

9.4.1 Change to ground level and creation of new waterways code



Photograph 9.4.1-1
Example of changes to ground level and creation of new waterways located at Coomera. Photograph by Remco Jansen.

9.4.1.1 Application

This code applies to assessing operational work (change to ground level) and bulk earthworks undertaken as part of an operational work (works for infrastructure) application where indicated within **Part 5 Tables of assessment**.

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

Supporting information is prepared by a suitably-qualified person in accordance with **SC6.140 City Plan policy – Land development guidelines, Section 8 – Engineering drawings, documents and reports and/or SC6.109 City Plan policy – Geotechnical stability assessment guidelines**.

9.4.1.2 Purpose

- (1) The purpose of the Change to ground level and creation of new waterways code is to protect the environment from impacts of earthworks and the creation or expansion of waterways.
- (2) The purpose of the code will be achieved through the following overall outcomes:
 - (a) Ground level changes are undertaken with geotechnically and ecologically sound practices.

Note: For guidance on how to meet this overall outcome refer to **SC6.109 City Plan policy – Geotechnical stability assessment guideline**.

 - (b) Development does not increase the risk of flood damage to life or property.
 - (c) Development does not increase the rate or volume of run-off during a flood.
 - (d) Soil disturbance and development of land containing potential and actual acid sulfate soils does not result in environmental damage.
 - (e) Construction phase erosion and sediment controls are implemented to minimise erosion and ensure total suspended solids in receiving waters meet the water quality objectives (*Environmental Protection (Water) Policy 2009*).
 - (f) Changes to existing ground levels, including the creation of new waterways do not adversely affect the amenity and landscape values.
 - (g) The environment and public safety are protected from impacts arising from the creation or expansion of non-tidal artificial waterways, such as urban lakes.

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- (h) Development does not adversely affect the quality of stormwater discharging from the development site.
- (i) 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 eroded due to cumulative impact of development.

9.4.1.3 Specific benchmarks for assessment

Part A applies to accepted development subject to requirements.

Part B applies to assessable development

Part B performance outcomes 13 – 20 apply only to assessing operational work (change to ground level) relating to a waterway or wetland for urban purposes where the earthworks are equal to or more than 100m³.

PART A – ACCEPTED DEVELOPMENT SUBJECT TO REQUIREMENTS

There are no requirements for accepted development for this code.

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.1-1: Change to ground level and creation of new waterways code – for assessable development

Performance outcomes	Acceptable outcomes
Finished surface levels	
PO1 The finished surface level is free draining and free from localised flooding.	AO1 Development is free draining and the surface gradient of the fill and/or excavated area is between 0.5% to 1.5%. OR For steep surface gradients, integration with the surrounding topography must be achieved so that the finished profile does not interrupt or materially change the surface water.
Stormwater drainage	
PO2 Development does not cause adverse stormwater drainage impacts on or off the site.	AO2.1 The change to ground level maintains flood conveyance through the site for flood events up to a 1 in 100 (Q100) year Average Recurrence Interval (ARI) storm event using the drainage strategy in accordance with SC6.1.40 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.
	AO2.2 The change in ground level does not involve fill below the designated flood level, unless approved as part of a development approval for material change of use or reconfiguration of a lot.
	AO2.3 The change in ground level does not result in an alteration of overland flows onto other properties or create an increase in flood damage to other properties.
Woongoolba Flood Mitigation Scheme Catchment Area	
PO3 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.	AO3 No acceptable outcome provided.

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Performance outcomes	Acceptable outcomes
Stormwater quantity	
<p>PO4</p> <p>Development ensures that there is no impact on local drainage systems, so that no damage is caused to any property upstream or downstream of the site.</p>	<p>AO4</p> <p>A site stormwater quantity management plan is prepared by a suitably qualified professional and demonstrates:</p> <p>(a) achievable stormwater quantity control measures for discharge during both the construction and operational phases of development designed in accordance with the <i>Queensland Urban Drainage Manual (QUDM)</i> unless subject to specific requirements of SC6.140 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design; and</p> <p>(b) on-site detention systems are designed to restrict peak outflows for Q2, Q5, Q10, Q20 Q50 and Q100 to pre-development conditions.</p> <p>OR</p> <p>A Site Stormwater Quantity Management Plan is consistent with that approved in a related development approval.</p>
Erosion and sediment control	
<p>PO5</p> <p>All construction and operational work is designed and managed with specific regard to the density, scale, layout and staging of development. All reasonable and practicable measures are taken to protect the environmental values of waters and the functionality of stormwater infrastructure from the impacts of erosion, turbidity and sedimentation, on and downstream of the development site.</p>	<p>AO5.1</p> <p>An assessment is undertaken in accordance with the criteria in Table 9.4.1-2: Erosion hazard assessment.</p> <p>AO5.2</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's approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the criteria within the guidelines entitled: <i>Urban Stormwater Quality Planning Guidelines by the Department of Environment and Heritage Protection.</i></p> <p>OR</p> <p>Where the Erosion hazard assessment has a risk score greater than 10:</p> <p>an Erosion and Sediment Control Plan (ESCP) is prepared by a suitably qualified person for Council's approval in accordance with the: <i>Best Practice Erosion and Sediment Control International Erosion Control Association (ICEA) 2008, Australasia Chapter 2008</i> detailing the stormwater (quality and flow) treatment measure during the construction phase of development, demonstrating how the minimum design objectives in Table 9.4.1-3 Summary of design objectives for management of stormwater quality – construction phase are achieved including:</p> <p>(a) measures to ensure that the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded;</p> <p>(b) detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and manufacturers recommendations;</p> <p>(c) detailing how the ESCP accompanying the Operational work (change to ground level) aligns with the Reconfiguration of lot staging.</p> <p>AO5.3</p> <p>Where development is on a lot less than 850m², provide an ESCP in accordance with SC6.140 City Plan policy –</p>

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Performance outcomes	Acceptable outcomes
	<p>Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design and Section 8 – Engineering drawings, documents and reports.</p> <p>AO5.4 Where development is on a lot equal to or more than 850m², provide an ESCP in accordance with SC6.140 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design and Section 8 – Engineering drawings, documents and reports.</p>
Hydraulic considerations	
<p>PO6 Any change to the level of the land does not have adverse flooding and drainage impacts.</p>	<p>AO6 An Hydraulic report is prepared by a suitably qualified professional to accord with the Council’s hydraulic requirements, demonstrating that the change to the level of the land does not:</p> <ul style="list-style-type: none"> (a) cause ponding on the site or nearby land; (b) increase flooding which adversely affects the safety or use of any land upstream and downstream; (c) adversely affect the flow of water in any overland flow path, or otherwise.
Geotechnical fill	
<p>PO7 Material used as fill has the ability to adequately support future development of the land.</p>	<p>AO7 The fill material type, composition and source is geotechnically suitable and adequately compacted to support future development, in accordance with SC6.140 City Plan policy – Land development guidelines, Section 3 – Change to ground level standards.</p>
Geotechnical stability	
<p>PO8 All earthworks are carried out in a location which is not at risk from geotechnical instability.</p>	<p>AO8 The site is free of compressible soils (e.g. soft clays underneath the site). OR Where the site is underlain by compressible soils, a Geotechnical stability assessment report is prepared by a suitably qualified professional demonstrating the treatment of compressible soils achieves a stable ground able to support future structures.</p>
Batters and retaining wall	
<p>PO9 Batters and retaining walls do not create a negative visual impact on the area.</p>	<p>AO9 Batters and retaining walls are in accordance with SC6.140 City Plan policy – Land development guidelines, Section 3 – Change to ground level standards.</p>
Local amenity, noise and emissions	
<p>PO10 Change to ground level or bulk earthwork activities do not impact on the amenity of the area.</p>	<p>AO10.1 Development work, which has the potential to generate dust is controlled by:</p> <ul style="list-style-type: none"> (a) daily water spraying of exposed areas; (b) sealed roads; (c) protective covering of exposed areas; and (d) installing wind barriers. <p>AO10.2 All earthworks on the site is undertaken within the following</p>

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Performance outcomes	Acceptable outcomes						
	<p>days and hours:</p> <table border="1"> <thead> <tr> <th>Day</th> <th>Hours</th> </tr> </thead> <tbody> <tr> <td>Monday to Friday</td> <td>6:30am and 6:30pm</td> </tr> <tr> <td>Saturday</td> <td>between 6:30am and 6:30pm</td> </tr> </tbody> </table>	Day	Hours	Monday to Friday	6:30am and 6:30pm	Saturday	between 6:30am and 6:30pm
Day	Hours						
Monday to Friday	6:30am and 6:30pm						
Saturday	between 6:30am and 6:30pm						
Managing contamination risk							
<p>PO11 Any filling or excavation material does not result in the contamination of land.</p>	<p>AO11 All fill material is solid clean earth or clean inert material, free of organic, putrescible or refuse matter.</p>						
Haulage activity and amenity							
<p>PO12 Haulage activities do not impact on the amenity of the area.</p>	<p>AO12.1 Where transportation of fill material to or from the site is involved, the following applies: (a) loads are covered; (b) spilled or wheel-tracked material is immediately cleaned from external roads; and (c) heavy vehicle traffic is controlled.</p>						
	<p>AO12.2 All waste material, including vegetation from the site is disposed of in an approved location.</p>						
	<p>AO12.3 All haulage routes are approved: (a) for declared main roads – by the Department of Transport and Main Roads; (b) for all other roads – by the Council.</p>						
	<p>AO12.4 All haulage to and from the site is conducted within the following days and hours:</p> <table border="1"> <thead> <tr> <th>Day</th> <th>Hours</th> </tr> </thead> <tbody> <tr> <td>Monday to Friday</td> <td>between 6am and 6pm</td> </tr> <tr> <td>Saturday</td> <td>between 7am and 6pm</td> </tr> </tbody> </table>	Day	Hours	Monday to Friday	between 6am and 6pm	Saturday	between 7am and 6pm
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Created new waterways							
<p>PO13 The waterway contributes to the amenity of the development and the surrounding area.</p>	<p>AO13.1 Created waterways within an Operational work (change to ground level) application are designed and managed for any of the following end-uses: (a) amenity, aesthetics, landscaping or recreation; (b) flood management; (c) stormwater harvesting within an integrated water-cycle management plan; and (d) aquatic habitat.</p>						
	<p>AO13.2 The end-use of the created waterway is designed and operated to protect water environmental values.</p>						
<p>PO14 The created waterway location is compatible with the land-use constraints of the site protecting water environmental values in existing natural waterways.</p>	<p>AO14.1 The created waterway within the Operational work (change to ground level) application achieves the following: (a) environmental values in downstream waterways are protected; (b) groundwater recharge areas are not affected; (c) the waterway location incorporates low-lying areas of a catchment connected to an existing waterway; and (d) any existing areas of ponded water are included.</p>						

Performance outcomes	Acceptable outcomes
	<p>AO14.2 Created waterways: (a) are located outside natural wetlands, waterways and associated buffer areas; (b) avoid soil or sediment disturbance; and (c) avoid alteration of the natural hydrologic regime in acid sulfate soil and nutrient hazard areas.</p>
<p>PO15 The created waterway's location is compatible with existing tidal waterways.</p>	<p>AO15 Where the created waterway is adjacent or connected to a tidal waterway by a weir, lock, pumping system or similar: (a) there is sufficient flushing or a tidal range of >0.3m; OR (b) any tidal flow alteration does not adversely impact on the tidal waterway ; OR (c) there is no introduction of salt water into freshwater environments.</p>
<p>PO16 Created waterways are designed and managed to support the legislated environmental values and water quality objectives within <i>Environmental Protection (Water) Policy 2009</i> of connected receiving water environments.</p>	<p>AO16.1 The created waterway within the Operational work (change to ground level) application is designed, constructed and managed by a suitably qualified Registered Professional Engineer Queensland (RPEQ) with specific artificial waterway experience.</p> <p>AO16.2 The created waterway within the Operational work (change to ground level) application is supported by a Water Quality Management Plan, prepared by a suitably qualified professional, demonstrating the following: (a) water quality of the created waterway is the same or higher standard as the existing water quality; (b) long-term maintenance of the water quality standard is achieved; and (c) breeding potential of biting insects is minimised.</p> <p>AO16.3 The created waterway does not have deep, isolated holes that stratify and increase the possibility of algal blooms occurring.</p> <p>AO16.4 Pumping from a created waterway to maintain water quality is avoided.</p> <p>AO16.5 The created waterway is designed with a suitable outlet to ensure that flooding is possible, if required.</p> <p>AO16.6 Stormwater is treated before any stormwater enters a created waterway.</p>
<p>PO17 Operational work does not cause geotechnical bank instability, erosion, bed scour or revetment wall collapse to existing or newly created waterway.</p>	<p>AO17 Edge treatments certified by a suitably qualified person are in place during and post-construction phase to strengthen the embankment and protect from damage.</p>

Performance outcomes	Acceptable outcomes
<p>PO18</p> <p>The waterway is managed and operated to achieve the water quality objectives (<i>Environmental Protection (Water) Policy 2009</i>) in natural waterways.</p>	<p>AO18.1</p> <p>Monitoring and maintenance programs manage the waterway to achieve the water quality objectives downstream.</p> <p>AO18.2</p> <p>Aquatic weeds are managed to achieve a low percentage (less than 10%) coverage of the water surface area. Pests and vectors are managed by avoiding stagnant water areas, providing for native fish predators, and, if necessary, other best practices for monitoring and treating pests.</p> <p>AO18.3</p> <p>The created waterway is managed and operated under agreement by an appropriate entity for the life of the waterway. A Waterway Management Plan is incorporated within the Community Management Statement for the principal body corporate that:</p> <ul style="list-style-type: none"> (a) identifies the waterway; (b) states the period of responsibility of the entity; (c) states a process for transfer of responsibility for the waterway; (d) states required actions for monitoring water quality of the waterway and receiving waters; (e) states required actions for maintaining the waterway to achieve the policy outcomes of the <i>Environmental Protection (Water) Policy 2009</i> and approval conditions; and (f) identifies funding sources for the above matters including bonds, headworks charges or levies.
<p>Access to new waterways</p>	
<p>PO19</p> <p>Created waterways are designed to provide maintenance access to revetment walls and cleaning of the waterway.</p>	<p>AO19</p> <p>Access is provided to the waterways by:</p> <ul style="list-style-type: none"> (a) dedication of land to the Crown; or (b) existing access arrangements.
<p>PO20</p> <p>Created waterways to be transferred to public ownership are supported by infrastructure to ensure public safety.</p>	<p>AO20</p> <p>Created waterways are designed to create a safe public asset by including:</p> <ul style="list-style-type: none"> (a) warning signs; and (b) fenced areas restricting access to steep-sided embankments or large drops.

Table 9.4.1-2: 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	5	High Risk
Anticipated duration of site disturbance		
Duration of 2 weeks or less	0	
More than 2 weeks and up to, and including 3 months	2	
More than 3 months and up to, and including 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 5 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 9.4.1-3: Summary of design objectives for management of stormwater quality – construction phase

Construction phase stormwater design objectives	Notes
Drainage control	
<p>Design life and design storm of temporary drainage works:</p> <p>(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.</p>	<ul style="list-style-type: none"> • ARI = Average Recurrence Interval (see Engineers Australia document Australian Rainfall and Runoff). • Design capacity excludes minimum 150 mm 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 (e.g. in North Queensland).
Erosion control	
<p>(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.</p>	<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 scale 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 council guidelines or detailed in best-practice guidelines.
Sediment control	
<p>(1) Use soil loss rates 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) Site discharge during sediment basin dewatering should not exceed 50 mg/L TSS and pH between 6.5 - 8.5.</p>	<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.