

Water Management

Contents

1	Introduction.....	2
2	Water Conservation	2
3	Stormwater Management.....	3
3.1	Water Quality.....	3
3.2	On-site Detention and infiltration.....	4
3.3	Construction water management	5
3.4	Stormwater infrastructure.....	5
4	Groundwater	6
4.1	Site investigations	6
4.2	Basement design and construction.....	7
4.3	Groundwater during construction	8
5	Flooding	9
5.1	Flood effects.....	10
5.2	Floor levels	10
5.3	Building components.....	12
5.4	Driveway access and car parking	12
5.5	Safety and evacuation.....	13
5.6	Management and design.....	14

1 Introduction

This section of the DCP contains objectives and controls for development in relation to water conservation, stormwater management, groundwater and flooding, with an overall focus on Water Sensitive Urban Design.

Water Sensitive Urban Design (WSUD) is the sustainable management of water in urban areas through intelligent and integrated design. It seeks to ensure that development is designed, constructed and maintained to minimise impacts on the natural water cycle.

It includes a wide range of technologies to reduce potable water consumption and reduce the pollution from stormwater ending up in local waterways. These can include rainwater tanks, gross pollutant traps, on site stormwater retention and reuse, landscaped swales, and infiltration systems.

For further information and examples of WSUD refer to www.urbanwater.info or www.wsud.org.au

2 Water Conservation

State Environmental Planning Policy (SEPP) - Building Sustainability Index (BASIX) includes targets for water conservation for most residential development.

The following controls, while not specifically mandated for residential development under BASIX, are encouraged to be applied, and are required to be addressed in all other development.

Objectives

- To promote the sustainable use of water across the City of Randwick.
- To minimise the development's reliance on mains supplied water and encourage water conservation and reuse.

Controls

- i) Provide rainwater tanks to meet all non-potable water demands including outdoor use, car washing, toilets and laundry.
 - a. Include a site-specific analysis to determine tank capacity based on potential collection area, and internal and external demands.
 - b. Encourage installation of dual reticulation systems to link collected rainwater to non-potable water uses such as irrigation or toilet flushing.

- c. Where site constraints restrict rainwater tank capacity or installation, an alternative off-set provision (in addition to standard requirements) promoting sustainability and innovation may be considered.
- ii) Encourage grey water recycling and reuse. Note that grey water treatment systems will require separate Council approval.

Contact Council's Environmental Health Section for further information on grey water reuse, or refer to the NSW Office of Water: <http://www.water.nsw.gov.au/Urban-water/Recycling-water/Greywater/Greywater/default.aspx>

3 Stormwater Management

Randwick LEP includes provisions for stormwater management which aim to minimise the impact of urban stormwater on land in Randwick City, including adjoining downstream properties, native bushland and receiving waters.

This section supports these LEP provisions, and contains specific requirements for developments in relation to managing the quality and quantity of stormwater impacting on Randwick City and surrounding catchments, waterways and coastlines.

Other sections in this DCP also contain related requirements for water permeable surfaces in landscaped open space. Refer to the sections on specific development types for further details.

3.1 Water Quality

Explanation

Water bodies and coastlines in urban areas often suffer from decreased water quality resulting from stormwater run-off from roads and other impermeable surfaces. This run-off collects sediments, oils, chemicals and other pollutants, and adversely impacts on the biodiversity and recreational amenity of waterways and coastlines.

Management of stormwater quality is particularly important to larger developments with open areas of hardstand or car parking that have higher potential to collect and direct sediments and pollutants into the stormwater system.

Objectives

- To prevent the transportation of pollutants and sediments from a site by stormwater runoff.
- To ensure that stormwater runoff is of suitable quality to protect the recreational amenity of water bodies and coastlines; aquatic ecosystems and downstream receiving waters.
- To prevent pollution spills or contaminants from leaving a site via the stormwater network.



Green sea turtle at Clovelly Beach

Controls

- i) All development proposing open car parking or hard stand areas exceeding 200 square metres, or incorporating new roads shall capture sediments and pollutants from the site via:
 - a) A minimum of one pollutant trap located between the last downstream stormwater pit and prior to discharge from the site, or
 - b) A system of water sensitive urban design treatments such as vegetated swales, bio-retention systems and buffer strips to achieve the same performance as the pollutant trap(s), and;
 - c) Submit a design report with the DA from a suitably qualified environmental consultant demonstrating how sediments and pollutants will be captured.
- ii) All other development must consider the use of water sensitive urban design technologies to improve the quality of stormwater run-off from a site prior to entering the drainage system, nearby catchments or waterways.

3.2 On-site Detention and infiltration

Explanation

On-site Stormwater Detention (OSD) temporarily stores excess stormwater on a site. It acts to restrict the rate that the stormwater leaves the site with the aim of better managing the rate and quantity of stormwater entering the drainage system, and reducing the risk of downstream flooding effects.

On-site detention will be required for certain development types, and certain locations within Randwick City. These are specified in Council's Private Stormwater Code

Objectives

- To control the release of private stormwater into Council's drainage system to maintain its capacity.
- To require the use of on-site detention systems and, where practical, to encourage the use of stormwater infiltration in lieu of on site detention.

For further details on requirements for on-site detention and the design and application of infiltration systems, refer to Council's Private Stormwater Code

Controls

- i) On-site detention and infiltration systems shall be designed and constructed to comply with the requirements of Council's Private Stormwater Code.
- ii) On-site detention storage volume may be reduced through the use of stormwater infiltration systems.

3.3 Construction water management

Explanation

Discharging site stormwater, groundwater or seepage water from a building site can introduce excess sediments and harmful pollutants into Council's stormwater drainage system and downstream receiving waters. Construction sites are required to manage erosion of sediment and stormwater run-off during construction. Council will include conditions of consent describing requirements during construction.

Objective

- To protect the drainage system, downstream receiving waters and the surrounding environment from harmful contaminants from construction sites.

Controls

- i) All DAs involving excavation or other site disturbance shall submit a soil and erosion management plan demonstrating how sediment and contaminants from construction shall be contained and managed.
- ii) Separate approval will be required from Council for any proposals to discharge stormwater, seepage water or groundwater from a construction site into Council's stormwater drainage system. Council may require water quality testing of the discharged water by a suitably qualified environmental consultant.

3.4 Stormwater infrastructure

Explanation

This sub-section applies to all development in proximity to public stormwater infrastructure or inter-allotment drainage, and all development proposing new connections to Council's drainage system.

Objectives

- To ensure stormwater infrastructure is designed and constructed to an acceptable standard.
- To prevent adverse impacts of development on the performance, serviceability and integrity of publicly owned stormwater systems and inter allotment drainage lines.
- To ensure that private stormwater systems discharge to the public stormwater system in an acceptable manner.

Controls

- i) Design and install stormwater infrastructure in accordance with Randwick City Council's Private Stormwater Code.

Note:

The public stormwater infrastructure is the system of drainage pipes and pits owned by Council or another public authority.

Inter-allotment drainage lines carry stormwater from more than one lot across private property before connecting to the public stormwater system.

- ii) New structures may not be constructed above public stormwater infrastructure or inter-allotment drainage.
- iii) Redevelopment of existing structures above public stormwater infrastructure or inter allotment drainage shall occur only where:
 - a. relocation of the stormwater conduit or structure is not feasible,
 - b. the conduit is reconstructed to meet relevant standards, and
 - c. the conduit is upgraded to ensure structural soundness and serviceability for the life of the structure and the life of the conduit;
- iv) A drainage easement may be required for development impacting existing Council stormwater infrastructure or an inter-allotment drainage line
- v) Separate approval from Council will be required for development proposing to connect private stormwater to the public drainage system.

4 Groundwater

Several areas within Randwick City are underlain by the Botany Sands aquifer. The level of the aquifer can vary with seasonal conditions, and in some areas is quite close to the surface. As a consequence some developments in locations above the aquifer may be affected by the groundwater system.

This sub-section applies to all development proposing basement construction or other forms of excavation that may interact with the groundwater table.

4.1 Site investigations

Explanation

It is important to establish the potential for a development to be impacted by groundwater early in the design process, to ensure appropriate investigations are undertaken that inform the design and construction of the development.

Objective

- To ensure appropriate site investigations are undertaken to identify the potential for a development to be affected by groundwater.

Controls

- i) All development proposals incorporating a basement level are required to undertake a preliminary geotechnical investigation to establish whether the development may be affected by groundwater

- ii) This investigation must be undertaken by a suitably qualified geotechnical or hydrogeological engineer, and shall be submitted with the DA.

4.2 Basement design and construction

Explanation

Basements that may intersect the water table must be designed and constructed to preclude the need for dewatering after construction, while also avoiding unreasonable adverse effects on groundwater flows and quality, and on neighbouring properties.

This sub-section sets out requirements for documentation to be included with DAs. Council will also include conditions of development consent requiring design details and certification of the suitability of the basement design prior to approval to commence works on site, and certification upon completion that the works have been implemented in accordance with the approved documentation.

Objective

- To require sufficient information to demonstrate that the proposed works may be feasibly constructed without unreasonable impacts to neighbouring properties, groundwater conditions, or the structural integrity of the development.

Controls

- i) Provide a letter or report prepared by a suitably qualified engineer experienced in the design of structures below a water table, confirming that the proposed basement will be designed and constructed in a manner that is suitable for the site conditions.
- ii) The report shall be submitted with the DA and include confirmation that the basement:
 - will be designed and certified by a suitably qualified and experienced engineer
 - will preclude the need for dewatering after construction
 - will be suitably water-proofed and tanked in all areas where groundwater may impact on the development
 - will include groundwater management systems if needed to maintain natural flowpaths of groundwater around the development.

4.3 Groundwater during construction

Explanation

Where a development intersects the groundwater table, temporary pumping (dewatering) may be required to allow construction to proceed. Dewatering is the process of removing groundwater from an aquifer to lower the water table below the lowest level of the excavation. This allows construction to proceed safely by limiting the potential for excavation instability and water-logged ground conditions.

Development proposals involving dewatering are referred for assessment, review and approval from the NSW Government's Office of Water. If approval is granted, they will issue general terms of approval which will be incorporated into any development consent issued by Council. It is also necessary to obtain a Water license from the Office of Water after development consent is issued, to permit the extraction of water from an aquifer.

Note that the Office of Water will not endorse continuous extraction of groundwater. Temporary de-watering may be approved by the Office of Water provided the design of basement areas precludes the need for dewatering after construction.

Council will also include conditions of development consent relating to excavation, shoring, piling, dewatering and other construction activities relating to basements affected by groundwater, including requirements for information/certification to be provided prior to approval to commence construction works.

Objectives

- To ensure that construction activities do not adversely impact on groundwater conditions or neighbouring properties.
- To identify requirements for development proposals that may require temporary de-watering during construction.

Controls

- i) All DAs involving excavations that may require temporary de-watering, shall include a letter or report prepared by a suitably qualified engineer experienced in the construction of structures below a water table. The letter/report shall:
 - a. outline the proposed method of construction and dewatering; and
 - b. confirm that the basement can be feasibly constructed without causing unreasonable impacts on the groundwater system or neighbouring properties.

5 Flooding

Explanation

Flooding in NSW is managed in accordance with the NSW Government's Flood Prone Lands Policy, which aims to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.

Randwick City Council is in the process of undertaking flood studies, Floodplain Risk Management Studies and Plans for its catchments to quantify flooding risks and potential measures in accordance with the NSW Government's Floodplain Development Manual.

RLEP includes flood planning provisions (CI 6.9) applying to land at or below the defined flood planning level, and which require the consent authority to consider the impacts of development on flooding. This sub-section of the DCP supports RLEP, and provides controls for development consistent with the NSW Government's Flood Prone Land Policy and the Floodplain Development Manual.

This sub-section applies to:

- Residential development on land below the 1% Annual Exceedence Probability (AEP) flood plus the required freeboard, and
- All other development on land below the Probable Maximum Flood (PMF) plus the required freeboard

Information including locations of floodways and flood levels is available from Council where a flood study for a particular catchment has been completed. If a flood study for the catchment has not been completed, development proposals may be required to submit a site specific flood study or other calculations to demonstrate there is no adverse impact on flooding.

Objectives

- To control development at risk of flooding in accordance with the NSW Government's Floodplain Development Manual.
- To ensure that the economic and social costs which may arise from damage to property due to flooding is minimised and can be reasonably managed by the property owner and general community.
- To reduce the risk to human life and damage to property caused by flooding by controlling development on land impacted by potential floods.
- To ensure that development is appropriately sited and designed according to the site's sensitivity to flood risk.

Refer to Council's website for status of flood studies, and availability of information for different catchments.

Property specific information, where available, can be obtained from Council by completing a Flood Report Application Form.

Definitions

Probable Maximum Flood (PMF):

The largest flood that could reasonably occur.

1% Annual Exceedance Probability (AEP) flood:

A flood with a 1% (1:100) probability of occurring in any given year, also known as the 100 year ARI.

5% Annual Exceedance Probability (AEP) flood:

A flood with a 5% (1:20) probability of occurring in any given year, also known as the 20 year ARI.

Freeboard:

A factor of safety typically used in relation to floor levels, to ensure that the required standard of protection is achieved.

Overland Flow Path:

The path of rain-induced surface run-off that is not part of a defined watercourse, including run-off in excess of the capacity of the underground drainage system

5.1 Flood effects

Objectives

- To ensure that development, either individually or cumulatively, minimises adverse impacts on flooding, conveyance of floodwaters and floodplain storage volume.
- Ensure that floodways and overland flow paths are not obstructed by development.

Controls

- i) The development shall not increase flood effects elsewhere, having regard to loss of flood storage, changes in flood levels and velocities and the cumulative impact of multiple potential developments, for floods up to and including the 1% AEP flood.
- ii) Floodways and overland flow paths must not be obstructed or diverted onto adjoining properties.
- iii) Areas identified as flood storage areas must not be filled unless compensatory excavation is provided to ensure that there will be no net loss of floodplain storage volume below the 1% AEP flood.

5.2 Floor levels

Floor levels refer to the minimum required building floor levels. For development such as basements, the floor level refers to the lowest level at each access point.

Objective

- To ensure that floor levels are set at an appropriate height to reduce the frequency of inundation of structures and floors to an acceptable probability.

Controls

- i) Building floor levels shall comply with the *Table A – Floor Levels for Buildings*, with exceptions noted below:
 - a. For existing single dwellings and dual occupancy dwellings, a single addition of not more than 10 square metres is permitted at the level of the existing lowest habitable floor level.
 - b. For all development other than single dwellings and dual occupancy dwellings, a single addition of up to 10 percent of the existing gross floor area may be permitted at the level of the existing lowest floor level. (note for large buildings, this increase may be limited to a lower amount)
- ii) A certificate by a registered surveyor shall certify that the floor levels are not less than the required level.
- iii) Where the lowest habitable floor area is elevated more than 1.5m above ground level, a restriction is to be placed on the title of the land confirming that the under-croft area is not to be enclosed.

Non habitable floors include areas such as laundries or sheds, but exclude garages. All other floor spaces are habitable areas.

Industrial and commercial facilities include areas such as office space, show rooms, child care facilities, residential floor levels for hotels and tourist establishments.

Critical facilities include: hospitals, police, fire, ambulance, SES stations, major transport facilities, major sewage or water supply or electricity or telecommunication plants, schools, nursing homes and retirement villages

Table A - Floor Levels for Buildings

Scenario	Floor level
Habitable Floors - all development (excluding critical facilities)	
Inundated by flooding	1% AEP + 0.5m freeboard
Inundated by overland flow path	Two times the depth of flow in the 1% AEP flood with a minimum of 0.3m above the surrounding surface
Habitable floors - Critical facilities	
Inundated by flooding	PMF + 0.5m freeboard
Inundated by overland flow path	Two times the depth of flow in the PMF with a minimum of 0.3m above the surrounding surface
Non-habitable floors – residential (excluding garages)	
Gross floor area less than or equal to 10 square metres.	1% AEP but not less than 0.15m above surrounding ground level
Gross floor area greater than 10 square meters.	The applicable habitable floor level
Non-habitable floors – Industrial and commercial	
Located on flooding or overland flow path	1% AEP but not less than 0.15m above surrounding ground level
Material storage locations – all development	
Materials sensitive to flood damage, or which may cause pollution or be potentially hazardous during flooding	1% AEP + 0.5m freeboard

Overland flow paths occur when:

- a. The maximum cross sectional depth across the entire overland flow path through and upstream of the site is less than 0.25m for the 1% AEP flood for other than critical facilities, or 0.25 for the PMF for critical facilities; and
- b. Existing surface levels within the site are not less than 0.5m above the 1% AEP flood level for other than critical facilities, or the PMF level for critical facilities, at the nearest upstream and downstream trapped low points.

For more information on overland flow paths, contact Council's Development Engineering section.

5.3 Building components**Objective**

- To ensure the structure and construction of development is compatible with flooding up to the applicable floor level.

Controls

- i) All development shall have flood compatible building components below the floor levels identified in Table A.
- ii) All structures shall be constructed to withstand the forces of floodwater, debris and buoyancy up to and including the floor levels identified in Table A.

5.4 Driveway access and car parking**Objectives**

- To ensure car parking and site access is constructed to an acceptable flood standard.
- To require appropriate protection measures for warning and safe evacuation from basement car parking.
- To minimise the likelihood of cars or other objects becoming floating debris during a flood.

Controls

- i) Car parking floor levels shall comply with *Table B – Floor Levels for Car Parking*.
- ii) Locate vehicular access where the road level is greater than or equal to the required floor level for the car park. Where road access above the required floor level is not available, locate vehicular access at the highest feasible location.
- iii) The level of the driveway between the road and car park shall be no lower than 0.3m below the 1% AEP flood or such that the depth of inundation during the 1% AEP flood

Additional guidance on structural soundness and flood compatibility of buildings can be obtained from the document “Reducing Vulnerability of Buildings to Flood Damage – Guidance on Building in Flood Prone Areas , Hawkesbury-Nepean Floodplain Management Steering Committee, June 2006, ISBN 0 7347 56143”

is not greater than the depth of flooding at either the car park or the road where the site is accessed.

- iv) Underground car parking accommodating more than three vehicles shall have warning systems signage and exits to ensure adequate warning and safe evacuation.
- v) Barriers shall be provided to prevent floating vehicles leaving the site during the 1% AEP flood.

Table B - Floor Levels for Car Parking

Scenario	Floor Level
Above ground level open car parking, car ports and garages	
Open car parking spaces and car ports	5% AEP flood
Residential garages for up to two spaces	1% AEP but not less than 0.15m above surrounding ground level
Residential garages with more than two spaces	Applicable residential habitable floor level requirement (Table A)
Enclosed industrial/ Commercial parking spaces	Applicable industrial/commercial floor level requirement (Table A)
Underground car park (where floor level is more than 0.8m below surrounding ground level)	
Inundated by flooding or local overland flow path	All openings to be sealed up to 1% AEP + 0.5m freeboard with a minimum of 0.3m above the surrounding ground level
All emergency exits	All underground garages and car parks to have emergency exits protected from inundation up to the 1% AEP flood plus 0.7m freeboard with a minimum of 0.2m freeboard from vehicle entry point.

For additional guidance on structural soundness and flood compatibility of buildings refer to: Reducing Vulnerability of Buildings to Flood Damage – Guidance on Building in Flood Prone areas (Hawkesbury-Nepean Flood Plain Management Steering Committee, 2006)

5.5 Safety and evacuation

Objective

- To ensure the safety of persons and emergency access during a flood.

Controls

- i) Include a description of the safety and evacuation methodology with all DAs, including:
 - a) the provision of reliable and safe egress for inhabitants from the lowest habitable floor level to a publicly accessible location above the PMF level, or

alternatively demonstrate that a minimum of 20% of the habitable floor area shall be above the PMF for each dwelling.

- b) the method of egress of vehicles to a publicly accessible location above the PMF level.
- c) the method of access for emergency personnel.

5.6 Management and design

Objectives

- To ensure development does not use materials sensitive to flood damage or be potentially hazardous during a flood.
- To ensure land subdivisions have suitable potential to be developed in accordance with the flooding requirements of this DCP.
- To ensure development does not increase erosion, siltation or destruction of natural or modified watercourses, wetlands or coastal areas.
- To ensure fencing does not obstruct the flow of flood waters, become unsafe during times of flood or become moving debris.

Controls

- i) Land shall not be subdivided unless it is demonstrated that the newly created parcels of land can be developed in accordance with the flooding requirements of this DCP. Parcels created for the specific purpose of being transferred to Council ownership are exempt from this requirement.
- ii) The development shall not cause or increase erosion, siltation or destruction of natural or modified watercourses, wetlands or coastal areas.
- iii) Fencing within a floodway or overland flow path must be of permeable open type design, and be constructed to withstand the forces of floodwaters or to collapse in a controlled manner.