

Planning Scheme Policy Stormwater Management

Post Consultation Version 2019



Planning scheme policy – Stormwater management

Adoption

Moreton Bay Regional Council adopted this planning scheme policy on 24 November 2015.

Commencement

This planning scheme policy will take effect from 1 February 2016.

Amendment

Alignment amendment 1 2017

- Adopted by Moreton Bay Regional Council on 27 June 2017
- Took effect from 3 July 2017

1. Introduction

This policy supports the Moreton Bay Regional Council Planning Scheme and has been made by Council in accordance with Chapter 2, Part 3, Division 2 of the *Planning Act 2016*.

1.1 Purpose

The purpose of this planning scheme policy is to provide guidance for the preparation of a Stormwater Management Plan that addresses stormwater quantity and quality.

1.2 Application

This planning scheme policy applies to assessable development where subject to Stormwater assessment criteria.

1.3 Interpretation

Terms used in this planning scheme policy are defined in Schedule 1 – Definitions of the planning scheme. Where a term is not defined in Schedule 1, section 1.3 Interpretation of the planning scheme applies.

2. Site Based Stormwater Management Plan

A Site Based Stormwater Management Plan (SBSMP) is a broad outline for planning, design, management and maintenance of stormwater quantity and quality management measures during construction, 'on' and 'off' maintenance and operational phases of a development.

A SBSMP is to be used as a standalone manual for site managers, engineers, landscape professionals and others conducting detailed design. A SBSMP may form part of an Environmental Management Plan for the development. Where a development is required to submit another management plan such as an Acid Sulphate Soils Management Plan or an Ecological Assessment Report these should be submitted together.

Site Based Stormwater Management Plan requirements

A Site Based Stormwater Management Plan is to be prepared by a suitably qualified individual such as a Civil Engineer or an Environmental Professional and is to be certified by a Registered Professional Engineer (RPEQ) (Civil or Environmental). Such a plan may be required as a result of development being assessed against assessment criteria ~~below~~ relating to stormwater quantity and quality management.

2.1 Computer Modelling

The use of computer models is common place and expected during the planning and design of a stormwater management system. Good modelling practice is required to ensure accurate and reliable

outcomes. Modellers must understand the limits and sensitivities of their models and the accuracy of the predicted outcomes. Models must be acknowledged as a coarse simplification of complex processes with their accuracy limited by terrain data and uncertainty in key parameters that can vary such as rainfall, roughness and blockage. Models must be calibrated or validated against a number of varying storms where data is available to provide confidence in the results. Although absolute flows and water levels can be subject to varying degrees of uncertainty, the difference or afflux between the model outputs for the before and after development scenarios is expected to be reasonably accurate as any assumptions or inaccuracies will be present in both scenarios.

A Site Based Stormwater Management Plan will need to include the following details with regards to the computer modelling undertaken:

- a) modelling software utilised, including the version/revision number;
- b) design/data inputs, including their source;
- c) modelling methodology;
- d) modelling parameters, assumptions and limitations;
- e) results of any sensitivity testing of key parameters;
- f) calibration/verification results;
- g) model modifications undertaken if using Council's model packages (refer to [Appendix C Section 1.12-3](#));
- h) quality checks including model log and error reporting (message and check) files;
- i) results including relevant mapping
- j) interpretation and recommendations

Council is to receive the final models with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is to be included with the model.

Additional guidance on best practice computer modelling can be referenced in Australian Rainfall and Runoff (AR&R) and Australian Runoff Quality (ARQ).

Council has internal modelling expertise and prefers the use of runoff routing and hydraulic models as described below. Alternative models will be considered but it is recommended to receive Council's acceptance of the use of these alternative models prior to their adoption.

2.1.1 Hydrological Modelling

Hydrological modelling is used to predict peak flow rates, flow volumes and hydrograph shapes for varying storm events and durations. Models can be based on individual rainfall events or continuous, long term simulations. Continuous models are usually used for assessing the impact to the hydrological cycle. Individual rainfall event simulations are typically used for the design of major stormwater systems. Dynamic or unsteady modelling is required to assess peak flow and storm volumes to understand the impact of changing floodplain storage and the time for flows to peak.

Hydrological modelling is to be completed based on the recommendations provided in AR&R.

Council's preferred hydrologic model is the Watershed Bounded Network Model (WBNM) developed by Michael Boyd, Ted Rigby & Rudi van Drie.

2.1.2 Hydraulic Modelling

Hydraulic models are used to determine the area of inundation, flood level and flow velocity to assist with identifying flood hazards. Models can be either one dimensional with a defined flow path (either a pipe or surface/overland flow), two dimensional with an undefined flow path, or a combined one/two dimensional model. Specialist three dimensional models may be applicable for complex hydraulic structures or water quality modelling.

It is recommended that all hydraulic modelling should be undertaken in accordance with the Regional Floodplain Database methodology. Relevant reports describing this methodology are downloadable from Council's website.

The DFE for Flood comprises the upper envelope of a number of storm/catchment scenarios as follows:

- a) 1% AEP flood event using ARR design rainfalls
- b) 1% Moreton Bay Design Storm (MDS) event which is a 15 minute in 270 minute embedded design storm (15min burst inside a 270 minute burst with storm 'wings' scaled down to preserve overall volume of an ARR design burst)
- c) 1% MDS event with Moderate structure blockage – refer to report *Regional Floodplain Database - Floodplain Parameterisation* (SKM, 2012) report downloadable from the Council website.
- d) 1% MDS event with 20% Increase in rainfall
- e) 1% MDS event with 20% Increase in rainfall and increased downstream boundary (0.8m sea level rise for coastal models and 0.02% AEP event for inland models)
- f) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain to reflect future revegetation.
- g) 1% MDS event with Medium Dense Vegetation changed to High Dense Vegetation and Low grass/grazing changed to Medium Dense Vegetation within the 1% AEP floodplain and impact of increased residential development (Change in minor catchment fraction impervious) (this applies only to selected minor basins where urban development is a feature).

Council's preferred hydraulic model is TUFLOW developed by Bill Syme. However in some cases alternate software may be justified depending on the nature of the hydraulic behaviour being assessed. The model complexity must match the complexity of the floodplain and catchment.

2.1.3 Regional Floodplain Database Model Packages

Council's Regional Floodplain Database model library includes fourteen coupled hydrologic and hydraulic models, one for each of the fourteen 'minor basins' within the Moreton Bay Regional Council area. These model packages are available for purchase and can be requested online via Council's Flood Check website <https://www.moretonbay.qld.gov.au/floodcheck/>

The following is provided when purchasing a model package for a chosen minor basin:

Hydrological model - WBNM.

- a) GIS files - Minor Catchments, Stream Reaches and Stream Junctions
- b) Model run files
- c) Model result files
 - i. 14 ARI's for 10 storm durations;
 - ii. 3 Moreton Bay Design Storm (MDS) simulations.

Hydraulic model - TUFLOW.

- a) GIS Files - MapInfo MID/MIF input files
- b) Model input files, run files
- c) Model results files
 - i. 14 ARI's for 3-4 durations (varies depending on the minor basin)
 - ii. 10 scenarios using the MDS (including DFE scenarios)
- d) Result file formats
 - i. flt max grids for h, d, V, Z0, ZQRA, ZMBRC (Flood modelling) and Z9 (Storm Tide modelling)
 - ii. xmdf - Time series data for h, d, V, q, SP, Z0, ZQRA, ZMBRC (Flood modelling), Z9 (Storm Tide modelling) and any standard TUFLOW outputs
 - iii. WRB - WaterRIDE file containing information regarding DEM, velocity and water level
- e) Landuse input files based on 2013 Aerial photography
- f) Latest LiDAR (2014) (within the model code boundary) as well as modifiers for post LiDAR developments where applicable and available. One or more of the following formats can be used for the modifiers: txt, 12da, asc, MID/MIF, grd and tin.

MBRC does not provide models for the estimation of Overland Flow.

2.1.4 Water Quality Modelling

Site Based Stormwater Management Plans and development applications are to be assessed to meet the operational pollutant reduction targets of the State Planning Policy and Schedule 10 of the MBRC Planning Scheme using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC). The models must be developed in accordance with the Water by Design MUSIC Modelling Guidelines.

There are numerous modelling platforms for detailed catchment and in-stream water quality assessment and sediment transfer. Adoption and appropriate design methodologies are to be discussed with Council prior to undertaking detailed in-stream analysis.

2.1.5 Other Models

Council may require as part of development conditions the modelling and assessment of other natural processes such as coastal erosion, groundwater and tidal dynamics. Computer models for these purposes shall be verified by an appropriately qualified expert as suitable for the intended application. Discussion with Council prior to selecting a modelling package is ~~encouraged~~required.

2.21 Stormwater Quantity

The following information is to be provided in a Site Based Stormwater Management Plan or in a Downstream Drainage Discharge Report to assist in the assessment process for all developments regarding stormwater quantity:

a. Site assessment information

A site analysis and description of the site, surrounds and catchment detailing:

- a) existing and proposed land use;
- b) topography;
- c) catchment area and sub catchments;
- d) any site-specific issues;
- e) existing stormwater drainage system;
- f) major and minor flow paths; and
- g) all discharge points ~~from~~ the site and any local flooding issues.

b. Review of existing information

- a) A review of existing ~~downstream~~ waterway/stormwater infrastructure that may be impacted by changes in hydrology, ~~and~~ hydraulics; ~~and~~
- b) A review of any Catchment or Waterway Management Plans, Stormwater Management Plans or Infrastructure Charges Plans for the area or catchment.
- c) Determine/ demonstrate the lawful point/s of stormwater discharge for the development site; ~~and-~~
- d) Obtain a Flood Check ~~p~~Property ~~r~~Report ~~and Flood Check Development Report~~ using the ~~flood information provided by the Council from Council's Flood Check website. These reports provide reference information for existing catchment conditions and the defined flood event levels, prior to development on the site.~~

c. Potential impacts of the development

- a) Investigate the hydraulic and the hydrological characteristics of both the undeveloped and developed scenarios ~~(including the fully developed contributing catchment);~~
- b) Determine whether the development site is likely to ~~be~~ subject to flooding and/ or overland flow;
- c) ~~If applicable~~Where required, determine ~~drainage impact mitigation requirements to ensure post development discharges do not exceed pre-existing conditions flood storage by computer model based on pre and post development field contour surveys;~~
- d) ~~Determine whether the~~Demonstrate that development ~~does not adversely impact on flood behaviours resulting in increased~~is likely to cause any nuisance and/or annoyance to upstream or downstream properties; ~~and~~
- e) ~~Determine whether the cumulative impact of development in the catchment is likely to cause an adverse impact on other properties; and~~
- f) ~~Indicate whether any flood risks associated with the development are fully known, quantifiable and capable of being addressed without any uncertainty.~~

The information to be provided should be based on the following data:

- i. ~~Mapping and topographic survey data;~~
- ~~Stream flow data;~~
- ii. ~~Rainfall data; and~~
- ii. ~~Flood height data (up to and including a 100-year ARI storm event).~~

d. Stormwater management strategy - Construction Phase

Provide a description of the overall strategy for the management of stormwater quantity for achieving adopted stormwater quantity design objectives during construction phase as defined in PSP Integrated Design.

e. Stormwater management strategy – Operational Phase

Provide a description of the overall strategy for the management of stormwater quantity for achieving adopted stormwater quantity management design objectives during operational phase as defined in PSP Integrated Design.

The stormwater management plan should identify and detail the following:

- a) existing and/or proposed regional stormwater management devices as identified in the regional Stormwater Management Plans or Catchment Management Plans or Infrastructure Charges Plans for the area or catchment;
- b) details of the management measures proposed for the implementation; ~~and~~
- c) timing of the proposed works in relation to the stage of development.

f. Computer models

~~Provide electronic copies of the computer models used in the stormwater quantity and flood management strategies; the computer models~~ ~~utilised in the stormwater quantity and flood management strategies~~ ~~should~~ ~~will need to~~ be:

- a) Generally accepted in the stormwater industry in Australia;
- b) Of the latest version.

~~Electronic copies of the final computer models will need to be provided with all associated input data files and results. A model log describing the relevant model names, scenarios and key differences is also to be included in the model.~~

~~Where the proponent chooses to make use of Council's Regional Flood Database (RFD) model, additional requirements and guidance may be provided as part of the licence arrangements.~~

g. Figures and plans

Include figures and plans wherever possible, with the minimum requirements including:

- a) Existing and proposed catchment ~~and~~ sub-catchments ~~and~~ flow paths ~~and inundation extents and levels where applicable~~;
- b) Conceptual 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, where applicable.
- c) Proposed development levels related to AHD ~~and flood levels where applicable~~.

2.32 Stormwater Quality

The following information is to be provided in a Site Based Stormwater Management Plan to assist in the assessment process for all developments regarding stormwater quality:

a. Site assessment information

A site analysis and description of the site, surrounds and catchment detailing:

- a) existing and proposed land use;
- b) topography;
- c) catchment area;
- d) soil type (including dispersive potential and iron content);
- e) existing vegetation;
- f) any site-specific issues;
- g) existing stormwater drainage system;
- h) major and minor flow paths; and
- i) all discharge points from the site and any local flooding issues.

b. Review of existing information

- a) Description of the receiving environment and review of available water quality data including comparison to identified Environmental Values and receiving Water Quality Objectives;
- b) A review of existing downstream waterway/stormwater infrastructure that may be impacted by changes in hydrology, hydraulics or water quality; and
- c) A review of any Catchment or Waterway Management Plans, Stormwater Management Plans or Infrastructure Charges Plans, and Council's Total Water Cycle Management Plan for the area or catchment.

c. Potential impacts of the development

Identify potential impacts that the development may have on stormwater quality, including:

- a) assess risks from the impacts of development;
- b) estimate ~~as~~ pollutant loads from the proposed development;
- c) ~~identification of~~ opportunities and constraints analysis based on the findings from Steps a) and b);
- d) identification of key pollutants for Construction and Operational Phase; ~~and~~
- e) identification of discharge limits based on adopted Water Quality Objectives.

d. Stormwater management strategy

Provide a description of the overall strategy for the management of stormwater and water quality issues, addressing key pollutants and major risks, ~~along with~~ ~~and~~ methods for achieving adopted Water Quality Objectives as defined in PSP Integrated Design.

Additionally, provide a water quality assessment on how on-site water quality ~~management~~ satisfies the Development and water quality vision, Development water quality objectives and relevant specific outcomes of the Seqwater Development Guidelines, *Development Guidelines for Water Quality Management in Drinking Water Catchments*.

e. Construction phase

Identify ~~all~~ details of the proposed erosion and sediment control measures to be provided as part of an erosion and sediment control program ~~for all phases of the development (e.g. site clearing, bulk earthworks, civil construction and final stabilisation)~~, including:

- a) Identification of management issues such as highly dispersive soils, reactive soils, acid sulphate soils, Iron rich and organic rich soils and significant environmental areas on the site to be protected during construction (e.g. wetlands);
- b) Erosion and sediment control measures to meet the relevant assessment criteria for achieving adopted design objectives in construction phase as defined in PSP Integrated Design.
- c) Monitoring, assessment and reporting provisions;
- d) Maintenance schedules including predicted frequency and responsibility for all treatment structures and the overall system during both the construction and operational phases of development;
- e) Timing of the proposed works; and
- f) A contingency plan if the system or particular structures do not meet the assessment criteria that the indicators have been based on.

~~These plans could be considered an element of complying with the general environmental duty in accordance with s319 Environmental Protection Act 1994.~~

~~Where development involves a staging plan, the SBSMP is to clearly demonstrate that the proposed staging will facilitate the provision of effective erosion and sediment control during construction of each stage.~~

~~Where development involves works which cross waterways or are within the Riparian setback identified on Overlay Map - Riparian Setbacks, the SBSMP must demonstrate how impacts on the waterway have been minimised through appropriate route selection, type of crossing and how construction of the crossing will be managed in accordance with current best practice such as IECA 2008, Best Practice Erosion and Sediment Control - Appendix I.~~

f. Operational phase

The following issues are to be addressed for the operational phases of the development:

- a) Modelled estimates of the hydraulic and mean annual pollutant loads (and concentrations) of stormwater pre and post development using local rainfall data, including comparisons of both (Model for Urban Stormwater Improvement Conceptualisation (MUSIC) is recommended to model loads);
- b) Provision of measures to mitigate hydrologic/hydraulic impacts and their integration with water quality mitigation measures;

- c) Selection of treatment devices to achieve the mean annual pollutant load reduction and/or water quality objectives for the identified target pollutants; and
- d) Specific treatment measures to target iron and organic concentrations where required (iron and organic rich soil and/or discharge to marine or estuarine waterway).

Information should be submitted demonstrating that a range of treatment options have been considered and the optimal treatment train has been selected to achieve maximum pollutant removal effectiveness and minimum maintenance cost to the Council.

If the proposed stormwater network is proposed to discharge into marine or estuarine waterways effective control of iron and organics (Total Organic Carbon) must be specifically demonstrated.

A conceptual design of the proposed stormwater treatment devices should be included. Planning Scheme Policy – Integrated Design should be consulted when applying for the installation of treatment devices. The *Healthy Waterways Water Sensitive Urban Design – Technical Design Guidelines for South East Queensland and other Technical Guidelines by Water by Design* should also be referred to when designing treatment trains.

The plan should identify and detail the following:

- a) description of the water quality objectives to be met by the proposed system;
- b) details of mean annual loads for specific pollutants and the reduction in load as a result of the proposed treatment train;
- c) details of anticipated iron and organic concentrations and the reduction in concentration as a result of the proposed treatment measures (where relevant);
- d) specifications of design for each treatment device and a site layout of the treatment train;
- e) details of the management measures proposed for the implementation;
- f) monitoring, assessment and reporting provisions;
- g) maintenance schedules including predicted frequency and responsibility for all treatment structures and the overall system during both the operational and construction phases of the development;
- h) cost estimation for maintenance required on stormwater treatment devices including on and off maintenance costs and life cost for the replacement of infrastructure;
- i) timing of the proposed works in relation to the stage of development and describe the maintenance regime to be undertaken during 'on' and 'off' maintenance and the proposed length of both; and
- j) a contingency plan if the system or particular structures do not meet the water quality objectives that the indicators have been based on; and
- k) Include an assessment against Healthy Waterways "Living Waterways" criteria.

h. Computer models

Provide electronic copies of the MUSIC models used in the stormwater quality management strategies; the MUSIC models should be of the latest version.

g. Figures and plans

Include figures and plans wherever possible, with the minimum requirements including:

- a) Existing and proposed catchment and sub-catchments and flow paths;
- b) The locations of stormwater treatment and management areas (at appropriate scale for comparison with other development plans);
- c) Conceptual plans and drawings of the location, size and type of stormwater treatment measures; and
- d) Descriptions and diagrams of the type of treatment measures to be provided.

3. Flood Impact Assessment

A Flood Impact Assessment Report will be required to assist in the assessment process for developments if the development site is located adjacent to a waterway or a waterway is traversing through the site and:

- a) The site is likely to be significantly affected by flooding or;
- b) The development proposal is likely affect the waterway characteristics including changes to the waterway that may affect the hydraulic capacity and realignment of the waterway.

Flood Impact Assessment Report is to be prepared by a suitably qualified Hydraulic Engineer and should be certified a Registered Professional Engineer (REPEQ) (Civil) and the following information is to be provided:

- i. Investigate the hydraulic characteristics of the waterway for the undeveloped and developed scenarios;
- i. Determine the flood storage by computer model based on pre and post development field contour surveys;
- i. Determine whether the development is likely to cause any nuisance or annoyance to upstream or downstream properties;
- i. Determine whether the cumulative impact of development is likely to cause an adverse impact on other properties; and
- i. Indicate whether any flood risks associated with the development are fully known, quantifiable and capable of being addressed without any uncertainty.

The flood study should be based on the following data:

- Mapping and topographic survey data;
- Stream flow data;
- Rainfall data; and
- Flood height data (up to and including a 100-year ARI storm event).

Provide electronic copies of the computer models used in the flood impact assessment; the computer models should be:

- Generally accepted in the stormwater industry in Australia;
- Of the latest version.

The Flood Assessment Report is to be prepared and certified by a Registered Professional Engineer of Queensland (RPEQ) with appropriate expertise in flood impact assessments.

The Flood Impact Assessment Report is to document the outcomes of a localised flood investigation, which has been carried out in support of the development. For consideration by the Council, the Flood Impact Assessment Report is to demonstrate that the proposed development of the site, including filling and excavation, if included, does not:

- a) cause an increase in flooding or drainage risks to surrounding properties or elsewhere on the floodplain;
- b) does not impede the flow of floodwaters across the site and/or cause any worsening of flood or coastal hazards (levels, velocities, hazard categories) on neighbouring properties; and
- c) does not change the timing of the flood wave or impact on flood warning times.

The scope of the localised flood investigation is to undertake the following:

- a) investigate the hydraulic characteristics of the waterway for the pre- and post-development scenarios;
- b) determine whether the development is likely to cause any adverse impacts to upstream or downstream properties;
- c) determine whether the cumulative impact of development is likely to cause an adverse impact on other properties elsewhere in the floodplain;
- a)d) Determine the flood mitigation requirements and demonstrate that they can be implemented through on-site works.

An adverse off-site impact is defined by the following conditions:

- a) Flood or Storm Tide levels increase on Department of Transport and Main Roads infrastructure; or
- b) Flood or Storm Tide levels increase by more than 0.02m; or
- c) Flow velocities increase by more than 0.1m/s; or
- d) Any increase to the Flood or Coastal Hazard categories.

Flood and storm tide information on a lot-by-lot basis is available from Council's Flood Check Property and Development Reports. Council has prepared detailed flood models for all fourteen minor basins across the local government area, as well as a storm tide study, which have been integrated into a consolidated Regional Floodplain Database. The localised flood investigation is to utilise appropriate information from Council's Regional Floodplain Database as relevant inputs into this assessment. For

larger developments, the use of Council's flood models for assessment purposes is recommended (refer Section 2.4 for further details regarding Council's model packages).

The Flood Impact Assessment Report is to contain, as a minimum, the following:

- a) a site survey plan showing drainage easements, waterway corridors, cadastral boundaries, ground levels, structures, trees, fences, kerb and road levels, pipe invert levels and pit surface levels for the existing and proposed conditions;
- b) the modelling information detailed in Section 2.1 above;
- c) a flood model layout, including ground elevations, adopted surface roughness and structures;
- d) a catchment plan showing sub-catchments, flowpaths and inundation extents and levels for the existing and proposed conditions;
- e) the proposed site layout, including an earthworks plan, the proposed development levels and mitigation measures etc;
- f) the model results for flood behaviour (levels, velocities, hazards) including difference plots between existing and proposed conditions across the site and in surrounding properties, for the 5%, 1% and 0.1% Annual Exceedance Probability (AEP) events and the DFE for Flood and Storm Tide, where applicable;
- g) discussion and assessment of impacts of flooding on the proposed development;
- h) discussion and assessment of the impacts of the proposed development on flooding elsewhere, including confirmation that there are no adverse off-site impacts as a result of the proposed development;
- i) a statement of compliance with relevant requirements in the overall outcomes and performance outcomes outlined in the applicable codes.

Where the proponent chooses to make use of Council's Regional Flood Database (RFD) model, additional requirements and guidance may be provided as part of the licence arrangements.

End Notes

Amendment Number: 2 Adopted: 27 June 2017 Effective from: 3 July 2017	
Planning Scheme Policy Reference	Summary of amendment
-	<ul style="list-style-type: none">• Amendment to reflect the terminology used in the <i>Planning Act 2016</i>, the <i>Planning Regulation 2017</i> and related state planning instruments.