SC6.9 Stormwater management

SC6.9.1 Application

1. This planning scheme policy applies to development where an applicable code identifies Planning Scheme Policy SC6.9 Stormwater management as supporting an outcome of the code.

SC6.9.2 Relationship to the planning scheme

1. This planning scheme policy is to be read in conjunction with the assessment benchmarks specified in the Planning Scheme and applies to the whole of the local government area. This Policy specifically relates to section 9.4.7 Stormwater management code and ensuring development is consistent with the stormwater management design objectives specified in the code.

SC6.9.3 Purpose

1. The purpose of this planning scheme policy is to esure that development complies with the local government's standards for the planning and design of stormwater infrastructure by:
   a. providing about achieving outcomes in the planning scheme code;
   b. identifying requirements for site assessments and management plans;
   c. providing supporting technical information, where relevant;
   d. identifying other guidelines, standards and information sources;
   e. ensuring stormwater management issues are appropriately addressed at the reconfiguring a lot and material change of use stages and any problems are identified and addressed prior to the operational works stage.
2. An information request will be requested where the information required by this policy is not supplied when a development application is made.

SC6.9.4 Qualifications

1. Stormwater quality and quantity management must be designed and certified by a suitably qualified person. A suitably qualified person is one (or more) of the following:
   a. For Urban Stormwater Quality and Quantity Management: A Registered Professional Engineer of Queensland (RPEQ) (civil engineering, environmental engineering). The person must have at least 5 years demonstrated experience in the design and delivery of stormwater management strategies.
   b. For Erosion and Sediment Control: A person who has minimum 5 year experience as a Certified Practitioner in Erosion and Sediment Control (CPESC) or a suitably experienced engineer (RPEQ) with training in soil science and erosion and sediment control. Such persons will be responsible for designing erosion and sediment control plans and supervising the delivery of erosion and sediment control on development sites.
   c. Non-tidal artificial waterways: A person with tertiary qualifications or equivalent, such as an RPEQ (environmental engineering) or environmental scientist (or similar), and at least 5 years demonstrated experience in the design and management of non-tidal artificial waterways or lakes.

Note—At suitable qualification in one of the disciplines above does not necessarily mean the person is qualified in all aspects of stormwater management. For example, a person qualified to complete stormwater quality and quantity management does not necessarily qualify for non-tidal artificial waterways, lake design or geomorphic assessment.

Note—Erosion and sediment control plan means a plan:
a. prepared by an appropriately qualified person; and
b. stating measures to be implemented, including measures relating to the design and location of buildings and structures, to minimise erosion and sediment run-off impacts of the use.

SC6.9.5 Technical standards

1. A reference in the policy to a specific resource, guideline, standard or document means the latest version of the resource, guideline, standard or document. Refer also to section 4 - Flood hazard policy.
2. The listed technical standards are not intended to be exhaustive. It is expected that appropriate references are also used in accordance with accepted best practice.

SC6.9.5.1 Guidelines

1. Accepted development requirements for the construction of new levees or the modification of existing levees
2. Beesley LS, Middleton J, Gwinn DC, Pettit N, Quinton B and Davies PM, Riparian Design Guidelines to Inform the Ecological Repair of Urban Waterways (2017), Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.
3. Brisbane City Council, Natural Channel Design Guidelines.
4. Department of Environment and Science Monitoring and Sampling Manual: Environmental Protection (Water) Policy
5. Department of Environment and Science Procedural guide: Releases to waters from land development sites and construction sites 2500m^2 and greater
6. Engineers Australia, Australian Run-off Quality: A guide to Water Sensitive Urban Design.
7. Environmental Protection (Water and Wetland Biodiversity) Policy 2019, Lockyer River Environmental Values and Water Quality Objectives, Part of Basin 143
8. Erosion and Sediment Control — A Field Guide for Construction Site Managers
9. Guideline for construction of new levees or modification of existing levees
10. Guidelines for construction or modification of category 1 levees
11. Guidelines for construction or modifcation of category 2 and 3 levees
12. Guidelines for failure impact assessment of water dams.
13. MUSIC Modelling Guidelines.
14. Queensland Dam Safety Management Guideline.
15. Small Dam Safety: Information for Queensland small dam owners.

SC6.9.5.2 Standards

1. Australian Rainfall and Runoff
2. ARR Data Hub https://data.arr-software.org
3. AS.1289.3.6.3:2020 Methods of testing soils for engineering purposes, Part 3.6.3: Soil classification tests — Determination of the particle size distribution of a soil — Standard method of fine analysis using a hydrometer
4. Austroads, Guide to Bridge Technology Part 8: Hydraulic Design of Waterway Structures and supporting information
5. Department of Agriculture and Fisheries, Accepted development requirements for operational work that is constructing or raising waterway barrier works
6. Department of Agriculture and Fisheries, Habitat Guidelines
   a. Fish passage in streams: Design of stream crossings (FHG 001);
   b. Restoration of fish habitats: Marine areas (FHG 002);
   c. Fish habitat buffer zones (FHG 003);
   d. Mangrove nurseries: Construction, propagation and planting (FHG004).
7. *Environmental Protection Act 1994*
8. Erosion and Sediment Control Decision Support Tools for Local Government templates including:
   a. Design Certificate for Erosion and Sediment Control.
   b. Inspection Certificate for Erosion and Sediment Control.
   c. Erosion and Sediment Control Plan Checklist.
   d. Erosion and Sediment Control Development Site Audit Checklist.
   e. Erosion and Sediment Control Pre-start Meeting Checklist.
9. International Erosion Control Association, Best Practice Erosion and Sediment Control
10. IPWEAQ Standard Drawings
11. Queensland Urban Drainage Manual
12. Transport and Main Roads, Road Drainage Manual
13. Water Sensitive Urban Design Principles including Water by Design Guidelines:
   a. Bioretention Technical Design Guidelines;
   b. Construction and Establishment Guidelines: Swales Bioretention Systems and Wetlands;
   c. Cost of Maintaining Bioretention;
   d. Framework for the Integration of Flood and Stormwater into Open Space;
   e. Maintaining Vegetated Stormwater Assets;
   f. Rectifying Vegetated Stormwater Assets;
   g. Stormwater harvesting guidelines;
   h. Transferring Ownership of Vegetated Assets;
   i. Waterbody management guidelines;
   j. Wetland Technical Design Guidelines.
14. Accepted development requirements for the construction of new levees or the modification of existing levees

Table SC6.9.5-1: Minimum water quality technical standards to be used at each stage of development

DEVELOPMENT STAGE	STANDARD

Planning application (Concept design)	Best Practice Erosion and Sediment Control Living waterways booklet Queensland Urban Drainage Manual MUSIC Modelling Guidelines Water Sensitive Urban Design Guides: a. Water by Design: Concept Design Guidelines for Water Sensitive Urban Design b. Water by Design: Deemed to Comply Solutions— Stormwater Quality c. Water by Design: MUSIC Modelling Guideline d. Water by Design: Stormwater Harvesting Guideline e. Water by Design: Water Sensitive Urban Design Technical Design Guidelines for South East Queensland
Operational works application (Detailed design)	Best Practice Erosion and Sediment Control Living waterways booklet Queensland Urban Drainage Manual IPWEAQ Standard Drawings Water Sensitive Urban Design Principles: a. Water by Design: Bioretention Technical Design Guideline b. Water by Design: Cost of Maintaining Bioretention c. Water by Design: Water Sensitive Urban Design Technical Design Guidelines for South East Queensland d. Water by Design: Wetland Technical Design Guidelines
Construction phase	Best Practice Erosion and Sediment Control Water Sensitive Urban Design Guides: a. Water by Design: Construction and Establishment Guidelines: Swales, Bioretention Systems and Wetlands b. Water by Design: Transferring Ownership of Vegetated Assets
Post construction phase	Water Sensitive Urban Design Principles: a. Water by Design: Maintaining Vegetated Stormwater Assets b. Water by Design: Rectifying Vegetated Stormwater Assets c. Water by Design: Transferring Ownership of Vegetated Assets

SC6.9.6 Consultation

1. Council may seek third party advice or comment about an application where:
   a. development may conflict with a code; or
   b. technical advice is required to assess the development.
2. Where technical advice is outsourced to an independent consultant an additional fee will apply.

SC6.9.7 Requirements for stormwater assessment and management plans

1. A Stormwater assessment and management plan should include the following:
   a. project location and address;
   b. project title and description;
   c. the date on which the assessment and any plans were prepared, including any amendments;
   d. name and relevant professional qualifications of the person/s preparing the assessment;
   e. for all plans include a north point, scale, location of property boundaries, road alignments and street names.
2. A Stormwater management plan should provide the minimum requirements shown in the table below:

Table SC6.9.7-1: Standard requirements for impact assessments and mitigation plans

SECTION:	DETAILS
1: Summary	This section should include: a. authorship details including contact information; b. industry accreditation number; c. document certification by RPEQ; d. assumptions, design criteria, hydrologic and hydraulic assessment, results and key findings, recommendations and conclusions; e. any areas of non-compliance with the Stormwater Management code; f. how areas of non-compliance with the Stormwater Management code will be managed or overcome.

2: Introduction	This section should include: a. the purpose, aims and objectives of the Stormwater assessment and management plan; b. scope of study including any limitations; c. any previous deal with stormwater management; d. any related reports that which should be read with this report such as waterway assessments and soil investigations; e. any previous approvals or request for information (if relevant).
3: Existing site conditions	This section should include information and plans showing: a. existing and land use or development including extent of existing impervious area; b. site topography survey including spot levels, contours, boundaries, waterways, vegetation (particularly regional ecosystem mapping), easements and other relevant site features catchment and sub catchments boundaries including a description of external catchments, upstream catchment and the downstream receiving environments; c. site geology survey of soil type (including salinity, dispersive potential, iron content and potential ground water issues (as applicable)); d. existing vegetation including areas to be cleared and retained; e. all relevant hydrological/drainage features including pre-development catchments and drainage needs to be shown on plans. i. major and minor flow paths and inundation extents and levels including design events for assessment (whre applicable); ii. all discharge points from the site including drain location/s, dimensions, elevation/s and capacity; iii. any local flooding issues; f. any other site-specific issues. *Note—Many areas of the Council's stormwater system are known to have capacity issues and a detailed assessment may be required to ensure that new development does not worsen existing stormwater drainage problems.*
4: Development details	This section should include: a. site details, real property description and street address; b. description of the proposed development and resulting land use/s; c. details of any relevant previous approvals; d. the date on which the assessment and any plans were prepared, including any amendments; e. name and relevant professional qualifications of the person/s preparing the assessment and management plan; f. plans that show all the development details, including those relevant to the stormwater designs; g. proposed development details including land use, scale, densities, site coverage and impervious area; h. proposed development details relevant to the stormwater drainage system including: i. an analysis of the capacity of the system to accept any extra flows, ii. existing stormwater devices, such as drains, detention basins, iii. stormwater quality improvement devices, and existing easements. *Note—The lawful point of discharge for the development is to be identified in accordance with QUDM and Section 4 — Stormwater drainage and water sensitive urban design.*
5: Catchment design objectives	This section should identify all of the stormwater management objectives which apply to the development must be listed in the report. These include: a. erosion and sediment control; b. stormwater quality; c. stormwater quantity including for lawful point of discharge (often a continuum — not a single point) for afflux, velocity, flow and hazard management, likely locations of offsite impacts requiring management; d. waterway stability and frequent flow objectives are required and their derivation. Where an objective has not been included for the site, a brief justification is to be provided.
6: Erosion and sediment control plans (refer to section SC6.9.10)	Developments involving multiple stages or disturbance of more than 2,500m^2 of land, a conceptual erosion and sediment control plan is to be included. The plan will need to include the following: a. area of disturbance and likely stockpiling locations; b. list of erosion control measures; c. location and size of external catchment diversions;

	d. location of channels which convey site runoff to sediment basins; e. location and size of sediment basins based on type D or F basins and whether they will be located within future stormwater treatment systems (i.e. bioretention basins and wetlands). The basin must be located on appropriate topography (typically <6% slopes); f. sediment basin calculations; g. summary of staging associated with the site and sediment basins; and h. any areas which cannot be drained to the sediment basin and details of compensatory erosion and sediment controls. Where possible all the above should be presented in A3 drawing format for ease of assessment.
7: Stormwater strategy	The selected stormwater management initiatives for the development are to be described. This should include a scaled figure providing conceptual catchments, location and scale of the stormwater management systems. This should also include detail on: a. opportunities and constraints; b. strategies for managing potential impacts of the development; c. strategies for achieving compliance with each of the design objectives including calculations of volumes and anticipated quality at Construction Phase and Operational Phase of the development including fully developed site catchment and release points; d. the total footprint of the stormwater management systems is to be provided in the form of conceptual earthworks plans; e. stakeholders and consultation with any party responsible for any specific actions including documentation of any discussions with Council, and affected landowners, affected landowners' consent for operational works application and construction works. *Note—Where development proposes to discharge an altered or concentrated flow of stormwater runoff onto adjacent (or downstream) property, a letter of approval from the property owner(s) must be supplied at application stage (an easement is likely required). Where this is not the case, stormwater flows must not create actionable nuisance over the pre-developed conditions and overall catchment response.*
8: Stormwater quality	The stormwater quality management sizes and function is described. Sufficient detail is required to show enough area and vertical height is available to allow the systems to function without impact on adjacent land uses. Detail should include: a. MUSIC modelling in accordance with the MUSIC Modelling Guidelines (Water by Design) or complying solutions; b. modelling assumptions; c. reduced imperviousness; d. supporting tools and calculations used to demonstrate compliance; e. design - Construction Phase and Operational Phase; f. plans showing location of water quality devices; g. plan details to be commensurate with preliminary approval for operational works.
9: Stormwater quantity	The stormwater quantity management sizes, volume and function is described. Sufficient detail is required to show enough area, volume and vertical height is available to allow the systems to meet the stormwater quantity objectives without impact on adjacent land uses. Details should include: a. flow mitigation requirements to meet the waterway stability objectives; b. hydraulic calculations derived from computer modelling that show that post development stormwater flows achieve no actionable nuisance both upstream and downstream including increased flood heights; *Note—Calculations must use the ultimate upstream development scenario.* c. mitigation measures to achieve no actionable nuisance both upstream and downstream. Measures should include as a minimum, investigation of upgrading the existing downstream system, onsite detention facilities; d. hydrologic modelling assumptions; e. blockage and sensitivity testing; f. evidence of a lawful point of discharge and satisfactory management of each lawful point of discharge; g. identification of the location of proposed easements internal and external to the site; h. identification of the location of proposed external works; i. proposed storage volumes — if a staged development, at each stage of the development and anticipated volume for each stage; j. infrastructure details — including outlet structures RLs and sizes, infrastructure life

	and replacement costs; k. plans and drawings of the location, and the details of stormwater management measures including sizes/ volumes and cross sections with dimensions, levels, batter slopes, and boundary clearances, demonstration of management of hazard within and outside of the site on e.g. roadways, channels, detention basins, application and implementation of Crime Prevention Through Environment Design (CPTED), service clashes and operational accessibility (where applicable). l. proposed development levels related to AHD. *Note—in many cases the practical approach to demonstrate satisfactory consideration of timing and impact dictates modelling (in TUFLOW or equivalent) of the proposed site and locality.* *Note—Assessment of potential flood hazard and risk must be consistent with the requirements of the TLPI 2024 Flood Regulation.*
10: Waterway stability	The waterway stability management sizes and function is described. Summary of the calculations or modelling is provided.
11: Detailed design and staging	This section should include: a. detailed design of measures; b. timing and delivery of strategy components where a development is staged (including separate implementation/maintenance periods as required); c. construction management to prevent interim stormwater quantity or quality impacts; d. conversion of construction phase erosion and sediment control measures to operational phase; e. the design and selection of pipe class must consider the construction loadings. Pipes must have a service life of 80-100 years without cracking. Plans and document that show embankments and basin design are to provide detailed landscaping plans consistent with the Planning Scheme Policy SC6.77 Landscaping. Basin design (embankments) need to consider planting risk on the embankments and need to be suitably designed (over-filled, proper cores not susceptible to piping, roots, fauna, etc.).
12: Maintence plan (refer to section SC6.9.11)	Where the stormwater strategy involves proprietary devices or systems other than bioretention, wetland and sediment basins, lifecycle costing information is to be provided including capital cost and on-going maintenance/operating costs (and frequency). Detailed information should include: a. responsibility and cost to maintain the infrastructure over the short and long term; b. proposed maintenance during the maintenance period; c. ongoing required maintenance once handed over to Council including type and timing of maintenance; d. access to easements and reserves considering the size and type of vehicles and/or machinery to ensure a safe working environment.
13: Assessment against stormwater management code	This section should demonstrate how the proposed development complies with the Stormwater management code and identify any areas of non-compliance and how these will be managed. Provide justification for any proposed variation.
14: Conclusions and recommendations	Summary of stormwater management objectives, outcomes and any key issues regarding the detailed design. Summary of modelling results.
15: References	List of documents referred to in the study.
16: Appendices	As required but as a minimum should include: a. relevant reference material and models that have been relied on; b. documenting model methodology and setup; c. time to and duration of inundation. d. conceptual earthworks plans; e. all modelled outputs that are mapped are provided to Council including: i. pre and post development; ii. impact mapping for all flow characteristics; f. all maps within the report are to include as high resolution A3 PDFs with reporting points included at key locations (e.g. critical infrastructure, road crossings, vulnerable sites, impacted property improvements, cropping lands, etc.).

	g. sensitivity Testing being an adverse change in flood risk or flow characteristics (i.e. flow, depth, volume, velocity, hazard, warning time) this includes consideration and application of relevant extreme events; h. other appendices may be required to present geomorphic assessment, waterway condition assessment or other investigations
17: Digital file	Model files (input and output), output files for each event (including difference mapping) - elevation, depth, velocity, velocity x depth, hazard (H1 to H6) in suitable format.

SC6.9.7.1 Material change of use

1. Development that is subject to a requirement for a stormwater management plan should protect drinking water quality by implementing a total water cycle approach that includes the use, reuse and disposal of:
   a. water;
   b. stormwater;
   c. sewage;
   d. wastewater (other than sewerage).
2. A water cycle environmental management plan is to be prepared by a suitably qualified person consistent with *Environmental Protection Act 1994*.
3. A water quality management plan should address the total water cycle and:
   a. minimise water use;
   b. minimise the use and strength of contaminants;
   c. avoid the creation of wastewater;
   d. wastewater should be managed through a combination of responsible and efficient wastewater treatment, reuse and disposal strategies that:
      i. store wastewater on-site until collected and disposed of by a regulated waste treatment facility;
      ii. dispose of wastewater on-site so that the water quality complies with the objectives suitable for agricultural irrigation under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2009*;
      iii. dispose of wastewater to a satisfactory reticulated sewerage system or an on-site effluent disposal system which is certified under the *Plumbing and Drainage Act 2018*;
      iv. dispose of wastewater to surface or groundwaters so that the water quality complies with the objectives suitable for drinking under the *Environmental Protection (Water and Wetland Biodiversity) Policy* and the *Australian Drinking Water Guidelines*.
4. Schedule 1 of the *Environmental Protection (Water and Wetland Biodiversity) Policy* provides the environmental values and water quality objectives for the Lockyer Creek catchment.
5. For any declared water catchments under the overlays OM12A and OM12B, development should aim to meet the specific outcomes of the *Seqwater Development Guidelines for Water Quality Management in Drinking Water Catchments*.

SC6.9.8 Requirements for a failure impact assessment

1. Detention basins are effectively dams and the requirements of the *Water Supply (Safety and Reliability) Act 2008* apply. As such, a detention basin must be assessed under the relevant Queensland Dam Safety and Failure Risk Assessment Guidelines. At the date of preparation of this policy, a dam failure impact assessment is required where it is considered that the failure of a detention basin may have a population at risk of 2 or more persons. In addition to the QDUM standards, a failure impact assessment of the detention basin is required to determine the downstream impact of an asset failure that discharges the whole volume over a 30-minute period. The requirement for the failure impact assessment is purely based on population at risk and not height or volume of the detention basin. These requirements may also apply to levees and in this case, the levees regulations apply.
2. Advice from the regulator indicates that the minimum design standard required for failure immunity is likely to be greater than a 1% CC and over a number of extreme events (refer to the regulations and best engineering practice).

SC6.9.9 Alternative quality design objectives and management measures

1. There are several approaches promoted within the industry to demonstrate compliance with the stormwater quality design objectives.
2. Alternative management measures are applicable only when the development is exempt from complying with stormwater quality design objectives.
3. It should be noted that not all alternative management measures will be accepted by Council; however, each compliance approach and their applicability are described below.

SC6.9.9.1 On-site stormwater treatment

1. A range of stormwater treatment measures and technologies can be adopted within developments and streetscapes that will fully achieve the stormwater quality design objectives on-site.
2. This is the traditional approach to achieving compliance, whereby a stormwater treatment train is implemented within the development to meet the stormwater quality design objectives. Due to water supply considerations, conventional approaches may not satisfy water quality objectives.

Note—Deemed-to-Comply Solutions (or Complying Solutions) may not meet the water quality requirements.

Note—Numerical Modelling: The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is widely adopted for this purpose. Modelling should be undertaken in accordance with the latest version of the MUSIC Modelling Guidelines using the split land use approach.

Note—Conventional approaches may not be consistent with inground soil conditions (e.g. dispersive soils).

SC6.9.9.2 Living waterways

1. A flexible environmental management approach assists practitioners and government to deliver water management systems which are integrated with outdoor spaces that are socially, economically and environmentally sound. These approaches must satisfy safety, maintenance and operative requirements.

SC6.9.9.3 Off-site stormwater solutions (off-site solutions)

1. Offsite stormwater solutions may be considered in locally applied alternative solutions that achieve an equivalent or improved water quality outcome to the stormwater management design objectives of the State Planning Policy. It is possible for this concept to be applied between multiple developers (in the same catchment) where it can be demonstrated that the combined outcome is equivalent to the outcome required of the individual sites (together) regardless of whether a particular site has satisfied the objectives. This could be done as an infrastructure agreement and would be considered by Council as part of the development application. The concept of off-site solutions has also been presented as a voluntary mechanism with local governments collecting a fee from developers in lieu of managing stormwater on-site. This money is then used by the local government to implement stormwater solutions off-site. This concept transfers developer responsibility to Council and creates a significant administrative burden for Council. At this time, this off-site solutions concept is not able to be supported and this compliance approach is not applicable.

SC6.9.9.4 Reducing imperviousness

1. Reducing imperviousness may assist in minimising stormwater runoff and reducing stormwater management requirements. To encourage low impact design that minimises stormwater runoff, MCU developments with less than 25% effective imperviousness are excluded from achieving the stormwater quality design objectives.
2. Although there is an emphasis on quantitatively meeting design objectives, of equal or greater importance is developing good concept designs which are low maintenance, and which deliver multiple benefits such as high amenity. Concept designs are to be developed in conjunction with each of the compliance approaches and should be based on the Concept Design Guidelines for Water Sensitive Urban Design, Chapter 3.
3. The benefits of low-impact design are well recognised, however traditional compliance methodologies such as through MUSIC modelling have often disadvantaged such approaches due to requirements for infiltrated flows to be accounted for in the pollutant export from the site.

SC6.9.10 Erosion and sediment control plans (ESCP)

1. Erosion and Sediment Control Plans (ESCP) are to be prepared by suitably qualified and experienced Registered Professional Engineer of Queensland (RPEQ) or Certified Professional in Erosion and Sediment Control (CPESC).

SC6.9.10.1 Standard requirements for ESCP

1. The goals of an ESCP are to:
   a. minimising site erosion;
   b. minimise sediment release from the site and water contamination;
   c. manage concentrated stormwater flows to ensure concentrated stormwater flow paths have sufficient capacity and are structurally stable before each rainfall event;
   d. ensure all site surfaces are ‘effectively stabilised’ soon as possible and before development commences.

Note—An ‘effectively stabilised’ surface is defined as one that does not, or is not likely to result in:
a. visible evidence of soil loss caused by sheet, rill or gully erosion; or

b. lead to sedimentation, or
c. lead to water contamination.

2. An ESCP is required to ensure that downstream receiving waters are not adversely affected by development. Protection of waterways is undertaken in accordance with the *Environmental Protection Act* and the discharge standards required in Stormwater code. An ESCP should:
   a. control erosion by ensuring that all exposed surfaces are stabilised as soon as possible and that erosion of un-stabilised areas of work are minimised.
   b. control drainage control by ensuring that provision is made to control all on site runoff to designated treatment areas and to enable appropriate by pass of external flows which do not require treatment.
   c. capture sediment capture by ensuring that mobilised sediment is captured through a combination of source controls such as silt fences and appropriately designed sediment basins.
   d. address the how site and cumulatively for each stage as it is rare that erosion and sediment control requirements for a single stage can be communicated and detailed effectively.
   e. include guidance for on-site contractors as standard notes and drawings do not provide informed on-site practice.

SC6.9.10.1.1 Submission requirements (<850m2)

1. For developments involving less than 850m^2 lot size, erosion and sediment control is to occur in accordance with the Model Code of Practice for Building Sites provided in Best Practice Erosion and Sediment Control and the relevant guidance provided by Healthy Waterways – Water by Design guidelines. These provide the minimum requirements for small scale construction or building works.

SC6.9.10.1.2 Submission requirements (≥850m2)

1. For developments of 850m^2 lot size or greater, submit to Council a site specific ESCP. The ESCP is to be developed in accordance with IECA and the relevant guidance provided by Water by Design.
2. An ESCP must:
   a. be prepared, certified and supervised by a licenced RPEQ engineer.
   b. be designed, implemented and maintained in accordance with Best Practice Erosion and Sediment Control published by the International Erosion Control Association (as documented in the State Planning Policy);
   c. include a scaled plan(s) which show the staging of works and the proposed strategy to manage runoff. Plans are to include topography of the site, locations of stockpiles, main vehicle access points, locations or footprints of sediment basins (including safe batters etc.), approximate alignment of sediment fences and any other interventions. Plans are provided at A3 size and clearly annotated with appropriate legends for different stabilisation methods and the like;
   d. demonstrate all phases of the works from any initial clearing works through to the final build out phase. Typically this will be achieved through separate plans that show the initial site clearing works, bulk earthworks and build out. The on-site control measures will need to be dynamic as development progresses and new areas are exposed;
   e. include details of the proposed flocculants and automatic dosing systems for sediment basins, including jar testing results. This should demonstrate the suitability of the proposed flocculants that has regard to the downstream receiving environment and water quality;
   f. be based on site-specific considerations, and include the results of all soil investigations, topography, hydrology, scale of excavations and protection of riparian buffers where applicable for the whole development site;
   g. include monitoring requirements, and clearly outlines the need to adjust or maintain erosion and sediment control and site management practices if the release limits are not being met or if contaminated water is released. Monitoring is to occur in accordance with IECA and compared with release limits and any other water quality objectives set for the site. A monitoring report is to be prepared and retained at the site officer and made available to Council upon request. A CSV file of the associated monitoring data, including methodology should be provided at both the pre-start meeting and the end of the on-maintenance period.

SC6.9.10.1.3 Design checklist

1. Where the stormwater management strategy has not changed since the SMP was submitted for a Material change of use or Reconfiguring a lot and no additional stormwater quality management modelling was completed as part of the Operational work application, the design checklists provided in the *Water Sensitive Urban Design-Technical Design Guidelines for South East Queensland* only need to be provided to Council, along with a design certification letter by a suitably qualified person. Where the stormwater management strategy has changed as part of detailed design, then a revised SMP is required.

SC6.9.11 Maintenance plans

1. This reporting template is to be used for preparing a maintenance report for vegetated stormwater assets such as

vegetated channels, swales, bioretention basins and wetlands. The report is intended to be read by Council maintenance staff after the asset has been handed over to Council (i.e. the asset is off-maintenance) so is to focus on long-term maintenance tasks rather than establishment.

2. The report should avoid large sections of text and should utilise drawings and tabular information to allow quick access to information by maintenance staff. Detailed guidance on maintenance for different vegetated stormwater assets can be found in the Healthy Waterways (2012) publication titled *Maintaining Vegetated Stormwater Assets* and should be referred to when completing sections of the below template.

SC6.9.11.1 Standard requirements for a stormwater maintence plans

1. A stormwater maintenance plan should provide the minimum requirements shown in the table below.

Table SC6.9.11-1: Standard requirements for stormwater maintenance plans

SECTION:	DETAILS
1: Site location	A plan should be provided showing the location of the asset, including the nearest street intersection and the name of any park or reserve in which the asset is located.
2: Functional description	This section should include: a. a brief description of the purpose and key design features of the asset; b. a schematic drawing showing the functional components; c. full design drawings should be referenced and provided as an appendix to the report.
3: Maintenance access	This section should include a plan of the asset showing: a. the access to the nearest constructed road; b. access around or within the asset; c. access standard and design features such as width and surface type (e.g. concrete, gravel, turf, etc.) of each access; d. the location of any access gates or removable bollards.
4: Surface and horticultural maintenance	This section should include a plan of the asset showing: a. the different functional surfaces of the asset (e.g. turf, filter media or batter); b. surfaces are to be categorised logically based on the function and the expected maintenance regime. c. the maintenance regime required for each surface type is to be summarised into a table (see Table SC6.9.11-2: Example horticultural maintenance schedule) that shows the preferred maintenance schedule: i. methods; ii. time period; iii. indicative rates for common activities; and iv. indicative cost.
5: Drainage and pollutant maintenance	This section should include maintenance activities that will be undertaken on a reactive basis when issues are observed. A plan showing the asset location and maintenance activities are to be shown. A maintenance regime is required for each asset type is to be summarised into a table (see Table SC6.9.11-3: Example drainage and pollutant maintenance schedule). Monitoring and reactive maintenance activities to be considered should include: a. unblocking inlets and outlets; b. managing mosquitos; c. managing birds; d. managing high or low water levels in a wetland; e. responding to spills of paint, fuel or concrete; f. replanting; g. managing excessive algal blooms in wetland or sediment basins; h. managing algae or moss on bioretention surfaces; i. storm damage assessments following events; j. green waste removal & notification of any dumping; k. infrastructure repairs — caps, pipes, pits, fencing; l. council also undertakes quarterly scheduled condition assessments in addition to the above reactive monitoring.
6: Benchmark and budget allocation	The resulting overall maintenance cost should be compared against benchmark costing data (where available) such as the “Guide to the Cost of Maintaining Bioretention Systems” (Water by Design, 2015). Where calculated maintenance costs exceed benchmark

	figures, the design should be revised based on utilising lower-cost surfaces or justification for the higher costs should be provided.

Table SC6.9.11-2: Example horticultural maintenance schedule

SURFACE TYPE	ACTIVITIES	PREFERRED METHODS	MAINTENANCE INTERVAL	AREA (M^2)	RATE ($/$M^2$ OR $/LM)	COST ($/YR)
Turf	mowing	flat-deck	Fortnightly December to April 3 weekly May to November	TBC	$0.0403/$m^2$	TBC
Filter media or planted channel invert	weeding	hand pulling	3 weekly	TBC	$0.30/$m^2$	TBC
Vegetated batter	weeding	herbicide—foliar spray or ropewick	3 weekly	TBC	$0.18/$m^2$	TBC
Loose rock (unplanted)	weeding	herbicide— foliar spray or ropewick	6 weekly	TBC	$0.093/$m^2$	TBC
Loose rock (with pocket planting)	weeding	hand pulling	6 weekly	TBC	$0.36/$m^2$	TBC
Open water	weeding	mechanical or hand removal of floating aquatic weeds	6 monthly	TBC	mechanical $188/hr hand $100/hr	TBC
Macrophyte plantings (wetland, edges of open water)	weeding	hand pulling cut-stump	6 monthly	TBC	mechanical $188/hr hand $100/hr	TBC

Table SC6.9.11-3: Example drainage and pollutant maintenance schedule

ACTIVITY	LOCATION/TYPE	MAINTENANCE INTERVAL	STORAGE VOLUME OR AREA (M^3 OR M^2)	RATE ($/$M^2$ OR $L/M)	COST ($/YR)
Sediment removal	forebay (at-source)	3 weekly	TBC	TBC	TBC
	forebay (end-of-line)	12 months	TBC	TBC	TBC
	sediment basin (wet)	12 months	TBC	TBC	TBC
	GPT	12 months	TBC	TBC	TBC
Litter removal	within vegetation (hand removal)	As per Table SC6.9.11-2	TBC	TBC	TBC
	in-pit basket	3 months	TBC	TBC	TBC
	floating boom	12 months	TBC	TBC	TBC
	GPT	12 months	TBC	TBC	TBC

SC6.9.12 Green infrastructure opportunities and operation

1. For green infrastructure opportunities and operation may be suitable for Material change of use applications with the exception of the swales. Swales are only suitable for subdivisions in Rural residential areas where the existing road network does not require upgrading to kerb and channel.

Table SC6.9.12-1: Green infrastructure opportunities and operation

GREEN	OPPORTUNITY AND OPERATION

INFRASTRUCTURE TYPE	
Swales	Swales are typically provided as roadside vegetated drains that filter and infiltrate stormwater into the soil. They can be turfed or planted with vegetation that provides effective protection for receiving waterways through filtration and can also deliver water to rain gardens or other passively irrigated vegetation. To prevent ponding, a subsurface drain may be required. Water tanks may be provided for private irrigation.
Rainwater tanks for private irrigation	The capture of roof water runoff can provide a significant amount of the household level needs for landscape irrigation. Greening of the private realm contributes significantly to both liveability outcomes and the local character of towns. It has the benefit of reducing demand on potable water, making the most of water that may otherwise not be available for use. Water tanks are not used to achieve stormwater quality and quantity outcomes.
Landscaping buffers	Buffer strips are vegetated surfaces that accept sheet runoff from adjacent impervious surfaces, such as road pavements. This maximises water availability for kerb-side vegetation, including gardens, turf and trees. Buffer strips are to be provided around waterways and gullies to intercept sediment-laden waters.
Passively irrigated trees	Passively irrigated street trees improve the growth and cooling benefits of vegetation. It focuses on ensuring that a suitable soil volume is achieved and directing stormwater drainage to the tree to provide soil moisture. Passively irrigated street trees can be provided with or without wicking zones to provide access to soil moisture through extended dry period. Road pavement competency must be considered and retained.
Bioretention street trees	Bioretention street trees typically use an engineered filter media with the aim of providing water quality treatment. These may be appropriate in new developments where water quality treatment objectives are required to be met.
Wicking lawns and gardens	Wicking lawns use a storage reservoir for the capture and storage of stormwater underneath the turf surface. The reservoir typically consists of coarse sand underneath a quality topsoil typically for turf surfaces. This maintains soil moisture of the root zone via wicking, or capillary rise. Stormwater typically enters a sub-surface drainage system through a filtration system or bioretention filter media to prevent clogging of the underdrainage. It can be used at a variety of scales from sports fields to streetscape.
Infiltration trench	Infiltration trenches with structural soils can improve deep-soil moisture recharge. Lateral exfiltration to the root zone of street trees can improve access to water and improved growth.
Permeable pavements	Permeable pavements can be used to provide improved infiltration of stormwater into the root zone of trees. They can be used in conjunction with infiltration trenches, wicking beds and passively irrigated vegetation.
Green corridors and waterway riparian areas	Activation and enhancement of waterways and riparian zones can provide linear connection for active transport and recreation, in a cooler part of the land. Trees in these areas have greater access to soil moisture and are therefore larger and provide more cooling benefit than other vegetation.