



FNQROC DEVELOPMENT MANUAL

DESIGN MANUAL

D5

STORMWATER QUALITY MANAGEMENT

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GENERAL

D5.01 SCOPE

1. This section sets out the minimum standards for the management of stormwater quality related to land development and sub-division activities that are subject to development assessment in accordance with an applicable council planning scheme.
2. The manual sets out the requirements for the management of both long term and short-term water quality impacts.

D5.02 OBJECTIVES

1. Management of water quality is founded on the need to protect the baseline water quality to ensure that there is no risk to public health and minimise the stresses placed on the ecosystems within and reliant on waterways within the catchment.
2. In recognition of the impacts that development may have on the quality of water within the waterways, the over-riding objective for water quality management is to minimise the potential for development activity to cause harm to the environment / receiving waters.
3. The key principles adopted for water quality management to achieve the objective are:
 - (a) Assessment and mitigation of risks to waterway health and public safety
 - (b) Minimisation of increase in flows arising from the development of land for urban use;
 - (c) Stabilisation of the stream profile to maintain hydraulic capacity and ensure public safety;
 - (d) Ensuring that the quality of the water within the waterways throughout each catchment is consistent with the ecological needs of the environment and the health needs of the community, and that environmental values are preserved;
 - (e) Vegetative enhancement of the riparian zone to ensure the overall stability of the waterways throughout each catchment and improve its resistance to contaminants;
 - (f) Adoption of appropriate management practices for the control of erosion and sedimentation for the period that a development site is disturbed
 - (g) Adoption of appropriate stormwater treatment in line with the Water Quality Design Objectives (State Planning Policy)
 - (h) Promotion of active community involvement in both the use and protection of the waterway;
 - (i) Development of a community appreciation of waterways as a living asset; and
 - (j) Development of a community based stream monitoring and management program.

D5.03 TERMINOLOGY

1. **ESC** refers to Erosion and Sediment Control, for example ESC measures are practices and devices used to minimise erosion and control sediment transport.
2. An **ESCS** is an Erosion and Sediment Control Strategy. It is a document, which details the acceptable management practices and strategies to be employed during the construction period of the development. The ESCS must be prepared by an appropriately qualified consultant to be submitted with Operational Works applications

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3. An **ESCP** is an Erosion and Sediment Control site plan, including explanatory notes detailing the site specific controls for the management of erosion and sediment transport.
4. **SQIDs** are Stormwater Quality Improvement Devices, which shall be a propriety product, or an alternative, which complies with requirements as, determined by Council.
5. **WSUD** Water Sensitive Urban Design is method for sustainably managing water resources including integrating SQIDs into development and management of waterway health.

D5.04 REFERENCE AND SOURCE DOCUMENTS

Note: Where Acts or reference documents are updated, reference should be made to the current version.

QLD Government Legislation

- Environmental Protection Act,
- Environmental Protection (Water) Policy
- Sustainable Planning Act
- State Planning Policy
- Queensland Water Quality Guidelines

Department of Natural Resources (jointly with Brisbane City Council & IMEAQ).

- Queensland Urban Drainage Manual, Volumes 1 & 2.

Brisbane City Council

- Water Quality Management Guidelines

Water by Design (Healthy Land and Water) (refer waterbydesign.com.au/resources)

- MUSIC Modelling Guideline
- Bioretention Technical Design Guideline
- Wetland Technical Design Guideline
- WSUD Construction and Establishment Guideline
- WSUD Asset Management and Handover Guideline
- Waterbody Management Guidelines
- Stormwater Harvesting Guidelines

International Erosion and Sediment Control Association

- Best Practice Erosion and Sediment Control (BPESC) document

PERMANENT (LONG TERM) WATER QUALITY WORKS

D5.05 GENERAL

1. Water quality issues related to land use or changes in land use are long-term issues and are addressed by long term, or permanent measures involving policy and planning.
2. Water quality issues relevant to development can be divided into two distinct categories ie site based issues and catchment-based issues.

D5.06 CATCHMENT BASED WATER QUALITY ISSUES

1. Catchment based water quality issues are common throughout an entire catchment, or subcatchment, and are outside the responsibility of any particular development or individual.
2. Catchment and subcatchment infrastructure will generally be focussed on the removal of suspended solids, nutrients heavy metals etc which may not be intercepted by site based infrastructure.
3. Management of these issues will generally be covered by an applicable Catchment Drainage Management Plan, which incorporate Stream Management and Stormwater Quality Management Plans.

D5.07 SITE BASED WATER QUALITY ISSUES

1. Site-based water quality issues refer to impacts or potential impacts from a particular development or land use that may affect the long-term water quality either locally or elsewhere within the catchment.
2. Site based infrastructure will be required to address the impacts identified in the Water Quality Report.
3. Site based infrastructure will be focussed on interception of pollutants such as suspended solids (80%), gross pollutants (90% >3mm), phosphorus (60%), nitrogen (40%), hydrocarbons prior to their entry into drainage systems and water ways. (Refer SPP Appendix B)
4. Site based issues are dealt with by interception solutions ie stormwater quality interception devices (SQIDs) such as bioretention basins, constructed wetlands, water wise street trees, swales, proprietary interceptors, trash racks, sedimentation basins, etc which will be permanent works to be incorporated into the design of the subdivision / development. Works may be developed in stages in conjunction with the staging of the development.
5. The default bio-retention treatment area to comply with load reduction targets is 1.5% of the total contributing catchment area being developed unless there are site specific investigations (i.e. MUSIC modelling) that show a lessor area will meet the stormwater management design objectives.
6. Degraded waterways (Scheduled or Gazetted under the Environmental Protection (water) Policy) may seek alternative discharge management objectives to achieve waterway stability. For peak flow for the 100% AEP event, use collocated storages to attenuate site discharge rate of stormwater.

D5.08 ACCEPTABLE DESIGN SOLUTIONS

1. All developments are required to include appropriate interception devices that ensure removal of suspended matter (litter) and treatment of contaminated stormwater prior to crossing the boundary of the development or discharge into downstream roadside gutters, stormwater drainage systems or waterways.
2. As mandated by the State Planning Policy, water quality improvement devices or a combination of interception devices and treatments are required to remove at least 90% of total suspended solids (litter) of

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size greater than 3.0mm as well as sand, 80% of total suspended sediment, 60% of total phosphorus, and 40% of nitrogen and shall be configured to prevent re-injection of captured contaminants.

3. Where approved by Council, Vegetated Stormwater Treatment (e.g. bioretention, swales and constructed wetlands) should be designed and constructed in accordance with the Water by Design technical and design guideline documents listed in reference documentation.
4. Where proprietary products (i.e. GPTs) are specified, they will require a manufacturer's performance guarantee as to the removal of foreign matter from stormwater and structural adequacy of the unit. The use of proprietary Wet Well Gross Pollutant Traps (GPT's) will not be accepted as a means of treating dissolved nitrogen and phosphorus.
5. Water quality improvement devices or a combination of interception devices and treatments are required to treat all first flush runoff, which shall be defined as that volume of water equivalent to the runoff from the 3 month ARI storm event (60% of the 1 year ARI storm event).
6. The location of the interception devices within the drainage system is to be planned to ensure that the first flush waters from all parts of the site are treated.
7. Water Quality Infrastructure may be located within a dedicated road reserve or other public space, the latter subject to approval by Council. Infrastructure within a dedicated road reserve is to be adjacent to the carriageway. Infrastructure within other public spaces shall be provided with a suitable formed and sealed access and maintenance area.
8. Interception devices shall be fitted with a basket/s or other collection facilities, which shall be sized and configured to enable removal with a maximum wet, full weight of the collection facility is to be not greater than 2 tonnes. Preference is for those solutions that can be serviced with the use of a vacuum truck.
9. Interception devices are to be designed to provide for routine cleanout at three monthly intervals. The design of the Interception device(s) shall not compromise the hydraulic performance of the overall drainage system.
10. Interception devices are to be designed to allow for economic and efficient maintenance operations. Multiple small scale devices at drainage system inlets will not be acceptable. Interception devices should generally be located at outlets to downstream trunk drainage, waterways or receiving waters.
11. A concrete access and hardstand area adjacent to the SQID must be provided to allow maintenance vehicles to carry out maintenance safely and effectively.

CONSTRUCTION PHASE (SHORT TERM) WATER QUALITY WORKS

D5.09 GENERAL

1. As well as considering the protection of long term water quality resulting from changes in land use designers are also required to consider the impacts on water quality resulting from the construction phase of a development for the period from when the site is initially disturbed until it is stabilised by permanent works.
2. Construction phase water quality works relates to temporary works and management measures required to manage a development site during periods when the site is disturbed to minimise the potential for release of Pollutants / Contaminants / Sediments to downstream properties and / or receiving waters.
3. The objective for the management practices to be applied during the time when sites are disturbed is:

“To minimise the potential for construction activities to cause harm to the environment / receiving waters.”
4. The requirements for implementation of management practices applies to all sites (i.e. subdivision and building sites) that involve disturbing of earth irrespective of size, timing for construction and / or the approval processes which preceded the construction. The extent of the management practices required will be influenced by consideration of the risk, which will take into account the scope of the works, the timing of works and other site specific factors.
5. The developer shall be held responsible for the rectification works required to clean up all pollutants and sediments that may leave the site as a result of construction activities (e.g. removal of silt from downstream culverts).
6. Dispose of waste containing contaminant at authorised facilities.
7. Waterway stability and flood flow management – for peak flow for the 100% AEP event and 1% AEP event, use constructed sediment basins to attenuate the discharge rate of stormwater from the site.

D5.10 EROSION AND SEDIMENT CONTROL STRATEGY

1. An Erosion and Sediment Control Strategy (ESCS) detailing management practices and strategies to ensure erosion and sediment control during construction period is to be prepared and submitted for Council approval as part of the supporting information/engineering submission for a Development Application for Operational Works.
2. The ESCS is to be prepared by a Certified Professional in Erosion and Sediment Control (CPESC) or a suitably qualified person with erosion and sediment control experience, eligible to apply to the CPESC program.
3. The ESCS is to be prepared in plan format (**Refer AP1 Application Procedures**) to achieve the following objectives:
 - a. Provide a level of assurance that the risk of soil erosion and sediment loss as a result of the construction activity shall be minimised.
 - b. Detail the major erosion and sediment control measures necessary to provide protection to downstream land owner(s), infrastructure, environment and receiving waters
 - c. Provide a base plan to which the Contractor can add site specific erosion and sediment control measures relating to its construction methodology and sequencing of works
 - d. Provide direction to the Contractor in relation to construction sequencing and major construction items to be incorporated into the Contractor’s Erosion and Sediment Control Plan (ESCP).
4. In preparing the ESCS the following are to be addressed:

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- a. Identification of environmentally sensitive areas
- b. Establishment of the environmental values of the receiving waters
- c. The presence of Acid Sulphate Soils (ASS) or Possible Acid Sulphate Soils (PASS) or contaminated land.
- d. Determination of the risk of erosion and anticipated sediment yields using local rainfall data and erosivity,
- e. An assessment of whether water quality monitoring is necessary
- f. All relevant requirements of the Planning Scheme, Development Manual, Drainage Management Plans and Development Control Plans and the Water Quality Report submitted with the development application.
- g. Clean water diversion measures to minimise runoff through the site.
- h. Sediment and erosion control measures to protect downstream land owners and receiving waters.
- i. Design criteria for Contractor's ESCP including for the management of materials stockpiles.
- j. Revegetation requirements.
- k. Recommended inspection, clean out and maintenance regime,
- l. As mandated by the State Planning Policy, all exposed areas greater than 2500 m² must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrologic effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5) (Qld State Planning Policy Appendix 2, Table A)

D5.11 ACCEPTABLE DESIGN SOLUTIONS

1. All erosion and sediment control structures, channels, catch drains, diversion drains, etc. shall be designed for an appropriate storm event. The minimum design criteria are shown in Table D5.1. Design capacity excludes minimum 150mm freeboard:

Table D5.1 ESC Structures - Design Criteria

	Design Life	ARI
Non erosive design capacity	0-6 months	1 year
	6-12 months	2 years
	12-24 months	5 years
	24months +	10 years
Structural Stability	0-6 months	5 years
	6-12 months	10 years
Temporary Culvert crossing		1 year

2. In providing a recommended inspection, clean out and maintenance regime the ESCS is to take into account the duration that the site will be disturbed and the timing of construction.
3. If the site is disturbed (ie. rehabilitation works are not complete) during the period of prolonged or high rainfall (wet season) it is likely to be more vulnerable to the risk of erosion and a more rigorous inspection, clean out and maintenance regime will be required than for a site which is disturbed during the drier months. In particular, whenever possible schedule the land clearing and bulk earthworks to avoid the wet season (December to March) and stage land clearing works to minimise the area of exposed land.

D5.12 DESIGN GUIDANCE

1. The following references and guideline documents may assist in the design of permanent water quality works and in preparing the ESCS:

Institution of Engineers

- Soil Erosion and Sediment Control, Engineering Guidelines for Queensland Construction Sites, Institution of Engineers Australia (Queensland).

Department of Natural Resources (jointly with Brisbane City Council & IMEAQ).

- Queensland Urban Drainage Manual, Volumes 1 & 2.

Brisbane City Council

- Water Quality Management Guidelines

Water by Design (Healthy Land and Water)

- MUSIC Modelling Guideline
- Bioretention Technical Design Guideline
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- WSUD Construction and Establishment Guideline
- WSUD Asset Management and Handover Guideline
- Waterbody Management Guidelines
- Stormwater Harvesting Guidelines

IECA Erosion and Sediment Control Guideline

- Best Practice Erosion and Sediment Control (BPESC) documents