
- (b) Minimise transportation of eroded soil by air and water
- (c) Limit suspended solids concentration in stormwater to not more than 50mg/l
- (d) Limit/minimise the amount of site disturbance
- (e) Isolate the site by diverting clean upstream "run on" water around the development
- (f) Control runoff and sediment at its point source rather than at one final point
- (g) Stage ground disturbance/earthworks and progressively revegetate the site where possible to reduce the area contributing sediment
- (h) Retain topsoil for revegetation works
- (i) Locate sediment control structures where they are most effective and efficient

- 1.2 The owner of land being developed is responsible for erosion and sediment control on the site and the actions of all persons (including employees, plant operators, contractors, subcontractors, delivery drivers etc) who may cause erosion and sediment generation. This also includes responsibility for erosion and sediment generation on adjacent land where construction activities or materials have encroached on the adjacent land.

- 1.3 The **primary** reference manual for erosion and sediment control works in this code of practice shall be "*Managing Urban Stormwater, Soils and Construction*" Landcom 4th Edition, 2004.

The **secondary** reference manual shall be "*Soil and Sediment Control - Engineering Guidelines for Queensland Construction Sites 1996*" The Institute of Engineers, Australia, Queensland Division. Construction works must also comply with the requirements of Tweed LEP 2000 clause 35 which regulates works (including drainage) on areas identified as having acid sulphate soils and the provisions of the "*Acid Sulphate Soil Manual, 1998 - Assmac*".

Reference numbers in brackets [Ref1..] refer to sections of the **primary** reference manual, reference numbers in brackets [Ref2..] refer to sections of the **secondary** reference manual .

D7.A2 Preparation of ESCP

2.1 Steps in preparation of ESCP

To prepare an ESCP the following steps are to be considered:-

- (a) Location of disturbance and non-disturbance zones, minimising extent and duration of disturbed areas
- (b) Location of fencing and signage for non-disturbance and buffer zones
- (c) Location and controls on construction entry/exit points
- (d) Location of site office, parking, stockpile and material storage areas
- (e) Determine and locate drainage and sediment controls for d)
- (f) Location temporary construction roads
- (g) Division of site into manageable drainage sectors
- (h) Staging, and programming (soil loss class constraints) of construction works for compatibility with ESCP in each drainage sector
- (i) Clean water management strategies for each drainage sector (diversion around disturbed, stockpile and risk areas)
- (j) Controls for channelised flow velocities
- (k) Erosion controls on each disturbed area
- (l) Control of sediment laden runoff
- (m) Control of sediment in surface runoff at site boundaries
- (n) Trapping of sediment within the development
- (o) Location and operation of sediment basins
- (p) Dust control measures
- (q) Revegetation program
- (r) Installation and decommissioning schedule
- (s) Maintenance and monitoring program
- (t) Assessment of effectiveness of ESCP in terms of soil loss (RUSLE) and impact on receiving waters

2.2 Application of Soil Loss Class

The soils on the development site shall be classified as follows

Soil Loss Class	Calculated soil loss (tonnes/ha/year As calculated by RUSLE)
1	0 to 150
2	151 to 225
3	226 to 350
4	351 to 500
5	501 to 750
6	751 to 1,500
7	>1,501

The ESCP shall use soil loss class data to ensure that works are seasonally programmed to keep soil loss below the rate of 37.5 tonnes/hectare/year in any 2-week period. The times when a regular suite of BMPs are normally adequate to keep soil loss within this range are:

Period	Soil Classes That May Be Developed
January	1 – 5
February and March	1 – 4
April and May	1 – 5
June, July, August, September October and first half November	1 – 6
Second half November and December	1 – 5

at other times the ESCP must ensure soils in these classes are revegetated or otherwise protected

2.3 ESCP plans shall use standard drawing symbols in [Ref 2, A8]

D7.A3 Clearing Vegetation, Soil Disturbance

3.1 The removal or disturbance of trees, shrubs and ground covers shall be minimised.

3.2 Buffer zones consisting of corridors of undisturbed vegetation adjacent to waterways or disturbed area are to be retained to reduce nutrient levels in runoff, unless these areas are protected by other means. Buffer zones are to have the following minimum widths:-

Slope %	Buffer Width in Metres
2	15
4	20
6	30
8	40
10	50
12	60
14	70

3.3 On construction/building sites:

- (a) The footpath or nature strip must not be disturbed by construction activities other than shown on the plan for:
 - (i) access to the site
 - (ii) installation of services
 - (iii) other works specifically approved by Council; and

- (b) Removal and disturbance of vegetation must be confined to:
 - (i) the approved envelope area and/or permanent access ways
 - (ii) areas within 3 metres of the outermost projection of approved works and storage areas (or as required by other authorities).

Retained vegetation and buffers must be protected by a suitable fence barrier. Fenced areas shall be clearly signposted "No Access Area".

3.4 For subdivision work:

- (a) Clearing for works must be limited to 2 metres from the edge of any essential construction activity as shown on the engineering plans
- (b) Where practical, development must be phased, with clearing undertaken only with the development of each stage; and
- (c) Understorey ground cover vegetation may be slashed, except in areas shown on the plan, providing ground surface disturbance is minimised and a rubber tyred vehicle is used.

3.5 All reasonable care must be taken to protect other vegetation from damage during construction. This will involve:

- (a) Clearly marking trees to remain
- (b) Avoiding compaction of ground or filling within the drip-line of trees to be retained
- (c) Clearly delineating the area of disturbance and keeping all vehicles, building materials and refuse within that area
- (d) Limiting the number of access points to the site
- (e) Clearly restricting access to "no go" areas.

3.6 No vegetation is to be removed prior to approval of Council to start work on any stage, and not before the approved sediment control measures are in place.

3.7 Where practicable vegetative debris must be salvaged either as logs or woodchip for later reuse to control erosion or to rehabilitate the site. Non-salvageable material, such as stumps and roots, can be removed.

3.8 Soil disturbance activities are to be in accordance with [Ref 1] Chapter 4.2 of the manual, slope lengths on batters are not to exceed those in [Ref 1] fig 4.7 and fig 4.8.

D7.A4 Access and Roads

4.1 Vehicular access must be confined to a maximum of two locations. Such locations will be shown on the ESCP and subject to the approval of Council.

4.2 Unless notified otherwise by Council, access for construction sites less than 1 hectare shall be fitted with a shakedown device

The shakedown device shall be either:-

- (a) a shaker grid (metal bar cattle grid minimum length 7m), placed to ensure vehicles crossing the grid have sufficient speed to shake off mud and contaminants from vehicles or

- (b) a 10m long shake down area constructed with 75mm diameter crushed rock

- 4.3 Unless notified otherwise by Council, access to construction sites of 1 hectare or more shall be fitted with a shakedown device

The shakedown device shall be a combination of:-

- (a) a shaker grid (metal bar cattle grid minimum length 7m), placed to ensure vehicles crossing the grid have sufficient speed to shake off mud and contaminants from vehicles and

- (b) a 10m long shake down area constructed with 75mm diameter crushed rock

- 4.4 The shakedown device shall be located along the haul route, immediately before the intersection with the public road.

Regular maintenance of shake down devices is required to ensure no material is deposited on public roads. Metal shall be cleaned/replaced when the exposed height of aggregate is less than 300mm.

Shaker grids are required on sites where more than 1,000m³ of material per month is hauled off site.

Shakedown areas are performance based and may be subject to change or amelioration as directed by Council.

If material is deposited on a public street, it shall be swept up and removed before the end of that working day.

- 4.5 If after using shakedown device, material is still adhering to truck wheels and being deposited on public roads, a wheel washing device must be installed and used at site exit locations to ensure no further material is carted off site and deposited on public roads.

- 4.6 Runoff from access surfaces must be drained into an adjacent sediment-trapping device before leaving the site. Where appropriate, devices to remove soil particles from vehicles must be placed at site exit locations.

- 4.7 On subdivision work, priority must be given to road and shoulder stabilisation based on erosion hazards. Where circumstances preclude the sealing of road shoulders and/or the construction of kerb and gutter, and:

- (a) where grades permit grass shoulders (less than 5%), the shoulders and associated table drains must be topsoiled and turfed, having dimensions that simplify maintenance mowing; and
- (b) where grades do not permit grass shoulders (more than 5%), the shoulders and associated table drains must be stabilised with appropriate erosion control measures (e.g. jute mesh and bitumen, cross drains, erosion matting etc.) and revegetated.

- 4.8 On subdivision work newly sealed hardstand areas must be swept thoroughly after sealing/surfacing to prevent excess aggregate or gravel entering street drains.

D7.A5 Site Works, Erosion Control

- 5.1 Site disturbance must not be undertaken before the issue of appropriate approvals

- 5.2 Construction sequence shall be generally in accordance with [Ref 2] A4.8.

5.3 Schedule the construction program to minimise the potential for soil loss so that at the time from the beginning of land disturbance activities to rehabilitation is minimised.

Further on lands with a high erosion hazard:

- (a) confine land disturbance to those times of the year designated in 2.2 for each soil loss class
- (b) or show special measures on the *Plan* to address the high erosion hazard

5.4 Site excavation must be designed and located to minimise cut and fill.

5.5 Runoff and erosion controls must be installed before clearing and must include:

- (a) Diversion of upslope runoff [Ref 1, 5.4.3, 5.4.4] around cleared and/or disturbed areas or areas to be cleared and/or disturbed, providing that:
 - (i) such diverted water will not cause erosion
 - (ii) the upslope catchment area is more than 2,000 square metres
 - (iii) waters are diverted to a legal point of discharge

Diversion works are to be designed to carry peak flows at non-erosive velocities in bare soil, vegetated or lined drains/banks. Generally, the channel should be lined with turf. However, where velocities are designed in excess of 2m per second, non-erosive linings such as concrete, geotextiles, grouted rock etc or velocity reducers (check dams etc) are required.

- (b) Sediment control fences or other measures at the downslope perimeter of cleared and/or disturbed areas to prevent unwanted sediment and other debris escaping from the land; and
- (c) Maintenance of all erosion control measures at operational capacity until land is effectively rehabilitated.

5.6 On sites where more than 1,000 square metres are to be disturbed, runoff and erosion controls must also include:

- (a) Protection of areas to remain undisturbed through the erection of barrier fencing; and
- (b) The maximum length of exposed (disturbed) slope shall be

Max Slope length = $90 - 48[\log(\%slope)]$ metres

% Slope	Max Slope Length (m)	% Slope	Max Slope Length (m)	% Slope	Max Slope Length (m)
1	90	10	42	19	29
2	75	11	40	20	28
3	67	12	38	25	23
4	61	13	37	30	19
5	56	14	35	35	16
6	52	15	34	40	13
7	49	16	32	45	11
8	47	17	31	50	8
9	44	18	30	60	5

- 5.7 Where possible, topsoil must be stripped only from those areas designated on the *Approved Plan*, and must be stockpiled for later use in rehabilitation and landscaping. Site topsoil shall be isolated from subsoil material in separate stockpiles.
- 5.8 Stockpiles (topsoil, spoil, subsoil, bricklayers loam, sand or other) must :
- (a) not be located on public footpaths, nature strips, roads, road shoulders or any other public land;
 - (b) be located at least 2 metres from any hazard areas, including surfaces with grades greater than 15%, zones of concentrated flow, gutters, drains, driveways, tree drip zones, swales or standing vegetation;
 - (c) be protected from upslope surface flows;
 - (d) be provided with sediment filters downslope; and
 - (e) be provided with a protective cover that reduces the C-factor [Ref 1, Appendix M] on bare surface areas to 0.15 or less where they are unlikely to be worked for more than 20 working days.
- 5.9 Fill batters should be located to avoid established trees, where this is not possible a tree surgeons advice is to be followed to minimise damage. Where retention is not possible affected trees are to be removed to reduce risk to slope stability.
- 5.10 Unless directed otherwise by approved plans and specifications, trenches must be backfilled and compacted to 95% standard compaction and capped with topsoil up to adjoining ground level and must be turfed or sown with an approved seed and fertiliser mix.
- 5.11 Excess spoil may be retained on site provided the stockpile area is prepared by stripping topsoil from beneath the fill site and respreading it later over affected areas.
- 5.12 All sedimentation control measures must be maintained at, or above their design capacity.
- 5.13 High efficiency dust control techniques must be employed on site on an as needs basis to prevent the emission of dust from the site [Ref 1 6.3.10]. Such techniques must be applied to the movement of soil, sand, all excavated areas, stockpiles, haul roads and ramps, and to any other areas or applications where the potential for dust generation exists. These control techniques may include the use of water sprays, application of dust suppressants, surface stabilisation or covering exposed surfaces. Dust control techniques must be employed on site at all times including outside normal working hours. All permanent roads and trafficable areas must be sealed or hard surfaced to minimise dust generation. Unless an exemption from Council is obtained, all sites where over 1,500 sq m are to be disturbed must be provided with a barrier fence wind break [Ref 1 6.3.6(b)(iv)].

D7.A6 Stormwater Control

- 6.1 When roof structures and piped or artificial stormwater systems are in place, discharge water is to be managed in a manner that reduces the likelihood of erosion. Roof water systems must be functional and discharge to the stormwater system before roof runoff begins. The stormwater system must prevent sediment from being eroded from the site and deposited downstream.

D7.A7 Sediment Control

- 7.1 All sediment control measures and facilities must be installed and stabilised before other site earthworks or measures are commenced including stormwater diversion facilities.

- 7.2 Sediment basin(s) must be constructed where the area to be developed exceeds 1 hectare. Where it is less than 1 hectare, other sediment control devices may be accepted.
- 7.3 Silt fences, hay bales and other sediment filters. Design shall generally be in accordance with [Ref 1] Chapter 6.3.7 of the manual and manual standard drawings SD6.7 - 6.12 except as varied by the following criteria:-
- (a) Maximum flow in to the silt fence from a design ARI 3 month storm (deemed to be 40% of the ARI one year event), is not to exceed 1.6l/sec/metre (or the maximum catchment per metre of fence etc is not to exceed 45 m²), and
 - (b) The fence or structure must be structurally viable and able to support hydraulic pressures during the ARI 100 year storm.
 - (c) Maximum post spacing 2m or 3m with wire mesh backing
 - (d) In fences or structures longer than 30m, spill through weirs shall be installed at 20-30m spacing
 - (e) Spill through weirs shall consist of a rock filled wall contained between an enclosed steel mesh fence retaining wall. Weir length 1.2m, thickness 0.6m, height 0.5m. Rock shall be 25-50mm aggregate.
 - (f) Sediment is to be removed after each rainfall event and weirs are to be regularly maintained and cleaned to ensure effective operational condition.
 - (g) Straw bales and silt fence geotextiles are to be replaced when damaged or permanently blocked and fully replaced at not more than six monthly intervals.
- 7.4 Where sediment ponds are required these are to be constructed upstream of any wetponds/wetlands or receiving waters and preferably off line.
- 7.5 A marker must be placed within each sediment retention basin to show the level above which the design capacity occurs. Plans shall indicate whether basins are to be temporary or permanent.
- 7.6 Where sediment retention basins are required, they must be designed to treat the design rainfall event sediment-laden stormwater emanating from the site during land development works. They must remain in place and fully operational until removal is authorised or required by Council (usually at the end of the maintenance period). Where required as part of a permanent, public stormwater management system, basins located on public land (or land to be dedicated to the public), may be accepted for Council ownership. Where required as part of a permanent, site stormwater management system, basins located on the site must be retained, operated and maintained in perpetuity by the landowner.
- 7.7 Sedimentation Basins - Design shall generally be in accordance with [Ref 1] Chapter 6.3.3 of the manual and manual standard drawings SD6.1 - 6.4 except as varied by the following criteria
- (a) Overflow/bypasses to be designed for 100 year ARI storm. Basins are to be designed so that flows greater than the ARI 3 month storm (deemed to be 40% of the ARI one year event) are transmitted in a manner that does not remobilise and remove existing settled sediment.
 - (b) Type C basins settling zone capacity, design storm the ARI 3 month storm (deemed to be 40% of the ARI one year event).
 - (c) Type F/D basins settling zone capacity, that necessary to contain the 75th percentile, 5 day rain event (41.5mm)

- (d) Type C basin sediment storage zone capacity, the greater of 100% of the settling zone capacity or the average 2 month soil loss as calculated by the RUSLE.
- (e) Type F/D basins sediment storage zone capacity, the greater of 50% of the settling zone capacity or the average 2 months soil loss as calculated by the RUSLE.
- (f) Basins shall be surrounded by a man-proof fence with lockable gates.
- (g) Proprietary devices (Humeceptors etc) will only be accepted in lieu of conventional sedimentation basins where they are sized in accordance with the above criteria.

7.8 Where eroding soils contain more than 10% of dispersible fines:

- (a) All waters captured in sediment basins must be treated with an approved flocculating agent. This treatment is to ensure that discharges from such basins contain no more than 50 milligrams per litre of non filtrable residues (or as specified in Council's Stormwater Management Plan). Following settlement of soil materials, the structure must be pumped out using a floating skimmer collection device.
- (b) Sediment retention basins must be maintained at a low water level in readiness for treatment and discharge of further runoff. All sediment captured in basins must be treated and discharged within 5 days of the cessation of a rainfall event; and
- (c) A minimum stockpile of flocculating agents must be retained onsite to provide for at least three complete treatments. It must be stored in a secure undercover location.

7.9 All sediment control structures must be operated and maintained in an effective operational condition following good engineering practice. These structures must not be allowed to accumulate sediment volumes in excess of 70% sediment storage design capacity. Materials removed from sediment retention basins must be disposed of in a manner approved by Council that does not cause pollution.

7.10 All weather compacted gravel vehicular access must be provided to all wetlands, sediment basins, detention basins, trash racks and gross pollutant traps etc.

7.11 Where practical surface waters from undisturbed lands must be diverted away from pollution control equipment to prevent contamination of clean runoff.

7.12 Appropriate measures must be provided to ensure that erosion and sediment control works themselves do not cause flooding, erosion or scour.

7.13 Work adjacent to Water Bodies

Without appropriate controls, earthworks adjacent to water bodies may lead to the introduction of sediment into the water-body. Typical works include bridgeworks, road embankments, wharves/jetties, boat ramps, culverts/drains/headwalls/pits, revetment walls, utility installations, etc.

These works must be carried out in a manner that prevents sediment being transported to the adjacent water body.

Methods of controlling earthworks adjacent to water bodies include:-

- (a) Using a floating sediment fence to isolate polluted waters (the sediment fence must extend from the floats on the water surface to the bed of the water body to fully contain the polluted water).
- (b) Water filled dams can be used to exclude water from the work area.
- (c) Embankments and other works can be constructed behind a barrier (e.g. water inflated dam, sheet piling) and surfaces fully restored before removal of barrier.
- (d) Water may be excluded or diverted from the site by coffer dams or other measures to enable construction in a water free environment. (This will require techniques for coffer dam (or other diversion systems) installation and removal that do not in themselves lead to production of sediment).
- (e) Bridge abutment works can be constructed behind appropriate sediment barrier and control systems.

D7.A8 Pollution Control

- 8.1 Petroleum and other chemical products and must be prevented from entering the stormwater system or contaminating the soil. Impervious bunds must be constructed around all fuel, oil or chemical storage areas with an enclosed volume large enough to contain 110% of the volume held in the largest tank.
- 8.2 Adequate trade waste and litter bins must be provided onsite and serviced regularly.
- 8.3 Concrete wastes or washings from concrete mixers must not be deposited in any location where those wastes or washings can flow, or can be washed into any areas of retained vegetation or receiving waters.

D7.A9 External Site Requirements

- 9.1 In some circumstances it may be necessary to locate sediment control devices or stabilising works outside the construction site.
- 9.2 Where increased stormwater run-off is likely to accelerate erosion of any downstream watercourse, the necessary remedial work shall be provided concurrently with other sediment and erosion requirements.
- 9.3 Where sediment is likely to be transported from the site, all immediate downstream drainage inlets shall have appropriate controls installed.
- 9.4 If such works require entry onto private property, written permission shall be obtained prior to the entry and commencement of such works. Documentary evidence to be submitted with the development application.
- 9.5 All disturbed areas on other property to be reinstated to original condition and to the satisfaction of the owner. All works to be complete prior to the release of the linen plan of subdivision or building certificate.

D7.A10 Rehabilitation and Landscaping

- 10.1 All ground disturbed must be progressively stabilised and rehabilitated so it no longer acts as a source of sediment.
- 10.2 The C-factor [Ref 1 Appendix M] is to be reduced to less than 0.15 (e.g. greater than 50% grass cover) on all lands, stockpiles and other exposed materials scheduled to remain unattended for a duration of more than 20 working days.

- 10.3 The final rehabilitation or landscaping program is to be scheduled so that a duration of less than 20 working days will elapse from final land shaping to permanent rehabilitation.
- 10.4 All landscaping and rehabilitation must be completed before occupation or use of buildings or premises.
- 10.5 Topsoil shall be used in accordance with [Ref 1] Chapter 4.3 of the manual.
- 10.6 Revegetation shall be in accordance with [Ref 1] Chapter 7 of the manual.
- 10.7 All temporary erosion and sedimentation control works are to be removed when works are completed and revegetation is successfully established on formerly disturbed areas. All redundant materials used for temporary erosion and sedimentation control works are to be removed from the site and all affected areas reinstated.

D7.A11 Operation, Maintenance

- 11.1 All erosion and sediment controls must be operated in accordance with the ESCP and maintained to be fully operational at all times. Worn, damaged or otherwise defective materials and components are to be repaired, refurbished or replaced as they become ineffective for their design purpose.
- 11.2 Where more than 2,500 square metres of land are disturbed, a self auditing program must be developed for the site. A site inspection self audit and monitoring program must be undertaken by the land developer:
- (a) at least each week
 - (b) immediately before site closure
 - (c) immediately following rainfall events that cause runoff.
- 11.3 The self-audit must be undertaken systematically on site (e.g. walking anticlockwise from main entrance) and recording:
- (a) installation/removal of any erosion and sediment control device
 - (b) the condition of each device employed (particularly outlet devices), noting whether it is likely to continue in an effective condition until the next self audit
 - (c) circumstances contributing to damage to any devices, accidental or otherwise
 - (d) storage capacity available in pollution control structures, including:
 - (i) waste receptacles and portable toilets
 - (ii) trash racks
 - (iii) sediment barriers and traps
 - (iv) gross pollutant traps
 - (v) wetlands/water quality control ponds
 - (e) time, date, volume and type of any additional flocculants
 - (f) the volumes of sediment removed from sediment retention systems, where applicable, and the site where sediment is disposed
 - (g) maintenance or repair requirements (if any) for each device

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- (h) circumstances contributing to the damage to device
- (i) repairs affected on erosion and pollution control devices

11.4 Signed, completed self audits, original test results, weekly and other result sheets shall be kept on site and are to be available on request to Council officers and other relevant statutory authorities.

D7.A12 Monitoring

12.1 Stormwater monitoring shall take place at all locations where drainage or surface water leaves the site or enters any natural or artificial receiving waters and at other locations as directed by Council or other statutory authority. Samples shall be taken and tested as follows:

Parameter	Frequency	Reporting
Suspended Solids, Non Filterable Residue (NFR)	monthly or during discharge event (defined as >25mm in any 24 hour period)	as per 11.4. Non complying test results are to be notified within 24 hours to Council officers
pH	<ul style="list-style-type: none"> • if in acid sulphate soils risk area, daily or during controlled discharge event • in areas with no identified acid sulphate risk, monthly and during controlled discharge event from sedimentation basins 	as per 11.4. Non complying test results are to be notified immediately to Council's Environmental & Health Services Unit
Total P, Total N	3 monthly	as per 11.4

D7.A13 Response to Monitoring, Non Compliance with ESCP, Amelioration Measures

13.1 Non compliance with Approved *Plans* and conditions of consent must be dealt with immediately. If there is a breach or infringement of conditions, action will be taken consistent with the nature and seriousness of the breach or infringement. Action may include:

- (a) issue of "stop work notice"
- (b) a fine under the provisions of the Protection of the Environment Operations Act 1997
- (c) notice to comply pending reinspection of the site.

13.2 Standard responses to Non Compliance

The following responses are required by the developer to non complying monitoring test results:

Indicator	Response	Comments
pH too low <6.5	<ul style="list-style-type: none"> • If possible stop discharge and store runoff on site • Respond in accordance with approved acid sulphate management plan or if no plan then • lime dose as per Acid Sulphate Soil Manual (Assmac), restore to acceptable pH before further discharge • Notify Council's Environmental and health Services Unit of non compliant discharge (within 24 hours) 	Reporting as per section 12
pH too high >8.5	<ul style="list-style-type: none"> • If possible stop discharge and store runoff on site 	

	<ul style="list-style-type: none"> • Dilute with other water until pH in acceptable range • re-test for compliance before further discharge 	
Suspended Solids (NFR) >50mg/litre	<p>Identify if non compliance is due to storm event greater than design storm of control devices. If so accept non compliance. If not then:-</p> <ul style="list-style-type: none"> • If possible stop discharge and store runoff on site • Use flocculation agents to lower NFR or • Pump contaminated water over grassed filter strips or buffer areas to lower NFR • Identify (by inspection and/or analysis) if non compliance is due to damage or ineffectiveness of erosion and sediment control devices. Repair or redesign/replace if necessary (or required by Council) to ensure future compliance. 	<p>Non compliance may occur, by design, in > 3month (deemed to be 40% of the ARI one year event)</p>

ANNEXURE B

PLAN REQUIREMENTS

D7.B1 WHAT PLANS MUST ACCOMPANY A DEVELOPMENT APPLICATION

1. The DA must include a preliminary erosion and sediment control plan (ESCP-P) for the construction phase of development and a preliminary stormwater management plan (SWMP-P) for the occupational or use stage of the development.

ESCP-P and SWMP-P must accompany DA

The stormwater management requirements for the operational phase of extractive industries and mines involving ground and soil disturbance, stockpiling, processing and transport of materials will generally be in accordance with the “construction phase” requirements of this specification.

2. **The ESCP-P (for all development except single dwellings and duplexes) shall include**

What a preliminary erosion and sediment control plan (ESCP-P) must contain

- (a) Adoption of the *Code Of Practice For Soil And Water Management On Construction Works* contained in Annexure A
- (b) Plans of external and internal catchments
- (c) Site layout to include
 - (i) preliminary plans showing existing site topography and final contours with cut and fill locations identified. property boundaries and lot lines
 - (ii) general staging of works
 - (iii) location of site works, facilities and access
 - (iv) erosion risk mapping - identification of low, medium, high and extreme erosion risk areas
 - (v) topographic site limitations which may include:- excessive slope gradients; unstable or hazardous terrain; flood inundation areas; rock outcrops; active coastal dune systems; land subject to wave attack; existing erosion; water bodies; drainage problem areas; areas of potential mass movement.
- (d) Vegetation layout
 - (i) general location, nature and condition of existing vegetation
 - (ii) location plan of protected trees and bushland, non disturbance areas, buffer zones, disturbance control fencing and limits of clearing
 - (iii) revegetation landscape plan (including staging)

- (e) Soil properties
 - (i) location and limitations of major soil types on site
 - (ii) identification of all known areas of dispersive soils (more than 10% being dispersive)
 - (iii) the R and K factors for the RUSLE and Soil Loss Classes (delineated where more than one class occurs)
 - (iv) soil hydrologic group [*Managing Urban Stormwater, Soils and Construction* Landcom 4th Edition 2004 - Appendix F]
 - (v) soil texture group (Type C, F or D)
- (f) Drainage
 - (i) preliminary plans of both temporary and permanent drainage, including design/capacities of major drains, identification of all proposed temporary and final overland flow paths, and any proposed diversions of overland flow paths or watercourses from the site. Lawful point of discharge, easements/land required for lawful discharge
- (g) Preliminary erosion and sediment control proposal including
 - (i) site specific text overview and design philosophy of erosion and sediment control proposal
 - (ii) location (on plans), type and function of drainage, erosion and sediment control measures (the location plans must include areas external to the site where these areas impact or are impacted upon by the drainage or ESCP of the subject site). Preliminary calculations of sedimentation pond sizing.
 - (iii) timetable, integration/sequencing of ESCP with staging of works,
 - (iv) preliminary RUSLE calculations to evaluate current annual soil loss and likely annual soil losses from the proposed development incorporating the proposed ESCP
- (h) Preliminary acid soil management plan (if applicable)
- (i) Details of receiving waters including quality characteristics.
- (j) Preliminary assessment of effects of construction phase of development on receiving waters.
- (k) Preliminary details of proposed water quality monitoring program.
- (l) If the development proposal is for a subdivision containing "master lots" ie. large lots to be further subdivided under a future DA, then the ESCP-P must be prepared containing details of erosion and sediment controls for each "master lot", independent of the ESCP-P for any other lots.

3. The ESCP-P (for single dwellings and duplexes) shall include

- (a) Adoption of the *Code of practice for soil and water management on construction works* contained in Annexure A
- (b) Proposed erosion and sediment control plan showing:- erosion and sediment control proposals; where surface runoff and drainage discharges off the site; site boundaries; contours (or levels) of the site; proposed drainage; location of trees and vegetation; accesses; proposed buildings and impermeable areas; areas to be disturbed; areas to be restored; topsoil stockpile areas; other stockpile and/or storage areas.

What a preliminary erosion and sediment control plan (ESCP-P) for single dwellings and duplexes must contain

4. The SWMP-P shall include

- (a) Plans of external and internal catchments
- (b) Plans showing location of natural watercourses, riparian vegetation and aquatic habitat, an assessment of their environmental values and proposals for their retention and enhancement
- (c) Plans of general site stormwater system, including proposed legal point of discharge
- (d) Stormwater quality control and treatment proposals (types of controls and treatment devices, indicative sizing of devices) and a report on how the principles of water sensitive design have been incorporated into the development proposal.
- (e) Assessment of current stormwater discharge quality and/or average annual pollutant/nutrient loads (if applicable)
- (f) Estimates of the likely stormwater pollutant/nutrient loads from proposed land uses and estimates of the ability of proposed control measures to reduce pollutant/nutrient levels to required standard. Where other than deemed to comply measures (D7.11) are proposed, these estimates are to be based on modelling.
- (g) Preliminary litter and gross pollutant management plan. Developments which have practices that are likely to generate substantial volumes of litter and gross pollutants eg. fast food outlets, shops (throw away food utensils, plastic bags, packaging etc) must submit a preliminary plan that; estimates the annual volume of litter and gross pollutants to be generated by the development; proposes procedures and management practices for its collection, reuse and/or disposal; and demonstrate how these pollutants can be collected and disposed of in a manner that does not adversely impact on stormwater quality or Council's maintenance budget.
- (h) Overview of operation, cleaning, harvesting, maintenance requirements for water quality control features and devices to be located on both private and public land.
- (i) Future public asset management costs. Estimated annual costs for the above devices which are proposed to be located on land dedicated (or to be dedicated) to the public, such costs to include annual costs and depreciation. (Note: proposed development which is likely to result in an excessive asset management cost burden to Council may be refused consent)
- (j) If the development proposal is for a subdivision containing "master lots" ie. large lots to be further subdivided under a future DA, then the SWMP-P must be prepared for stormwater quality proposals for each "master lot", independent of the SWMP-P for any other lots.

What a preliminary stormwater management plan (SWMP-P) must contain

5. **The SWMP-P (for single dwellings and duplexes) shall include**

- (a) Proposed measures to minimise stormwater runoff to public streets or drains (eg. disposal of roof water by infiltration, use of porous paving, reducing runoff to the street by grading driveways and hardstand areas to tip runoff onto grassed areas on the allotment)
- (b) Proposed measures to treat stormwater prior to discharge to the public drainage system (eg. use of grass filter strips to reduce pollutants in runoff from hardstand areas).

What a preliminary Stormwater Management Plan (SWMP-P) for single dwellings and duplexes must contain

Note: The SWMP-P must demonstrate a genuine attempt to minimise and treat stormwater runoff from the dwelling site, given the constraints of the buildings and topography.

D7.B2 WHAT PLANS MUST ACCOMPANY A CONSTRUCTION CERTIFICATE & SECTION 68 LOCAL GOVERNMENT ACT APPLICATION

1. The Construction Certificate Application must include a detailed erosion and sediment control plan (ESCP) for the construction phase of development and a detailed stormwater management plan (SWMP) for the occupational or use stage of the development.

ESCP and SWMP must accompany Construction Certificate application

The stormwater management requirements for the operational phase of extractive industries and mines involving ground and soil disturbance, stockpiling, processing and transport of materials will generally be in accordance with the “construction phase” requirements of this specification.

2. An application to Council, vide section 68 of the Local Government Act 1993 is required to carry out any of the following:

ESCP must accompany LGA s68 application to carry out erosion and sediment control works

- (a) s68h1: Connect a private stormwater drain to a public drain: *This includes*
 - (i) connecting roofwater or hardstand drainage from private property to a Council drain or kerb and gutter
 - (ii) installing a pipe to carry the above across a public road, road reserve, footpath or nature strip
- (b) s68h2: Install a permanent stormwater quality control device in a private drainage system, that will ultimately discharge to a public stormwater drainage system. This includes installation of :
 - (i) Gross pollutant traps (GPT)
 - (ii) Sediment trapping devices
 - (iii) Litter and gross pollutant racks, baskets or screens
 - (iv) Oil and grease trapping devices

This approval is for one year only, annual renewal of this approval is required

- (c) s68h2 renewal: Obtain annual renewal of approval for permanent stormwater quality control device in private drainage system
- (d) s68h3: Carry out erosion and sediment control works

Plans required are

- (a) S68h1 application
 - (i) 3 copies of site plan of property and adjacent footpath/road drawn at a scale of 1:200, showing proposed buildings, hardstand areas, landscaped areas, internal stormwater drainage system and proposed connection to the public drainage system. Surface details are required where the private drain crosses public land (to determine restoration requirements)
 - (ii) 3 copies of a detailed engineering plan of the connection of the private drain to the public drainage system
 - (iii) 3 copies of longitudinal section of the section of private drain crossing the road reserve to include details of pipe diameter, type & class, depth, cover, backfill and restoration of surfaces
- (b) s68h2 application
 - (i) 3 copies of site plan of property and adjacent footpath/road drawn at a scale of 1:200, showing proposed buildings, hardstand areas, landscaped areas, internal stormwater drainage system and proposed permanent stormwater quality control devices
 - (ii) 3 copies of detailed engineering plans of the proposed permanent stormwater quality control devices
 - (iii) 3 copies of operating, cleaning and maintenance manuals/schedules for the proposed permanent stormwater quality control devices. This information must include the following as a minimum: Inspection frequency; Clean out frequency; How devices are to be cleaned including list of necessary labour, plant & equipment; Disposal procedures and location for cleaned out waste products.
- (c) s68h3 application
 - (i) 3 copies of the site erosion and sediment control plan (ESCP) as required by D7.07-3 or D7.07-4.

3. **The ESCP (for all development except single dwellings and duplexes) shall include**
- (a) Adoption of the *Code Of Practice For Soil And Water Management On Construction Works* contained in Annexure A
 - (b) Plans of external and internal catchments

What a detailed erosion and sediment control plan (ESCP) must contain

- (c) Site layout to include
 - (i) plans showing existing site topography and final contours with cut and fill locations identified, property boundaries and lot lines
 - (ii) staging of works, including staging of site clearing and topsoil stripping
 - (iii) location of all site access points, parking areas, site facilities and on site roadways/tracks
 - (iv) location of site storage and stockpile areas (sand, gravel, topsoil, building materials, fuel etc)
 - (v) utility plans
 - (vi) erosion risk mapping - identification of low, medium, high and extreme erosion risk areas
 - (vii) topographic site limitations which may include:- excessive slope gradients; unstable or hazardous terrain; flood inundation areas; rock outcrops; active coastal dune systems; land subject to wave attack; existing erosion; water bodies; drainage problem areas; areas of potential mass movement.
- (d) Vegetation layout
 - (i) general location, nature and condition of existing vegetation
 - (ii) location plan of protected trees and bushland, non disturbance areas, buffer zones, disturbance control fencing and limits of clearing
 - (iii) revegetation landscape plan (including staging)
- (e) Soil properties
 - (i) location and limitations of major soil types on site
 - (ii) identification of all known areas of dispersive soils (more than 10% being dispersive)
 - (iii) the R and K factors for the RUSLE and Soil Loss Classes (delineated where more than one class occurs)
 - (iv) soil hydrologic group [*Managing Urban Stormwater, Soils and Construction* Landcom 4th Edition, 2004 - Appendix F]
 - (v) soil texture group (Type C, F or D)
- (f) Drainage
 - (i) plans of both temporary and permanent drainage, including design/capacities, identification of all proposed temporary and final overland flow paths, and any proposed diversions of overland flow paths or watercourses from the site

- (g) Erosion and sediment control proposal including
 - (i) site specific text overview and design philosophy of erosion and sediment control proposal
 - (ii) location (on plans), type, function, and timing (instigation and decommissioning) of all drainage, erosion and sediment control measures (the location plans must include areas external to the site where these areas impact or are impacted upon by the drainage or ESCP of the subject site). Preliminary calculations of sedimentation pond sizing.
 - (iii) timetable, integration/sequencing of ESCP with staging of works, detailed RUSLE calculations to evaluate current annual soil loss and likely annual soil losses from the proposed development incorporating the proposed ESCP
 - (iv) water quality monitoring program with water quality criteria goals, parameters to be monitored, monitoring locations, monitoring frequency
 - (v) proposed response to failure of system and non-compliance with discharge quality standards.
 - (vi) reporting procedures
- (h) Acid soil management plan (if applicable)
- (i) Details of receiving waters including quality characteristics.
- (j) Assessment of effects of construction phase of development on receiving waters.
- (k) Procedures for amending the ESCP

4. The ESCP (for single dwellings and duplexes) shall include

(Note: For single dwellings and duplexes, the requirements of the ESCP submitted with the construction certificate are identical to those for the ESCP-P submitted with the development application.)

- (a) Adoption of the *Code of practice for soil and water management on construction works* contained in Annexure A
- (b) Proposed erosion and sediment control plan showing:- erosion and sediment control proposals; where surface runoff and drainage discharges off the site; site boundaries; contours (or levels) of the site; proposed drainage; location of trees and vegetation; accesses; proposed buildings and impermeable areas; areas to be disturbed; areas to be restored; topsoil stockpile areas; other stockpile and/or storage areas.

What a erosion and sediment control plan (ESCP) for single dwellings and duplexes must contain

5. The SWMP (for all development except single dwellings and duplexes) shall include

- (a) Text and plan overview of stormwater management plan to incorporate SWMP-P proposals (submitted with DA) as amended by conditions of development consent.
- (b) Overview plans of drainage system, including details of size and location of all major system elements.
- (c) Plans for retention and enhancement of natural watercourses, riparian vegetation and aquatic habitat

What a detailed stormwater management plan (SWMP) must contain

- (d) Detailed design and sizing of each proposed water quality control measure required to reduce pollutant/nutrient levels to required standard. The design must be sufficiently site specific to identify and assess each quality control device and its contribution catchment(s). Where other than deemed to comply measures (D7.11) are proposed, the sizing of water quality control devices is to be based on modelling.
- (e) Drawings (including details of size, location, function and processes) of all permanent water quality control features and devices. (Note: full engineering drawings and specifications are required, but, these do not have to be included with the SWMP and may be included with other engineering drawings and specifications)
- (f) Manuals for above containing operation, cleaning and maintenance procedures for each device or feature.
- (g) Final litter and gross pollutant management plan. Developments which have practices that are likely to generate substantial volumes of litter and gross pollutants eg. fast food outlets, shops (throw away food utensils, plastic bags, packaging etc) must submit a final plan (based on the preliminary plan submitted with the DA and as modified by conditions of consent) which details procedures and management practices for collection, reuse and/or disposal of litter and gross pollutants; including systems to ensure these practices are implemented and contingency plan in the event that these procedures break down.

6. **The SWMP (for single dwellings and duplexes) shall include**

(Note: For single dwellings and duplexes, the requirements of the SWMP submitted with the construction certificate are identical to those for the SWMP-P submitted with the development application.)

- (a) Proposed measures to minimise stormwater runoff to public streets or drains (eg. disposal of roof water by infiltration, use of porous paving, reducing runoff to the street by grading driveways and hardstand areas to tip runoff onto grassed areas on the allotment)
- (b) Proposed measures to treat stormwater prior to discharge to the public drainage system (eg. use of grass filter strips to reduce pollutants in runoff from hardstand areas).

Note: The SWMP must demonstrate a substantial attempt to minimise and treat stormwater runoff from the dwelling site, given the constraints of the buildings and topography.

(Source: Derived from "Appendix M: Model Code Of Practice For Soil & Water Management on Urban Lands" of "Managing Urban Stormwater, Soils and Construction", Landcom 4th Edition 2004, and "Soil and Sediment Control - Engineering Guidelines for Queensland Construction Sites 1996" The Institute of Engineers, Australia, Queensland Division, and amended for Tweed Shire conditions.)

What a Stormwater Management Plan (SWMP) for single dwellings and duplexes must contain