

9.4.5 Healthy waters code



Photograph 9.4.5-1
Example of a waterway located at South Stradbroke Island. Photograph by Russell Shakespeare.

9.4.5.1 Application

This code applies to assessing material change of use ~~or~~, reconfiguring a lot ~~or~~ operational work for development where indicated within:

- (1) **Part 5 Tables of assessment**; and
- (2) **Table 9.4.5.1-1: Development triggers for applying the Healthy waters code** ~~unless either of the following circumstances apply:~~

- ~~(1) No increase in impervious area is required onsite for the development.~~
- ~~(2) A stormwater quality and quantity management plan previously approved by the Council has been fully implemented within the existing development layout.~~

~~Note: Where a development proposal meets either (1) and (2) above, this code is not applicable.~~

Table 9.4.5.1-1: Development triggers for applying the Healthy waters code

Topic	Assessment triggers	Applicable assessment benchmarks
Erosion and sediment control	All development.	For accepted development subject to requirements: RO1, RO2
		For assessable development: PO1, PO2
Stormwater quality & waterway stability	For residential land uses involving one or more of the following: (a) 3 or more dwellings; or (b) a land area greater than 1,200m ² ; or (c) a newly constructed road (previously unformed road) exceeding 30m in total length; or (d) 200m ² or more of uncovered new or refurbished car park area including parking bays and circulation	For accepted development subject to requirements: RO3, RO5
		For assessable development: PO3, PO4, PO8 – PO13

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Comment [MU3 - CP2]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Topic	Assessment triggers	Applicable assessment benchmarks
	<ul style="list-style-type: none"> driveways; or (e) the creation of high polluting outdoor activities (including Bulk landscape supplies, Garden centres, Tourist parks, Transport depots, Warehouses and Wholesale nurseries). 	
	<p>For non-residential land uses involving one or more of the following:</p> <ul style="list-style-type: none"> (a) a land area greater than 1,200m²; or (b) a newly constructed road (previously unformed road) exceeding 30m in total length; or (c) 200m² or more of uncovered new or refurbished car park area including parking bays and circulation driveways; or (d) the creation of high polluting outdoor activities (including Bulk landscape supplies, Garden centres, Tourist parks, Transport depots, Warehouses and Wholesale nurseries). 	<p>For accepted development subject to requirements: RO4, RO5</p> <p>For assessable development: PO3, PO4, PO8 – PO14</p>
Stormwater quantity	<p>For residential activities, development associated with the creation of 3 or more dwellings, resulting in either:</p> <ul style="list-style-type: none"> (a) an increase in the total impervious area; or (b) an alteration of upstream conveyance or change to existing discharge location or condition. 	<p>For accepted development subject to requirements: RO3, RO6, RO7</p> <p>For assessable development: PO5 – PO14</p>
	<p>For all other land uses, development that results in either:</p> <ul style="list-style-type: none"> (a) an increase in the total impervious area; or (b) an alteration of upstream conveyance or change to existing discharge location or condition. 	<p>For accepted development subject to requirements: RO4, RO6, RO7</p> <p>For assessable development: PO5 – PO14</p>
Woongoolba flood mitigation catchment area	Development that is code or impact assessable, on land within the 'Woongoolba flood mitigation catchment area' on the Water catchments and dual reticulation overlay map .	For assessable development: PO15

Comment [MU3 - CP3]: Theme: Environment - safeguarding our environmental values;
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Comment [MU2 - CP4]: Theme: Environment - safeguarding our environmental values;
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This code does not apply in the following instances:

- (1) where the development involves internal works or minor building works to a lawfully established building; or
- (2) a sales office.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.4.5.2 Purpose

- (1) The purpose of the Healthy waters code is to:
 - (a) protect the quality of the city's waters and watercourses from the by managing the impacts of development on quality and quantity of surface and ground water runoff; and
 - (b) ensure that development does not cause adverse impact on people and/or property.
- (2) The purpose of the code will be achieved through the following overall outcomes:
 - (a) Urban stormwater quality management, wastewater management, and management of waters are based on the following principles:
 - (i) Development and construction activities are conducted to achieve the water quality objectives, as specified in the *Environmental Protection (Water) Policy 2000*.
 - (ii) The ongoing management of urban stormwater quality reflect the regional climate and the site's landscape characteristics.
 - (iii) Development is undertaken in accordance with best practice environmental management.

- ~~(iv) Development avoids adverse impacts on the City of Gold Coast's waters or, where this is not feasible, adverse impacts are minimised.~~
- (a) Total water cycle management and water sensitive urban design (WSUD) principles are:
- (i) implemented to contribute to biodiversity areas and green space values within the city and promote co-location of assets; and
 - (ii) integrated into the landscape so as to maintain watercourse health, biodiversity and ecosystems.
- (b) ~~Water resource catchments are protected from contamination by chemicals.~~ Development avoids or minimises disturbance to existing landforms, surface drainage, watercourses and groundwater.
- (c) Impacts to public health and safety hazards are minimised.
- (d) Adverse impacts to people and/or property are prevented and stormwater is safely managed within urban areas.
- (e) Development protects existing overland flow paths and watercourses of environmental value.
- (f) Development limits the quantity of key pollutants discharged in stormwater to protect the quality of receiving waters.
- (g) Development avoids adverse impacts to downstream properties or environmental value from stormwater peak discharge.
- (h) Development avoids or minimises adverse impacts on the environmental values of receiving waters from the release and mobilisation of nutrients and sediments.
- (e) The drainage capacity of the Woongoolba Flood Mitigation Scheme Area for rainfall events up to 1 in 10 year 72 hours is maintained (contained within the Scheme drains within a 4 day period) and this capacity is not be eroded due to cumulative impact of development.

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Comment [MU3 - CP5]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

9.4.5.3 Specific benchmarks for assessment

Part A applies to accepted development subject to requirements.

Part B applies to assessable development.

PART A – ACCEPTED DEVELOPMENT SUBJECT TO REQUIREMENTS

Table 9.4.5-12: Healthy waters code – for accepted development subject to requirements

Required outcomes	
Erosion and sediment control	<p>RO1 Development does not involve works that will:</p> <ul style="list-style-type: none"> (a) result in the exposure of a ground surface area greater than 1,200m²; or (b) require the importation or excavation of 50m³ or greater of soil. <hr/> <p>RO2 Erosion and sediment control is undertaken in accordance with the <i>Model Code of Practice – Building Sites: Best practice Erosion and Sediment Control</i>; <i>International Erosion Control Association (IECA)</i> and sediment fences are installed around the perimeter of all exposed surface areas and soil stockpiles.</p>
Stormwater quality and quantity – general	<p>RO3 For development in the Rural residential zone that does not require the construction of public roads and results in less than 15% impervious areas:</p> <ul style="list-style-type: none"> (a) rainwater tank/s overflows are connected to a below ground infiltration trench with the following design requirements (subject to any geotechnical constraints/limitations): <ul style="list-style-type: none"> (i) 1m deep with a minimum surface area of 10m²; (ii) setback 1.5m from the lowest boundary; (iii) located at least 3m from any building; and (iv) allows any overflow to sheet flow evenly and not cause any concentrated flow in one particular area. (b) where no rainwater tanks exist, newly created impervious surfaces direct water flow to landscaped or grassed filtered areas. <p>Note: Certification of infiltration trench suitability is provided by a suitably qualified geotechnical engineer. Development does not cause erosion or allow sediments to leave the site.</p> <hr/> <p>RO4 For industrial activities in the Medium and High impact industry zones (where not in a precinct) and where an established stormwater network is not in place, stormwater is only discharged to a lawful point of discharge upon achieving the following minimum pollutant reduction targets for post-developed site:</p> <ul style="list-style-type: none"> (a) Gross pollutants (>5mm) – 90%; (b) Total Suspended Solids (TSS) – 80%; (c) Total Phosphorous (TP) – 60% reduction; and (a)(d) Total Nitrogen (TN) – 45% reduction. Development does not result in an increase in the discharge quantity or a decrease in quality of stormwater.
Wastewater management	<p>RO5 Development does not involve any discharge of wastewater that could be conveyed into receiving waters or areas external to the site.</p>
Lawful point of discharge	<p>RO6 Stormwater flows to a lawful point of discharge in accordance with SC6.10 City Plan policy – Land development guidelines.</p>
Overland flow paths	<p>RO7 Development is not located within an overland flow path or watercourse and does not obstruct or cause blockage of an external flow.</p>

Advisory note

Accepted development identified in the assessment tables as subject to requirements must comply with all the nominated requirements in this and other applicable codes.

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.5-23: Healthy waters code – for assessable development

Performance outcomes	Acceptable outcomes
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Comment [MU3 - CP6]: Theme: Other land use changes - improving clarity, consistency and alignment within the City Plan;
Item 32 – Minor administrative and editorial improvements

Comment [MU2 - CP7]: Theme - Environment - safeguarding our environmental values;
Item 24 – Healthy waters code

Performance outcomes	Acceptable outcomes
Erosion and sediment control Stormwater quality	
PO1 Stormwater discharge from a development site achieves the construction phase water quality objectives of SC6.10 City Plan policy – Land development guidelines .	AO1 No acceptable outcome provided.
PO2 Erosion, sediment and dust is appropriately managed during the construction phase.	AO2 The level of risk for soil erosion and sediment pollution to the environment is determined by an erosion hazard assessment, completed by a suitably-qualified person in accordance with the criteria in Table 9.4.5-4: Erosion hazard assessment . Where the erosion hazard assessment has a risk score of: (a) less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008</i> . (b) greater than 10 or developments involving multiple stages of disturbance or more than 1.25 ha of land: (i) For material change of use or reconfiguring a lot, a conceptual erosion and sediment control plan (ESCP) is prepared by a suitably-qualified person for Council approval in accordance with SC6.10 City Plan policy – Land development guidelines and the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008</i> . (ii) For operational work, a detailed ESCP is prepared by a suitably-qualified person in accordance with SC6.10 City Plan policy – Land development guidelines and <i>Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008</i> . The ESCP is to detail appropriate treatment measures for the construction phase of development, demonstrating how the minimum design objectives in Table 9.4.5-5: Stormwater design objectives are achieved, including: (a) measures to ensure the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded; (b) detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and manufacturer's recommendations; and (c) details of how the ESCP aligns with the approved development staging plan.
Stormwater quality	
PO4PO3 Development appropriately manages stormwater quality to: (a) protect natural ecosystems; (b) integrate stormwater treatment into the urban landscape; (eb) protect water quality;	AO4AO3.1 For post developed sites, the following minimum pollutant reduction targets are achieved: (a) Gross pollutants (>5mm) – 90%; (b) Total Suspended Solids (TSS) – 80%, (c) Total Phosphorus (TP) – 60% reduction; and (d) Total Nitrogen (TN) – 45% reduction. Where

Comment [MU2 - CP8]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP9]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP10]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP11]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Performance outcomes	Acceptable outcomes
<p>(dc) reduce runoff and peak flows; and</p> <p>(ed) meet the water quality objectives and environmental values for Queensland waters.</p> <p>Note: Water quality objectives and environmental values for Queensland waters are contained within <i>Schedule 1 of the Environmental Protection (Water) Policy 2009</i>. Water quality objectives are locally specific and vary between and within river catchments.</p> <p>Note: A stormwater quality management plan prepared by a suitably qualified person in accordance with SC6.10 City Plan policy – Land development guidelines is Council’s preferred method for addressing this performance outcome.</p>	<p>development is:</p> <p>(a) for a dwelling house, dual occupancy or multiple dwelling on a lot less than 5000m²; or</p> <p>(b) light industry or business activity on a lot less than 2500m²;</p> <p>it complies with the ‘Deemed to comply’ requirements detailed in the Stormwater quality management guidelines in SC6.9 City Plan policy – Land development guidelines.</p> <hr/> <p>AO1AO3.2</p> <p>For development on land less than 1.25ha, a deemed to comply solution for stormwater quality is achieved in accordance with Table 9.4.5-6: Stormwater quality deemed to comply solutions. Where development is:</p> <p>(a) for a dwelling house, dual occupancy or multiple dwelling on a lot equal to or more than 5000m² but less than 1.25 ha; or</p> <p>(b) light industry or business activity on a lot equal to or more than 2500m² but less than 1.25 ha;</p> <p>it complies with the ‘Deemed to comply’ requirements detailed in the Stormwater quality management guidelines in SC6.9 City Plan policy – Land development guidelines.</p> <hr/> <p>AO1AO3.3</p> <p>For development on land greater than 1.25ha, a stormwater quality management plan is to be prepared by a suitably qualified person in accordance with SC6.10 City Plan policy – Land development guidelines is required. Where development is not listed in AO1 a Stormwater Quality Management Plan is prepared by a suitably qualified person in accordance with the Stormwater quality management guidelines in SC6.9 City Plan policy – Land development guidelines.</p>
<p>Waterway stability</p>	
<p>PO4</p> <p>In-stream erosion, downstream of urban development is prevented by controlling the rate (or magnitude) and duration of sediment transporting flows.</p>	<p>AO4</p> <p>Post-development peak 0.632 Annual Exceedance Probability (AEP) event discharge within receiving waterway is limited to pre-development peak 0.632 AEP event discharge and is in accordance with SC6.10 City Plan policy – Land development guidelines.</p>
<p>Stormwater quantity control</p>	
<p>PO2PO5</p> <p>Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.</p>	<p>AO2AO5.1</p> <p>The following is achieved external to the development site:</p> <p>(a) no increase in peak flood flow rate from the development site for all events up to and including the 0.01 AEP;</p> <p>(b) no increase in peak flood velocities from the development site for all events up to and including the 0.01 AEP;</p> <p>(c) no increase in peak flood level from the development site for all events up to and including the 0.01 AEP; and</p> <p>(d) stormwater outfalls or discharge is located to avoid conflict with existing usage of downstream land or impacts on existing watercourse or drainage. A stormwater quantity management plan is prepared by a suitably qualified person and demonstrates:</p> <p>(a) achievable stormwater quantity control measures for discharge during both the construction and operational</p>

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Comment [MU2 - CP16]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

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Performance outcomes	Acceptable outcomes
	<p>phases of development designed in accordance with the Queensland Urban Drainage Manual (QUDM) unless subject to specific requirements of SC6.9 City Plan policy – Land development guidelines;</p> <p>(b) on site detention systems that are designed to restrict peak outflows for Q2, Q5, Q10, Q20-Q50 and Q100 to pre-development conditions.</p>
Lawful point of discharge	
PO6 Development ensures the stormwater systems are designed to not cause actionable nuisance that would adversely affect adjoining (upstream or downstream) properties.	AO6 A lawful point of discharge must be identified and demonstrated that all discharge point/s from the development are in accordance with SC6.10 City Plan policy – Land development guidelines.
Overland flow paths	
PO7 Development must not obstruct free open surface flow of stormwater through a site.	AO7 Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear of a property, in accordance with the provisions of the <i>Building Code of Australia.</i>
Whole of life costs	
PO8 Stormwater infrastructure is designed and constructed to: (a) remain fit for purpose for the life of the development and maintains full functionality in the design flood event; (b) be cost effective to maintain; and (c) ensure no structural damage to existing stormwater infrastructure.	AO8 No acceptable outcome provided.
Landscape integration	
PO9 Stormwater treatment devices and stormwater infrastructure are designed to: (a) integrate with the urban design and landscape outcomes of the development; (b) complement natural environments, wetlands and watercourses; (c) protect environmental values; (d) enhance visual amenity; and (e) incorporate CPTED principles in accordance with SC6.10 City Plan policy – Land development guidelines.	AO9.1 Where stormwater treatment devices and stormwater infrastructure are integrated into public open space, a Statement of Landscape Intent is to be prepared by a suitably qualified person, for approval by Council. The plan is to demonstrate that the operation of stormwater infrastructure does not compromise the function of any co-located uses and reflect the design principles within SC6.10 City Plan policy – Land development guidelines. Note: A Statement of Landscape Intent is to be prepared in accordance with SC6.10 City Plan policy – Landscape work.
	AO9.2 Stormwater treatment devices are located offline to any upstream catchment. Note: This provision relates to the integration of stormwater treatment devices and stormwater infrastructure into the landscape. Development identified on the Environmental significance – wetlands and watercourse overlay map will still require assessment against the Environmental significance overlay code.
	AO9.3 All stormwater outlets that are located adjacent to watercourses, creeks and drainage paths are aligned at a maximum of 45 degrees to the downstream direction of flow, and energy dissipation measures installed to minimise scour.

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Performance outcomes	Acceptable outcomes
Public safety	
PO10 Stormwater treatment devices and stormwater infrastructure minimise impacts on public health and safety.	AO10 All stormwater quantity control measures are designed in accordance with SC6.10 City Plan policy – Land development guidelines .
Maintenance access	
PO11 Maintenance access is provided for all stormwater management systems and considers: (a) the type of vehicle or machinery needed to service particular assets; and (b) the need to ensure a safe working environment for maintenance personnel and the public.	AO11.1 All weather vehicle access is to be provided to inlet zones of the stormwater treatment systems in accordance with Table 9.4.5-7: Maintenance access requirements (slope) .
	AO11.2 Maintenance access is to be provided around the perimeter of all stormwater treatment systems in accordance with Table 9.4.5-8: Maintenance access requirements (size) .
	AO11.3 A maintenance buffer is provided around the perimeter of all stormwater treatment devices and adjoining private property equal to: (a) 1m in width; or (b) the width of a perimeter maintenance access, as delivered in AO11.2, plus 0.5m. The maintenance buffer is measured from the adjacent allotment boundary to the top of batter around the treatment measure. The maximum slope on the maintenance buffer is 1 in 10.
Fauna movement	
PO12 Stormwater conveyance structures and channels are designed to ensure the safe movement of native fauna and provide for terrestrial and aquatic passage.	AO12.1 Stormwater drainage structures and channels minimise impacts on aquatic fauna and associated habitats and provide opportunities for beneficial habitat uses of structures in accordance with the <i>Department of Primary Industries and Fisheries – Fisheries guidelines for Fish-friendly structures (2006)</i> .
	AO12.2 Stormwater drainage structures allow for the safe movement of terrestrial fauna in accordance with: (a) the <i>Queensland Government Fauna Sensitive Road Design Manual Volume 2: Preferred Practices</i> ; and (b) the <i>Queensland Government Koala-Sensitive Design Guidelines</i> .
Wastewater management	

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Performance outcomes	Acceptable outcomes
<p>PO13</p> <p>Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration:</p> <p>(a) the applicable water quality objectives for the receiving waters; and</p> <p>(b) the potential adverse impact on ecosystem health of receiving waters.</p>	<p>AO13</p> <p>Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following:</p> <p>(a) wastewater type;</p> <p>(b) climatic conditions;</p> <p>(c) water quality objectives;</p> <p>(d) best-practice environmental management;</p> <p>(e) waste management hierarchy; and</p> <p>(f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that:</p> <p>(i) avoids wastewater discharge to watercourses; or</p> <p>(ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to watercourses is minimised through re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.</p>
Dewatering management	
<p>PO14</p> <p>Dewatering occurs in accordance with an approved dewatering management plan.</p>	<p>AO14</p> <p>No acceptable outcome provided.</p>
Woongoolba Flood Mitigation Scheme Catchment Area	
<p>PO3PO15</p> <p>In the Woongoolba Flood Mitigation Scheme Catchment Area, shown on the Water catchments and dual reticulation supply system overlay map, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.</p>	<p>AO3AO15</p> <p>No acceptable outcome provided.</p>
Protection of natural flows (discharge)	
<p>PO4</p> <p>Construction and operational activities avoid or minimise adverse impacts of altered stormwater quality and quantity.</p>	<p>AO4</p> <p>Development achieves the Frequent Flow Management and Waterway Stability Management design objectives as stated within Chapter 2 – Section 2.4.2 of the Urban Stormwater Quality Planning Guidelines 2010.</p> <p>Note: A site Stormwater Quality and Quantity Management Report prepared by a suitably qualified person is Council's preferred method required to be submitted to Council to address this Acceptable outcome.</p> <p>The intent in the above guidelines (Urban Stormwater Quality Planning Guidelines 2010) can be achieved by adopting Water Sensitive Urban Design (WSUD) concepts within the development.</p>
Wastewater management	

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Comment [MU2 - CP41]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP42]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP43]: Theme: Other land use changes - improving clarity, consistency and alignment within the City Plan; Item 27 – Dual supply system

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Comment [MU2 - CP45]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Comment [MU2 - CP46]: Theme: Environment - safeguarding our environmental values; Item 24 – Healthy waters code

Performance outcomes	Acceptable outcomes
<p>PO5</p> <p>Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best practice environmental management for that site and takes into consideration:</p> <p>(a) the applicable water quality objectives for the receiving waters; and</p> <p>(b) the potential adverse impact on ecosystem health of receiving waters.</p>	<p>AQ5</p> <p>Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following:</p> <p>(a) wastewater type;</p> <p>(b) climatic conditions;</p> <p>(c) water quality objectives;</p> <p>(d) best practice environmental management;</p> <p>(e) waste management hierarchy; and</p> <p>(f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that:</p> <p>(i) avoids wastewater discharge to waterways; or</p> <p>(ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to waterways is minimised through re-use, recycling, recovery and treatment for disposal to sewer, surface water and groundwater.</p>
Erosion and sediment control (ESC)	
<p>PO6</p> <p>Development does not cause erosion or allow sediments to leave the site.</p>	<p>AQ6</p> <p>An Erosion hazard assessment completed in accordance with the criteria in Table 9.4.5-3 is undertaken to establish the level of risk for soil erosion and sediment pollution to the environment.</p> <p>Where the Erosion hazard assessment has a risk score less than or equal to 10:</p> <p>A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008</i>.</p> <p>Where the Erosion hazard assessment has a risk score greater than 10:</p> <p>A conceptual erosion and sediment control plan (ESCP) is prepared by a suitably qualified person for Council approval in accordance with the <i>Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008</i>.</p>

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Table 9.4.5-3: Erosion hazard assessment

Controlling factor	Points	Score
Average slope of the whole site prior to operational works		
Slope less than 2%	0	
More than or equal to 2% but less than 5%	1	
More than or equal to 5% but less than 10%	2	
More than or equal to 10% but less than 15%	4	
More than or equal to 15%	5	High risk
Soil type (to be disturbed)		
Gravels and sandy soils	1	
Sandy loam	2	
Clays on flood plains	3	
Shallow soils on slopes	4	
Clays on slopes greater than 5%/imported fill or untested fill	5	High risk
Anticipated duration of site disturbance		
Duration less than 2 weeks	0	
More than 2 weeks but less than 3 months	2	
More than 3 months but less than 6 months	4	
More than 6 months	5	High risk
Anticipated erosive rainfall risk during site disturbance		
Low (monthly average rainfall less than 45 mm)	0	
Moderate (monthly average rainfall 46 - 100 mm)	1	
High (monthly average rainfall 101 - 225 mm)	2	
Very high (monthly average rainfall 226 - 1500 mm)	4	
Extreme (monthly average rainfall more than 1500 mm)	5	High risk
Off-site sediment control (down-slope of the soil disturbance)		
Score 1 point if there is no purpose-built sediment trap (e.g. sediment basin, gross pollutant trap or purpose-built wetland).	1	
Run-off entering the site		
Score 1 point if stormwater run-off is not diverted from entering the site or away from soil disturbance.	1	
Extent of site disturbance		
Score 2 points if the building works requires reshaping of the ground surface.	2	
Total Score		
Note: High erosion risk - if score 11 or greater, or five for any factor.		

This Erosion Hazard Assessment form is adapted from the Best Practice Erosion and Sediment Control, International Erosion Control Association (Australasia), IECA 2008 Appendix H - Building Sites, the Brisbane City Council Erosion Hazard Assessment Form and Attachment 2 to the QDC Draft Part 16 Erosion and Sediment Control.

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Table 9.4.5-5: Stormwater design objectives

Construction phase stormwater design objectives	Notes
Drainage control	
Design life and design storm of temporary drainage works: (1) Disturbed area open for less than 12 months - 1 in 2 ARI. (2) Disturbed area open for 12-24 months - 1 in 5 ARI. (3) Disturbed area open for more than 24 months - 1 in 10 ARI.	<ul style="list-style-type: none"> • ARI = Average Recurrence Interval (see Engineers Australia document Australian Rainfall and Runoff). • Design capacity excludes minimum 150mm freeboard. • A higher drainage design objective may be required for temporary drainage structures upslope of occupied properties. • A revised drainage design storm may be required if these design objectives are found to be impracticable.
Erosion control	
(1) Minimise exposure of disturbed soils at any time. (2) Avoid or minimise large construction activities in the 'wet season'. (3) Divert water run-off from undisturbed areas around disturbed areas. (4) Use erosion risk ratings to determine appropriate erosion control measures.	<ul style="list-style-type: none"> • 'Wet season' means the high rainfall months, e.g. the four highest rainfall months. • For point 4, determine the erosion risk rating using local rainfall erosivity, rainfall depth, or soil loss rate or other acceptable method. A rating <u>scale</u> such as very low, low, moderate, high, extreme should be applied. Such ratings should reflect the local area. Example ratings may be shown in local <u>council</u> guidelines or detailed in best-practice guidelines.
Sediment control	
(1) <u>Use soil loss rates</u> to determine appropriate sediment control measures. (2) Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water run-off. (3) <u>Site discharge</u> during sediment basin dewatering should not exceed 50mg/L TSS and pH between 6.5 - 8.5.	<ul style="list-style-type: none"> • For point 1, surrogate determinations may be used such as monthly erosion or average monthly rainfall. • For point 2, a commonly used design storm for basin sizing is 80th percentile five-day event. Depending on the settling characteristics of local soils, a higher 'operational' design storm can be achieved with chemical dosing operated in flow-through mode in a large storm with rainfall-activated auto-flocculent dosing, and advanced hydraulic efficiency features such as floating off-takes, and a sediment forebay. • For point 3, TSS = Total Suspended Solids. Turbidity measurements (e.g. 60 Nephelometric Turbidity Units (NTU)) could be used; however, for accuracy, a site-specific relationship should be developed between turbidity and TSS.

Table 9.4.5-6: Stormwater quality deemed to comply solutions

The following deemed to comply solutions are to be documented within a Stormwater quality management plan prepared by a suitably-qualified person in accordance with **SC6.10 City Plan policy – Land development guidelines**.

Development type			Stormwater treatment train		Land ownership ²
Land use	Scenario	Scale			
Residential	>2 lots up to 20 lots	N/A	Tank Volume per dwelling: • Detached 5 kl • Attached 3 kl	Bio retention ³ @ 1.3% of impervious catchment area. ¹	Public and/or Private
			No Tanks	Bio retention ³ @ 1.8% of impervious catchment area. ¹	Public and/or Private
			Tank Volume per dwelling: • Detached 5 kl	Wetland @ 5% of impervious catchment area.	Public and/or Private

			• Attached 3 kl		
			No Tanks	Wetland @ 7% of impervious catchment area. ¹	Public and/or Private
> 2 dwellings (Townhouse style up to 2 storeys)	≤ 12,500m ²	Tank Volume per dwelling:	• Detached 5 kl • Attached 3 kl	Bio retention ³ @ 1.3% of impervious catchment area. ¹	Private
		No Tanks		Bio retention ³ @ 1.8% of impervious catchment area. ¹	Private
		Tank Volume per dwelling:	• Detached 5 kl • Attached 3 kl	Wetland @ 5% of impervious catchment area. ¹	Private
		No Tanks		Wetland @ 7% of impervious catchment area. ¹	Private
High density multiple dwelling apartments (flats, high-rise)*	≤ 12,500m ²	Tank Volume per dwelling:	• Detached 5 kl • Attached 3 kl	Bio retention ³ @ 1.8% of impervious catchment area. ¹	Private
		No Tanks		Wetland @ 7% of impervious catchment area. ¹	Private
Commercial, Industrial and Retail (including retail at the bottom floors of high rise) ⁴	Commercial and/or Industrial uses	≤ 12,500m ²	Tank Volume per dwelling:	• Detached 5 kl • Attached 3 kl	Gross pollutant management (GPT) + Bio retention ³ @ 1.8% of impervious catchment area. ¹
			No Tanks		Gross pollutant management (GPT) + Wetland @ 8% of impervious catchment area. ¹

¹ For developments that results in an increase in less than 15% imperviousness (i.e. roof and ground level impervious), then stormwater management to focus on the impervious areas only.

² Ultimate owner of the device and responsible for maintenance.

³ For bioretention basins larger than 800m² an inlet pond will be required.

⁴ The City requires gross pollutant management for these land uses. It is preferred that these are located on private property, but in larger scale Reconfiguring a lot applications it is logical to have a single gross pollutant trap for the site. The City will not accept proprietary devices for nutrient management on public/City land.

Table 9.4.5-7: Maintenance access requirements (slope)

Treatment type	Access track slope	Material and width
Stormwater inflows where pipe is 450mm or greater (where there is no forebay or inlet pond)	1 in 4 or flatter	2.5m wide minimum Gravel or reinforced turf from inlet
Coarse sediment forebay	1 in 4 or flatter	2.5m minimum Reinforced concrete in accordance with IPWEAQ standard drawing RS-051

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		Concrete paver (subject to City approval), cement treated gravel 250mm thick may be accepted by the City through negotiation.
Inlet pond (wet) for retention or wetland Sediment basins	1 in 4 or flatter	3m wide Reinforced concrete in accordance with Heavy Vehicle Crossing Industrial (refer IPWEAQ standard drawing RS-051). Where this access crosses perpendicular to pedestrian paths, the path must be 200mm thick, double reinforced and 42MPa.
Proprietary devices	1 in 4 or flatter	Reinforced concrete in accordance with Heavy Vehicle Crossing Industrial (refer IPWEAQ standard drawing RS-051).

Table 9.4.5-8: Maintenance access requirements (size)

Treatment type	Size	Maintenance access requirements (all paths 1 in 10 cross fall or less and maximum 1 in 4 longitudinal grade)
Bioretention	< 500m ²	Access path to > 40% of perimeter. ≥ 0.75m wide. Grass, mulch, gravel or concrete suitable for access on foot. ¹
	≥ 500m ²	Access path to > 40% of perimeter. ≥ 2.5m wide. Reinforced grass, gravel or concrete for light vehicles. ¹ Remainder of perimeter as per < 500m ² bioretention.
Wetland	<1000m ²	Access path to > 40% of perimeter. ≥ 0.75m wide. Grass, mulch, gravel or concrete suitable for access on foot.
	≥ 1000m ² to < 5000m ²	Access path minimum 40% of perimeter. ≥ 2.5m wide. Reinforced grass, gravel or concrete for light vehicles. ¹ Remainder of perimeter ≥ 0.75m wide.
	≥ 5000m ²	Access path 100% of perimeter. ≥ 2.5m wide. Cement treated gravel 200mm or concrete for large vehicles.

¹ Determine access path treatment based on slope, maintenance vehicle and the surrounding landscape. For example, turf is not appropriate where the treatment system is located against conservation open space, and where revegetation for the treatment system complements the surroundings. In this case, use gravel or concrete.

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