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C3 Water Management

General Objectives

- a) To adopt an integrated approach that takes into account all aspects of the water cycle in determining impacts and enhancing water resources;
- b) To promote sustainable practices in relation to the use of water resources for human activities;
- c) To minimise water consumption for human uses by using best practice site planning, design and water efficient appliances;
- d) To address water resources in terms of the entire water catchment;
- e) To protect water catchments and environmental systems from development pressures and potential pollution sources;
- f) To protect and enhance natural watercourses, riparian corridors, wetlands and groundwater dependent ecosystems;
- g) To protect, conserve and enhance surface and groundwater resources;
- h) To integrate water management with stormwater, drainage and flood conveyance requirements; and
- i) To utilise principles of Water Sensitive Urban Design in designing new developments or infill development in existing areas.

3.1. The Water Cycle/Water Conservation

A. Background

Key Issues

Key issues for preserving the quality of water supplies and minimising impact on the water cycle include:

- a) Pursuing more sustainable consumption practices for water;
- b) Regulating the pumping of water from ground water and surface water systems;
- c) Promoting the trapping of surface run-off in dams and storage areas, where appropriate;
- d) Minimising water consumption for new developments; and
- e) Recycling grey-water and stormwater, including rain water collection.

Relevant Water Conservation Policies

For residential development, the current water conservation requirements are set out in *State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004* (BASIX). Other building types do not currently have any legislative requirements for water conservation. However, there are a number of tools available for testing the water conservation initiatives of a range of developments (e.g. the Greenstar and NABERS rating tools). The following controls supplement the existing legislative requirements for all developments.

All naturally occurring water (both surface and ground water) in NSW that is capable of being used for irrigation or for watering stock is regulated by the provisions of the *Water*

Management Act 2000 or the *Water Act 1912*. Any 'work' (which includes any dam, pump, weir, regulator, race, channel, cutting, well, excavation, etc.), which affects the quantity of water flowing to or from, or contained in, a river, stream or lake comes within the provisions of the *Water Management Act 2000* in areas where water sharing plans have commenced (includes Penrith LGA). Licences are issued to authorise (construct/install and use) such works. In relation to groundwater, the construction of any bore (which includes any bore, spear point or excavation) requires authorisation under the *Water Management Act 2000*.

B. Objectives

- a) To minimise impacts on the water cycle and natural ecosystems from redirection of water for human land uses and activities; and
- b) Where possible, to recycle water for non-drinking uses.

C. Controls

1) Alterations/Additions to Existing Buildings

Extensions to existing residential buildings will, in most cases, need to comply with the requirements of BASIX, the sustainability tool developed by the State Government.

For extensions to non-residential buildings or residential extensions that do not trigger BASIX, the following controls apply:

- a) Water saving devices must be incorporated into any internal renovation (taps, toilets, etc.).
- b) Rainwater tank(s) and gutter systems shall be installed to capture rainwater and reuse for irrigation, toilet flushing and other non-drinking purposes. Installation of rainwater tanks shall comply with the relevant standards established by Sydney Water.
- c) If water saving devices and/or rainwater tanks are not to be installed, the applicant will need to submit a statement explaining why the installation of these measures is not economically feasible or is technically difficult.

2) Pools, Spas and Water Features

Any proposal for a permanent residential swimming pool, spa pool or water feature with a capacity of greater than 40,000 litres must consider the following:

- a) Provision of shading or covers to minimise evaporation; and
- b) Other mechanisms to reduce water consumption.

3) Proposed Industrial Land Uses

Any new industrial development or significant alteration and/or addition to an industrial building needs to reduce water consumption by a combination of careful site planning, design and water efficient appliances.

Significant alterations/ additions are those where the roof or hard surface area is increased to the minimum standard AND those additions are not less than 25% of the existing roof area.

The minimum standard is:

- a) 200m² in clause 3 a)
- b) 1,000m² in clause 3 b)
- c) 600m² in clause 3 c).

The following controls apply to new industrial buildings and significant alterations/additions to industrial buildings:

- a) All proposed industrial buildings with a roof area greater than 200m² are required to install a rainwater tank of minimum capacity of 100,000 litres on the site for re-use of water in irrigation, industrial processes, toilet flushing or for other non-drinking purposes through a separate reticulated water supply system.
- b) All proposed industrial sites with a hard surface area (including roof area, driveways, parking areas, loading bays, covered storage areas, etc.) greater than 1,000m² shall submit a water management plan which estimates required water needs, and includes an investigation into the feasibility of the measures listed below, outlines those to be adopted on the site and explains why any measures not adopted were unable to be implemented:
 - i) Rainwater tanks connected to roof and gutter systems and installed to enable reuse of rainwater for irrigation, industrial processes, toilet flushing or other non-drinking purposes;
 - ii) Stormwater detention systems installed and maintained to enable the reuse of stored water for irrigation, industrial processes, toilet flushing or other non-drinking purposes, and to minimise the impact of runoff from the site;
 - iii) Roof gardens, either for recreational purposes or as a means to reduce hard stand area.
- c) Any proposed industrial development with a roof area greater than 600m² must submit a documented investigation into the feasibility of a roof garden to reduce hard surface area and associated run off.

4) Proposed Rural Land Uses

- a) Any application for a new rural land use that requires the consent of Council and will increase the water needs of a particular rural area must submit a water management plan which:
 - i) Estimates future water needs of the proposed development;
 - ii) Indicates the proposed water source to meet those needs; and
 - iii) Outlines water conservation measures to be implemented.
- b) Where new rural dwellings are proposed and reticulated water supplies are not available, each allotment or dwelling should demonstrate that it has an adequate and self sufficient water supply without having to pump from streams or groundwater sources.

5) Requirements for Extraction of Water

Rural landholders have rights to access water for some basic purposes, such as domestic and stock water, harvestable rights from farm dams and native title rights (see other provisions in this section).

Whether or not you need a licence (or other approval) from the Office of Water to access surface water (water from rivers, lakes etc.) depends on how and why you want to use the water. Please consult with the Office of Water regarding any proposed water extraction.

Access to groundwater for any purpose requires a licence or approval from the Office of Water (see other provisions in this section).

If you want to extract water from rivers or aquifers and use it for commercial purposes, you must hold a water access licence and an approval from the Office of Water.

D. Lifting the Bar

The following represent some ways in which applicants can demonstrate additional commitment to the water conservation principles expressed in this Plan. Demonstration of this commitment may lead to Council considering variation of development controls. Applications that vary the development controls listed in this section will need to demonstrate that the proposed development complies with the objectives relevant to the development controls it seeks to vary.

- a) Exceeding BASIX for proposed residential dwellings: Whilst BASIX sets the minimum requirement for reduction in water consumption for new residential dwellings (depending on location), Council recommends that an additional 10% water reduction is sought for any residential developments over 3 dwellings.
- b) Recycling of grey-water / stormwater: Where possible, any new developments or substantial re-developments of a site should seek to include opportunities for recycling of grey-water and stormwater on the site to minimise use of potable (drinking) water.
- a) Reticulated recycling systems: New large scale developments resulting in 5 or more dwellings should seek to provide a reticulated water system that enables on-site treatment and re-use of grey water from the site.

E. Other Information

People seeking further information on water management may wish to refer to the following:

- Penrith City Council's *Stormwater Drainage Specification for Building Developments*
- BASIX – the on-line program that assesses a house or unit design and compares it against energy and water reduction targets. A BASIX Certificate must be submitted with every development application for a new home. The design must meet these targets before a BASIX Certificate can be provided (www.basix.nsw.gov.au)
- Greenstar rating tool for commercial and other developments (www.gbcaus.org)
- National Australian Built Environment Rating System (NABERS) water tool for commercial and other developments (www.nabers.com.au)
- *Australian Drinking Water Guidelines* (2011) National Health and Medical Research Council (NHMRC) (compliance regulated by NSW Health)
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1)* (2006) Environment Protection and Heritage Council, Natural Resource Management Ministerial Council and Australian Health Ministers' Conference
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) - Augmentation of Drinking Water Supplies* (2008) Environment Protection and Heritage Council, Natural Resource Management Ministerial Council and Australian Health Ministers' Conference
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) - Stormwater Harvesting and Reuse* (2009) Environment Protection and Heritage Council, Natural Resource Management Ministerial Council and Australian Health Ministers' Conference
- *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) - Managed Aquifer Recharge* (2009) Environment Protection and Heritage

Council, Natural Resource Management Ministerial Council and Australian Health Ministers' Conference

- *Management of Private Recycled Water Schemes (Interim NSW Guidelines) (2007)* NSW Department of Water and Energy
- Penrith City Council's *Sustainability Blueprint for urban release areas* (June 2005)
- *NSW Water Conservation Strategy* (Oct 2000) NSW Department of Land and Water Conservation
- *Sydney Metropolitan Water Plan* (reviewed 2010) NSW Department of Water and Energy
- *Water for Life* (www.waterforlife.nsw.gov.au).

3.2. Catchment Management and Water Quality

A. Background

Catchment management requires protecting water systems from:

- Chemicals (including pesticides and insecticides);
- Untreated sewage from on-site effluent treatment and disposal systems;
- Nutrient run-off from application of fertilisers and animal manure;
- Soil erosion and sedimentation from poor construction/land use practices;
- Removal of natural vegetation around watercourses that could trap sediment and provide treatment of surface run-off to reduce pollution entering water systems; and
- Stormwater run-off and surface pollution.

Water Sensitive Urban Design (WSUD) involves adopting design and management practices that take advantage of natural site features and seek to minimise impacts on the water cycle. WSUD requires consideration of issues such as water conservation, water quality and stormwater management. It seeks to minimise the extent of impervious surfaces and mitigate changes to the natural water balance through on-site re-use of water as well as through temporary storage.

WSUD relies on an integrated approach to both water and stormwater management. This integrated approach regards stormwater as a resource and involves considering all aspects of runoff within a development, including environmental and social issues. For example, the inclusion of a multi-purpose corridor in an integrated stormwater management system may provide water features, stormwater treatment, habitat protection and recreation.

Council's Water Sensitive Urban Design Policy (2013) was prepared to improve water conservation, quality and quantity in both new developments and some redevelopments. The Policy sought to clarify which developments needed to achieve water conservation, quality and quantity outcomes. The Policy has now been incorporated into this section of the DCP.

B. Objectives

Catchment Management

- a) To adopt a total catchment management approach to water quality and protection of water systems;

- b) To prevent direct pollution of existing groundwater or surface water systems;
- c) To ensure appropriate management of land uses and activities to minimise the risk of indirect water pollution;
- d) To improve the water quality of the Hawkesbury-Nepean River system and tributaries;
- e) To ensure the high quality of discharge to sewer and drainage systems; and
- f) To protect the aquatic environment through the use of ecologically sustainable development principles.

Water Sensitive Urban Design

- g) To protect and enhance natural land and water systems such as creeks and rivers, particularly water quality.
- h) To maintain and restore the natural water balance;
- i) To make more efficient use of water resources by conserving water, particularly potable (drinking) water;
- j) To reduce flood risk in urban areas;
- k) To reduce erosion of waterways, slopes and banks;
- l) To control stormwater pollution and improve water quality in waterways and groundwater;
- m) To integrate stormwater management with water supply and waste water treatment; and
- n) To integrate stormwater treatment into the landscape so as to maximise the visual and recreational amenity of urban development.

C. Controls

1) Approval to Discharge Contaminants

Water discharge from any development must not contain contaminants, unless necessary licences and/or approvals are obtained from relevant government authorities.

All liquids (including water) produced and/or discharged from the site shall not contain pollutants above acceptable levels. Acceptable levels will be determined at the time of consideration of individual proposals by Council, the Office of Environment and Heritage and, if required, Sydney Water.

2) Addressing Potential Catchment Impacts

All applications to Council, where there is the potential to impact upon a water system, are required to identify in the application the relevant water systems in the catchment area of the site that may be affected and address how any potential impacts will be mitigated/avoided.

3) Water Quality for all Land Uses

Council's Water Sensitive Urban Design (WSUD) Policy (2013) has been prepared to improve water conservation, quality and quantity in both new development and some redevelopments. The policy seeks to clarify which developments need to achieve the targets for water conservation, quality and quantity.

Where any development could result in water quality impacts in nearby surface water systems, the water quality at that system is to be monitored for pollutants prior to the commencement of works, and at regular intervals during construction and/or operation.

Water quality entering natural areas shall either maintain or improve on pre-development levels.

All monitoring is to be undertaken in accordance with any relevant guidelines of the Office of Environment and Heritage (or any other applicable guidelines).

4) Council Approval Requirements for WSUD Systems

Development types required to meet water conservation and stormwater quality and quantity targets are defined in Table C3.1. The performance criteria required to be met are listed below under subsection '5) WSUD Development Controls'. Affected developments must submit a WSUD Strategy (report dealing with measures to be implemented as part of the development) with a Development Application.

A WSUD Strategy is a written report detailing potable water savings and stormwater quality and quantity control measures to be implemented as part of a development. The required content of the Strategy is outlined in Council's WSUD Technical Guidelines. The WSUD Technical Guidelines must be considered when undertaking certain developments within the City. The guidelines outline the information to be submitted with development applications and construction certificates, in order to demonstrate compliance with the objectives and performance criteria outlined below. The WSUD Technical Guidelines provide a list of:

- Council's requirements for the location, ownership and ongoing maintenance responsibilities of WSUD measures;
- What is to be submitted with a development application or construction certificate application;
- What is required to be included in a WSUD Strategy;
- Parameters to be used in MUSIC modelling;
- Where to get further information on the design, construction, operation and maintenance of stormwater treatment measures; and
- Council's expectations in relation to the proposed WSUD measures.

The Technical Guidelines should be read in conjunction with a number of referenced industry best practice guidelines/documents including the following:

- Draft NSW Music Modelling Guidelines (prepared for the Sydney Metropolitan CMA);
- WSUD Conceptual Design Information (prepared by Water by Design);
- WSUD Technical Design Guidelines (prepared by Water by Design);
- Typical Drawings (prepared for the Sydney Metropolitan CMA).

When preparing supporting documentation for a development application or construction certificate application, Council requires applicants and developers to engage appropriately qualified and experienced practitioners for the development of appropriate WSUD designs and strategies. Discussion with Council is encouraged at an early stage of a development proposal to agree on a general design approach before a detailed WSUD Strategy is prepared.

Nothing in this section is to be construed as limiting, in any way, Council's right to impose differing conditions when approving development proposals, or limiting the discretion of Council's nominated representative to vary any necessary requirements in respect of a particular development or Council project, having regard to potential site restrictions and best practice.

The WSUD Technical Guidelines will be periodically reviewed and updated to reflect changes in industry best practice and are available on Council's website.

Table C3.1: Developments Required to Consider Water Sensitive Urban Design

Land Use	Development Type	Water Conservation 5(a)	Stormwater Quality 5(b)	Water Quantity Flow 5(c)
Residential	Alterations and additions, detached dwellings and residential land uses not addressed below	√ - BASIX	No	No
	New single dwellings and dual occupancy	√ - BASIX	No	No
	Existing residential villas, flats and townhouses with additional impervious area greater than 250m ²	√ - BASIX	No	No
	Residential development of 5 or more dwellings including multi dwelling housing, residential housing, residential flat buildings and mixed use development	√ - BASIX	√	√
Commercial and Industrial	All new commercial, retail, mixed use and industrial development greater than 2,500m ² total site area	√ - WELS	√	√
	Alterations and additions where the increase in roof area and impervious area* is equal to or greater than 250m ² .	√ - WELS	√	√
	Commercial, retail, mixed use and industrial	√ - WELS	No	No

Land Use	Development Type	Water Conservation 5(a)	Stormwater Quality 5(b)	Water Quantity Flow 5(c)
	development not addressed above			
Subdivision (where new road and or carriageway works are involved)	Residential (5 or more lots) or commercial and industrial subdivision	N/A	√	√
Other development not listed above	Any development which results in an increase of the existing impervious area by greater than 250m ² . Development includes but not limited to additional roads, driveways, vehicle parking areas, manoeuvring areas, loading and storage areas	√ - WELS (as required)	√	√

Note: √ means performance criteria detailed in subsection '5) WSUD Development Controls' apply.

*Additional impervious area includes building footprint (including roof area), vehicle access ways and parking spaces.

5) WSUD Development Controls

A. Water conservation

Water conservation seeks to reduce the demand for potable water. Reduced potable mains water demand is a key commitment of the NSW Government as outlined in the Metropolitan Water Plan (see <http://www.waterforlife.nsw.gov.au>). The NSW Government's BASIX Scheme requires all new residential development to incorporate water savings measures (<http://www.basix.nsw.gov.au>). There are, however, no such requirements for other development types (e.g. commercial or industrial), which are addressed by these controls.

Objectives

- a) To reduce consumption of potable water for all development types within the City;
- b) To use harvested rainwater, treated urban stormwater or treated wastewater for non-potable substitution where appropriate.

Performance Criteria

Water conservation requirements for development types identified in Table C3.1 are:

- a) All residential buildings are to demonstrate compliance with State Environmental Planning Policy – Building Sustainability Index (BASIX), as required.
- b) All buildings not covered by the State Environmental Planning Policy – BASIX:
 - i) That are installing any water use fittings must demonstrate minimum standards defined by the Water Efficiency Labelling and Standards (WELS) Scheme. Minimum WELS ratings are 4 star dual-flush toilets, 3 star showerheads, 4 star taps (for all taps other than bath outlets and garden taps) and 3 star urinals. Water efficient washing machines and dishwashers are to be used wherever possible.
 - ii) To install rainwater tanks to meet 80% of non-potable demand including outdoor use, toilets and laundry;
 - iii) To incorporate passive cooling methods that rely on improved natural ventilation to supplement or preclude mechanical cooling.
- c) Where cooling towers are used, they are:
 - i) To be connected to a conductivity meter to ensure optimum circulation before discharge;
 - ii) To include a water meter connected to a building energy and water metering system to monitor water usage;
 - iii) To employ alternative water sources for cooling towers where practical and in accordance with the Public Health Act and NSW Health Guidelines.
- d) Water use within public open space (for uses such as irrigation, pools, water features, etc.) should be supplied from sources other than potable mains water (e.g. treated stormwater or greywater) to meet 80% water use demand.

B. Stormwater Quality

Urban development increases the pollution load entering receiving environments. Stormwater quality controls have been derived through the modelling of numerous combinations of WSUD elements for a range of urban development types. They reflect a cost-effective level of stormwater treatment considered to be technically feasible in terms of land-take (or footprint) of stormwater and WSUD measures. Stormwater quality elements are to be sized using MUSIC modelling (the model for Urban Stormwater Improvement Conceptualisation, or equivalent) using Penrith data, which is available in the associated WSUD Technical Guidelines.

Objectives

- a) To safeguard the environment by improving the quality of stormwater run-off entering receiving waters.

Performance Criteria

Stormwater quality requirements for all development types identified in Table C3.1 are:

- a) Pollution load reductions:
 - i) 90% reduction in the post development mean annual load total gross pollutant (greater than 5mm);
 - ii) 85% reduction in the post development mean annual load of Total Suspended Solids (TSS);
 - iii) 60% reduction in the post development mean annual load of Total Phosphorus (TP);
 - iv) 45% reduction in the post development mean annual load of Total Nitrogen (TN);

- v) 90% Free Oils and Grease with no visible discharge.
- b) Modelling for the determination of the mean annual loads of land uses must be undertaken in MUSIC and in accordance with the associated WSUD Technical Guidelines.
- c) Any changes to the flow rate and flow duration within the receiving watercourses as a result of the development shall be limited as far as practicable. Natural flow paths, discharge point and runoff volumes from the site should also be retained and maintained as far as practicable.
- d) Impervious areas directly connected to the stormwater system shall be minimised. Runoff from impervious areas such as roofs, driveways and rainwater tank overflows shall be directed onto grass and other landscaped areas designed to accept such flows.

C. Stormwater Quantity – Stream Forming Flows

Urban development has the potential to significantly increase surface runoff flow rates and volumes leading to impacts on stream stability, receiving water ecology and flooding in receiving waters.

Objectives

- a) To manage the volume and duration of stormwater flows entering local waterways so as to protect the geomorphic values of those waterways.

Performance Criteria

- a) The post development duration of stream forming flows shall be no greater than 3.5 times the pre developed duration of stream forming flows. The comparison of post development and pre development stream flows is commonly referred to as the Stream Erosion Index (SEI). The approach to evaluating the SEI is outlined in the associated WSUD Technical Guidelines.

6) Use and Storage of Chemicals/Pesticides/Fertilisers

- a) Any application for a land use/activity that involves significant use of chemicals/fertilisers must demonstrate what measures are proposed to minimise and control nutrients or chemicals entering watercourses, water bodies or groundwater.
- b) All land uses, particularly rural land uses, should avoid use of chemicals and pesticides in areas or situations where they are likely to enter surface water or ground water sources.
- c) Chemicals and pesticides must be stored in such a way as to prevent accidental leakage into water systems or the on-site stormwater system. This may include:
 - i) Secure storage in a bunded area; and
 - ii) Secure storage in water proof/spill proof containers.

7) Other relevant areas of this DCP

Provisions relating to on-site effluent disposal, soil erosion and sedimentation and protection of vegetation near watercourses are all highly relevant to water quality. Applicants should refer to these and other relevant sections of this DCP for more information.

D. Lifting the Bar

The following represent some ways in which applicants can demonstrate additional commitment to the catchment management/water quality principles expressed in this Plan. Demonstration of this commitment may lead to Council considering variation of development controls. Applications that vary the development controls listed in this section will need to

demonstrate that the proposed development complies with the objectives relevant to the development controls it seeks to vary.

- a) On-site water monitoring for water pollutants to identify practices/activities impacting on the water systems; and
- b) Best-practice farming practices including minimising the use of chemicals and fertilisers (where possible).

E. Other Information

People seeking further information on water quality may wish to refer to the following:

- Penrith City Council's *Stormwater Drainage Specification for Building Developments*
- *ANZECC Guidelines and Water Quality Objectives in NSW* (2000) Department of Environment (Australian Government)
- Office of Environment and Heritage's website – www.environment.nsw.gov.au
- Sydney Catchment Authority's website - www.sca.nsw.gov.au
- Sydney Water Corporation's website - www.sydneywater.com.au
- Penrith City Council's *Sustainability Blueprint for urban release areas* (June 2005)
- Penrith City Council's *Water Sensitive Urban Design Technical Guidelines*, (December 2013)
- www.wsud.org

3.3. Watercourses, Wetlands and Riparian Corridors

A. Background

A riparian corridor is the land directly adjacent to (or surrounding) a natural or artificial waterway and provides a crucial link between terrestrial and stream ecosystems.

Wetlands and riparian corridors help purify water, improving the quality of larger water bodies. As runoff from surrounding land is critical to the performance of a wetland or riparian corridor, buffer areas are needed around wetlands and riparian corridors to minimise the entry of pollutants.

In addition to the water catchment management issues above, the following issues need to be addressed in relation to land uses and activities which can impact on watercourses, wetlands and riparian corridors:

- Preserving the natural alignment of watercourses;
- Avoiding disturbance to the watercourse banks and channels;
- Retaining native vegetation along creek corridors to stabilise banks and treat surface water run-off;
- Protecting wetland and riparian corridor flora and fauna;
- Providing setbacks to development in proximity to watercourses, wetlands and riparian corridors; and
- Protecting the watercourses natural stream flow regimes.

B. Objectives

- a) To protect water quality and terrestrial and aquatic life forms by identifying a riparian corridor along identified waterways and establishing specific planning controls for land within those corridors;
- b) To minimise disturbance and/or impacts on natural waterbodies;
- c) To rehabilitate existing riparian corridors and ensure that width, buffers to development, quality of landscape and diversity of vegetation to support principles of ecological sustainability are provided.

C. Controls

1) Controlled Activity Approval under the Water Management Act 2000

If any activities/land uses are proposed near a watercourse, the *Water Management Act 2000* may apply and you may be required to seek a Controlled Activity Approval from the Office of Water. Please consult with this Office regarding your proposal. Except for certain exemptions, you are likely to need a controlled activity approval for:

- a) The erection of a building or the carrying out of a work (within the meaning of the *Environmental Planning and Assessment Act 1979*) on the bank or shore of any river, estuary or lake or within 40m from the top of its bank or shore;
- b) Excavation in a river, estuary or lake, or within 40m from the top of its bank or shore;
- c) Removal of material (including vegetation) from the bank or shore of any river, estuary or lake or from within 40m from the top of the bank or shore;
- d) Deposition of material, whether by way of landfill operations or otherwise on or within the bank or shore of any river, estuary or lake or within 40m from the top of the bank or shore;
- e) Anything which affects the quantity or flow of water in a water source, or is likely to do so.

Even if there is an exemption from the requirement for an approval from this Office, you may still require the approval of Council. You may also require approval from Fisheries (NSW).

2) Preserving Alignment of Watercourses

- a) Where possible, the natural (or historic) alignment of an existing wetland or watercourse should be retained along with its natural dimensions and flow regimes.
- b) Watercourses should not be straightened to reduce the natural meander or flow path or to improve flood conveyance.
- c) The alignment of major overland flow paths should be recognised in site planning and development design.

3) Avoiding Modifications to Natural Waterbodies

- a) There should be no modifications to a natural (or historic) waterbody in its dimensions, depth or bank height unless it seeks to enhance the ecological outcomes of the waterbody.
- b) Watercourses should not be modified to maximise flood conveyance unless there are no other means to avoid damage to existing dwellings or infrastructure that cannot be relocated.

- c) Natural hydrological processes are to be maintained where possible, including natural vegetation and the flow regimes to maintain creek line stability and the health of terrestrial and aquatic plant communities.

4) Protection and Enhancement of Riparian Corridors

- a) All riparian corridors should comprise a vegetated riparian zone along each side of the waterway (see Figure C3.1).
- b) The vegetated riparian zone should retain or be vegetated with, fully structured native vegetation (trees, shrubs and groundwater species).
- c) In relation to activities within the vegetated riparian zone, such as cycleways and paths, detention basins, stormwater management devices and essential services, compliance is required with the 'riparian corridor matrix' in the NSW Office of Water's Guidelines for riparian corridors on waterfront land (July 2012).
- d) A managed buffer zone outside the vegetated riparian zone should be provided (where possible), to provide an additional buffer between development and the vegetated riparian zone. Land uses within the managed buffer zone could include roads, paths, playgrounds and stormwater management devices.
- e) Asset protection zones should be located outside the vegetated riparian zones.
- f) Appropriate widths for vegetated riparian zones will depend on the specific ecosystems being managed. Council's approach to determining the Order of Stream is based on the Strahler methodology, which is consistent with the NSW Office of Water.

Council reserves the right to assess each riparian corridor and each development on its merits. In general, however, the width will depend on the order of the stream/watercourse (see Figure C3.2) which provides an indication. The width should be measured from the top of the highest bank on both sides of the stream/watercourse, excluding any managed buffer zone, and shall comply with the requirements outlined in Table C3.3.

Figure C3.1

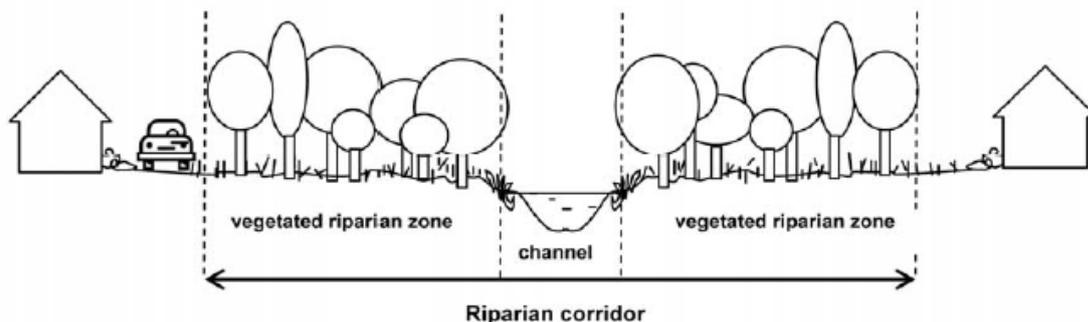


Figure C3.2: Stream Classification

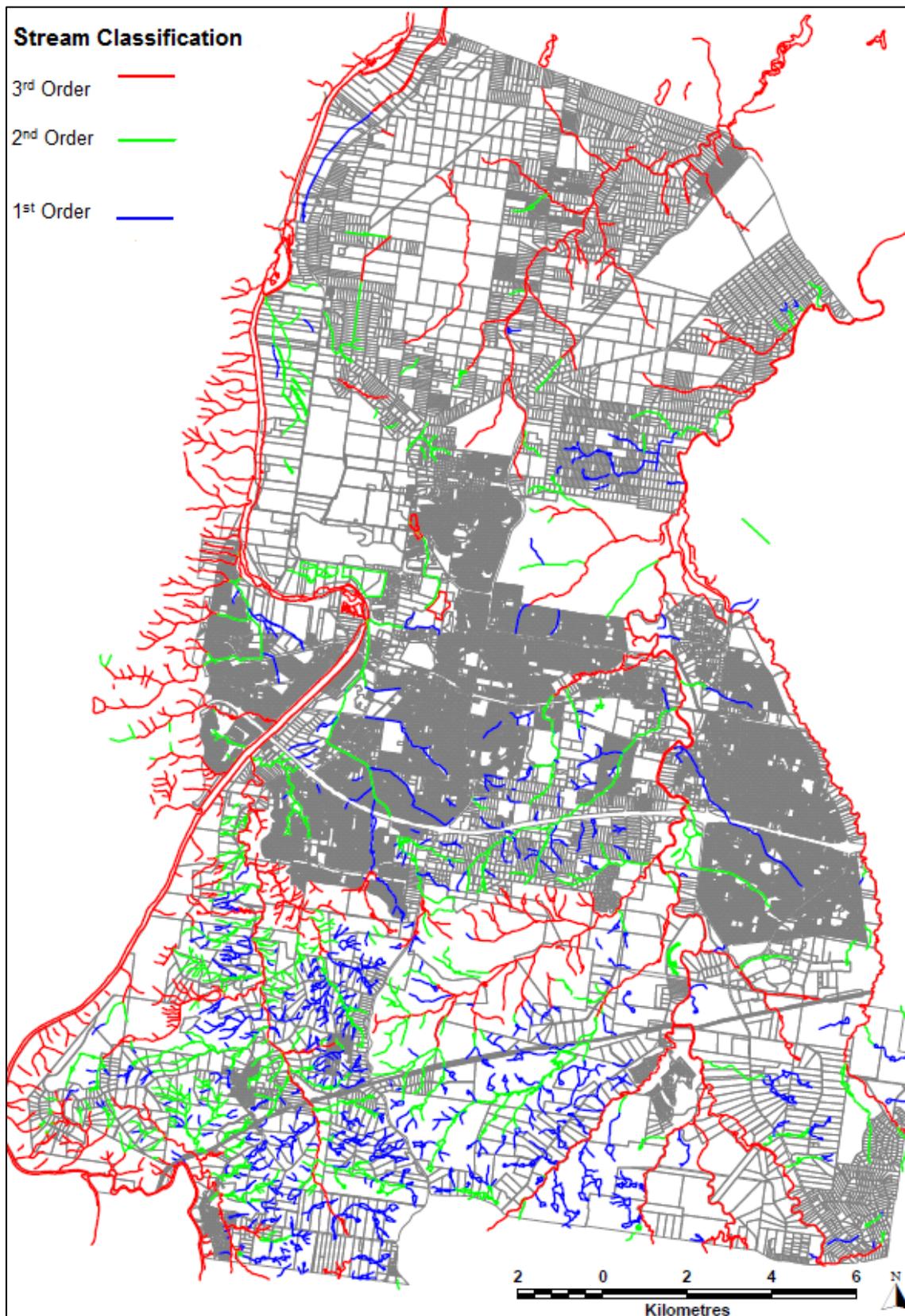


Table C3.3

Water Course Type	Vegetated Riparian Zone Width	Total Riparian Corridor Width
1 st Order (Blue)	10m	20m + channel width
2 nd Order (Green)	20m	40m + channel width
3 rd Order (Red) except Nepean River	30m	60m + channel width
Nepean River	90m	
Wetland	40m	80m + channel width

Where, a watercourse has had a gabion wall or channellisation constructed, this should be removed to restore a natural meander for ecological purposes, except where:

- i) The length of the watercourse through the development site is less than 50m; or
- ii) The watercourse through the development site is a middle section of the overall watercourse, and it is technically unfeasible to reverse the channellisation; or
- iii) Restoring the natural meander will create a hazard.

Enhancement of riparian corridors should, where possible:

- i) Mimic natural hydrological regimes for watercourse treatments;
- ii) Replicate the natural watercourse through creation of a meandering channel, rather than straight channels;
- iii) Simulate natural roughness having regard to riparian requirements and flow velocities to sustain vegetation groupings;

Roughness: A watercourse's shape, smoothness of its channel and amount of vegetation in the channel all affect the 'roughness' of that watercourse and the speed of water conveyed in the channel.

- iv) Minimise ongoing maintenance requirements through channel design;
- v) Establish a functional riparian zone and natural channel section;
- vi) Maintain or create a full assemblage of vegetation with likely natural obstructions;
- vii) Create variations in channel cross-section and provide an opportunity for meandering of the channel within the flood plain;
- viii) Minimise likely damage to channel banks and vegetation from storm flow through channel design; and
- ix) Ensure that the channel has the capacity for appropriate flood flows having regard to the steepness of the catchment; channel modifications and future liability for land owners, Council and government agencies.

There may be a need for a sensitivity analysis for a range of flood hydrology and design flows having regard to supporting flood studies for development.

D. Lifting the Bar

The following represent some ways in which applicants can demonstrate additional commitment to the protection of watercourses, wetlands and riparian corridors expressed in this Plan. Demonstration of this commitment may lead to Council considering variation of development controls. Applications that vary the development controls listed in this section will need to demonstrate that the proposed development complies with the objectives relevant to the development controls it seeks to vary.

a) No development or site disturbance occurs:

- i) Within 40m on either side, measured from the top of the bank, of a 2nd Order stream/watercourse; or
- ii) Within 20m on either side, measured from the top of the bank, of a 1st Order stream/watercourse or significant natural drainage line; and
- iii) Where riparian corridors are also acting as a significant wildlife corridor (subject to Council's review), the minimum area to be protected or revegetated is 40m on either side of the watercourse. This may be increased to up to 60m if the wildlife corridor is significant, or if it forms a major link to an extensive area of natural bushland (e.g. nature reserve or national park).

E. Other Information

People seeking further information on watercourses, wetlands and riparian corridors may wish to refer to the following:

- Penrith City Council's *Stormwater Drainage Specification for Building Developments*
- *Guidelines for riparian corridors on waterfront land* (2012) (Office of Water)
- *NSW Wetlands Policy* (2010) (Office of Water)
- *NSW Rivers and Estuaries Policy* (1993) (Office of Water)
- Penrith City Council's *Sustainability Blueprint for urban release areas* (June 2005)
- *Rehabilitation Manual for Australian Streams* (1999) Rutherford et al
- *Natural Channel Design Guidelines* (2003) (Brisbane City Council)
- *Stream Corridor Restoration: Principles Processes and Practices* (2000) United States Department of Agriculture
- Fairfull, S. and Witheridge, G. (2003) *Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings*. NSW Fisheries, Cronulla, 16pp
- NSW Fisheries (2013) *Policy and Guidelines for Fish Habitat Conservation* NSW Department of Primary Industries, *Policy and Guidelines for Fish Friendly Waterway Crossings*.

3.4. Groundwater

A. Background

Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of rock formations. Water can become trapped in aquifers which provide useable quantities of water. The depth at which soil pore spaces or fractures and voids in rock become fully saturated with water is called the water table. Groundwater is recharged from,

and eventually flows to, the surface naturally. Natural discharge often occurs at springs and streams, and may also form oases or wetlands.

Groundwater is often withdrawn for agricultural, residential, construction (i.e. dewatering where construction is below the water table) and industrial use. However, due to demand for water, there are increasing pressures on groundwater and aquifer supplies and groundwater dependent ecosystems which need to be managed. Most controls relating to groundwater use are governed by State Government and not Council. A summary of the key issues is set out below to guide any developments that may impact on groundwater.

B. Objectives

- a) To protect groundwater supplies against excessive water extraction;
- b) To protect groundwater supplies against pollution and contaminants;
- c) To provide equity in access to groundwater supplies.

C. Controls

1) Utilising Groundwater/Bores

Where groundwater is proposed to be accessed, satisfactory arrangements for the proper utilisation and protection of the groundwater resource must be made with the Office of Water. All piezometers or bores must be licensed by the Office of Water.

A bore must be at least:

- a) 40m from the nearest bank of any river or creek;
- b) 500m from any town water supply bore;
- c) 400m from any irrigation bore on an adjoining property;
- d) 50 – 100m from a property boundary; and
- e) 200 – 400m from any Office of Water observation bores.

For distance rules, applicants are advised to consult the Water Sharing Plan for the Greater Metropolitan Region Groundwater Sources – Part 9 – Rules for Water Supply Work Approvals.

2) Protecting Groundwater

- a) Applicants are required to consider the impact of the proposed development on underlying and surrounding groundwater resources and adopt appropriate measures to avoid these impacts.
- b) The following matters should be considered:
 - i) The design of the development and the potential for its below-ground extent to impede, dam or otherwise obstruct the passage of groundwater flow;
 - ii) The management of stormwater or roof runoff within and around the development and any potential degradation or deterioration of local groundwater quality that may occur as a result;
 - iii) The management of greywater or wastewater generated from the development and any potential degradation or deterioration of local groundwater quality that may occur as a result;
 - iv) The existence of groundwater users in the vicinity of the development and the potential for them to be adversely impacted by the proposed development;

- v) The vulnerability of groundwater locally and the pollution potential of the development; and
 - vi) The presence and distribution of groundwater dependent systems (environmental attributes having a dependence on groundwater) in the vicinity and the potential for adverse impacts to occur as a result of the development.
- c) Groundwater shall not generally be pumped or extracted without specific licensed approval for any purpose other than temporary construction dewatering at the site identified in the development application.
- d) Where construction is proposed below the water table:
- i) The volume of any groundwater abstracted for the purposes of temporary dewatering should be minimised, e.g. by minimising the length of time that any basement excavations below the water table are left open. In general, the Office of Water will not authorise temporary construction dewatering for periods of more than 12 months.
 - ii) The design and construction of the building should prevent any long-term take of groundwater by making any below-water table levels watertight for the anticipated life of the building. Waterproofing of below-ground levels must be sufficiently extensive to incorporate adequate provision for unforeseen high water table elevations to prevent potential future inundation.
 - iii) A reasonable estimate of the total volume of groundwater to be extracted shall be calculated and a report provided to the NSW Office of Water. Details of the calculation method shall be included in the report.

D. Other Information

People seeking further information on groundwater may wish to refer to the following:

- *NSW State Groundwater Policy Framework Document* (1997) NSW Government
- *NSW State Groundwater Quality Protection Policy* (1998) NSW Government
- *NSW State Groundwater Dependent Ecosystems Policy* (2002) NSW Government
- *Hawkesbury-Nepean Catchment Groundwater Vulnerability Map* (1998) Department of Land and Water Conservation
- *Hawkesbury-Nepean Catchment Groundwater Availability Map* (1998) Department of Land and Water Conservation.

3.5 Flood Planning

A. Background

Impact of Flooding

The Hawkesbury/Nepean River system has one of the most dramatic flood behaviours in the world. The geography and topography of the area mean that flood waters are contained in the Nepean Gorge until they reach the floodplains at Penrith, resulting in unusually rapid rises in water levels. These floods continue to modify the physical environment of the valley as well as causing social and economic challenges to the valley's inhabitants.

Relevant Policies

Local government is the primary authority responsible for both flood risk management and land use planning in NSW. However, the State Government has introduced the *Flood Prone*

Land Policy and the associated *Floodplain Development Manual* (2005) (FDM) to reduce the impacts 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. To achieve this objective, the supporting FDM acknowledges a broad risk management hierarchy of:

- avoidance of flood risk;
- minimisation of flood risk using appropriate planning controls; and
- flood risk mitigation.

Generally, the Flood Prone Land Policy adopts the following approach:

- The impact of flooding and flood liability on existing developed areas shall be reduced by flood mitigation works and measures, appropriate development and building controls and the voluntary acquisition of property in hazardous areas;
- The potential for flood losses in all new developed areas shall be contained by the application of effective planning and development controls;
- A merit approach to all development and building decisions which takes account of social, economic factors, as well as flooding considerations, should be followed.

Local Environmental Plan

The LEP contains provisions for development on land at or below the flood planning level, defined in the LEP as the level of a 1:100 Average Recurrence Interval (ARI) (1% AEP (100 year ARI)) flood event plus 0.5m freeboard.

The 1% AEP (100 year ARI) flood event is a tool for broadly assessing the suitability of land for development. It is not an assessment of flood risk, nor does reference to the 1% AEP (100 year ARI) flood event mean that properties and development above this level are not subject to flood risk.

Average Recurrence Interval (ARI) is the long term average number of years between the occurrence of a flood as big as or larger than the selected event. For example, floods with a discharge as great as or greater than the 100 year ARI flood event will occur on average once every 100 years.

Consideration of Floods Larger than the 1% AEP (100 year ARI) Flood Event

The 1% AEP (100 year ARI) flood is not, in most cases, the largest flood that can occur. There have been documented floods which exceeded this level for the Nepean River on a number of occasions over the last 200 years. The highest flood event at Penrith occurred in June 1867 and is estimated at greater than the 1:200 ARI event. Floodwaters reached a peak height of 27.5m above Australian Height Datum and covered most of the present day Emu Plains and large parts of Penrith. The 1967 flood for Ropes Creek and the 1956 and 1988 floods for South Creek were also major flood events.

For this reason, developments that may have a significant impact on the extent of flooding experienced by nearby or downstream properties may be asked to consider floods larger than the 1% AEP (100 year ARI) flood event. Significant areas of Penrith are affected by the Probable Maximum Flood (PMF) and in some cases this will need to be considered in determining flood hazard.

Probable Maximum Flood (PMF) is the largest flood that could conceivably occur at a particular location.

Flood Hazard Classifications

In order to determine what development may occur in areas subject to partial or full flooding, it is necessary to classify land according to flood hazard.

The greatest flood hazard occurs in land that is a 'floodway'. They are often aligned with obvious naturally defined channels.

Floodway is defined as those areas of the floodplain where a significant discharge of water occurs during floods.

In addition, there are significant risks in 'flood storage areas'.

Flood storage areas are defined as those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood.

Floodplain is defined as the area of land which is subject to inundation by floods up to and including the PMF event.

The remaining area of land affected by flooding after floodway and flood storage areas have been defined is the 'flood fringe area'.

Alterations to Land at or below the Flood Planning Level/Watercourses

One key issue with the development of land at or below the flood planning level is that some developments have the potential to adversely affect flood behaviour (including flow distributions and velocities). This can result in detrimental increases in the potential flood impacts on other development or properties and/or impacts on the floodplain environment that could cause erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse.

Developments that would partially or fully block floodways or flood storage areas may result in redistribution of flood flows or impacts. The greatest impact comes from filling land at or below the flood planning level in order to raise development above the flood planning level. Therefore, these impacts must be minimised in the location and design of any structures on the land.

Minimising Flood Impacts on Property

Flood impacts on property can be reduced not only by appropriate location of development but also by design, layout and structure. This Plan provides controls for appropriate levels for 'habitable rooms' or 'flood proofing' of buildings.

Habitable rooms are defined as a living area such as a lounge room, dining room, rumpus room, kitchen and bedroom and excluding garages.

Flood proofing refers to the combination of measures incorporated in the design, construction and alteration of individual buildings or structures subject to flooding to reduce or eliminate flood damages.

B. Objectives

- a) To ensure floodplain risk management minimises the potential impact of development and other activity upon the aesthetic, recreational and ecological value of the waterway corridors;
- b) To maintain the existing flood regime and flow conveyance capacity and avoid significant adverse impacts on flood behaviour;

- c) To avoid significant adverse effects on the floodplain environment that would cause erosion, siltation, destruction of riparian vegetation or a reduction in the stability of the river bank/watercourse;
- d) To reduce the impact of flooding and flood liability on individual owners and occupiers;
- e) To limit the potential risk to life and property resulting from flood events;
- f) To contain the potential for flood losses in all new developed areas by the application of effective planning and development controls;
- g) To apply a “merit approach” to all development and building decisions, which takes account of social, economic and ecological factors as well as flooding considerations;
- h) To prevent the introduction of unsuitable land uses on land subject to the flood planning provisions of the LEP; and
- i) To deal equitably and consistently (where possible) with applications for development on land affected by potential floods, in accordance with the principles contained in the Floodplain Development Manual, issued by the NSW Government.

C. Controls

The following controls only apply to land subject to the flood planning provisions of the LEP.

1) Submission Requirements

- a) Where relevant, a comprehensive flood study, incorporating:
 - i) a survey of the main watercourse;
 - ii) a survey of the site; and
 - iii) a detailed flood and drainage investigation which establishes the estimated 1% AEP (100 year ARI) flood level;

is to be submitted with any development application on land identified as fully or partially flood affected. The levels on the survey are required to be verified during construction by a survey certificate.
- b) The applicant shall be required to demonstrate to the satisfaction of Council (on the basis of a qualified consultant report) that:
 - i) The development will not increase the flood hazard or risk to other properties;
 - ii) The structure of the proposed building works shall be adequate to deal with flooding situations;
 - iii) The proposed building materials are suitable;
 - iv) The buildings are sited in the optimum position to avoid flood waters and allow safe flood access for evacuation;
 - v) The proposed redevelopment will not expose any resident to unacceptable levels of risk or any property to unreasonable damage; and
 - vi) Compliance of any existing buildings with the *Standard - Construction of Buildings in Flood Hazard Area* and the accompanying handbook developed by the Australian Building Codes Board (2012).

2) Flood Hazard Classifications

- a) Council will consider development on land subject to the flood planning provisions of the LEP but will not grant consent to new development in floodways or in high hazard areas.

Flood hazard (high) or high flood hazard occurs when there is possible danger to life and limb; evacuation by trucks is difficult; there is potential for structural damage; and social disruption and financial losses could be high.

- b) Consideration will be given to such matters as depth and nature of flood waters, whether the area forms flood storage, the nature and risk posed to the development by flood waters, the velocity of floodwaters and the speed of inundation, and whether the development lies in an area classed as a 'floodway', 'flood fringe area' or 'flood storage area'.

3) Residential - New Developments - Single Dwellings

- b) Residential – upper storey additions will not be considered as 'New Development' provided; the first floor additions are above the Flood Planning level and the additions and alterations do not increase the building footprint at ground level beyond 35m². (Ground floor additions include all non-habitable buildings such as garages, storage areas, carports and the like).
- c) Floor levels of habitable rooms shall be at least 0.5m above the 1% AEP (100 year ARI) flood; i.e. the flood planning level.
- d) The lowest floor level of habitable rooms shall be not more than 3.0m above ground level.
- e) Any portion of buildings subject to inundation shall be built from flood compatible materials.
- f) Flood safe access and emergency egress shall be provided to all new developments and for dwelling replacements where practicable.

Flood safe access means access that is generally considered satisfactory when the depth of flooding over vehicular driveways and roads is limited to approximately 0.25m with low velocities.

- g) All services associated with the development shall be adequately flood proofed.
- h) A certificate, prepared by a registered surveyor to verify the lowest floor level of a habitable room of a residential building to the required Australian Height Datum (AHD) level, shall be submitted to the Council upon completion of the building to that level. The building shall not be further constructed until approval is given by Council to proceed with construction works.

4) Residential - Minor Extensions

- a) This section does not apply to minor extensions for the purpose of dual occupancy development, an existing single storey home which retains essentially the outer walls of the existing dwelling and proposes an upper floor addition, a knockdown rebuild that retains exactly the same building footprint, or a building burnt down and replaced with the same building footprint. These shall be treated as new development.
- b) Once only extensions with a floor area up to 30m² may be approved with floor levels below the 1% AEP (100 year ARI) flood, if the applicant can demonstrate that no practical alternatives exists for constructing the extension above the 1% AEP (100 year ARI) flood.
- c) Once only extensions which increase the existing floor area by between 30 and 35m² may be approved with floor levels at or above the 1% AEP (100 year ARI) flood.
- d) Extensions greater than 35m² will be treated as a new development.

5) Non-Habitable Extensions or Alterations, Outbuildings and Swimming Pools

- a) All electrical services shall be adequately flood proofed.
- b) All flood sensitive equipment (including electric motors and switches) shall be located above the 1% AEP (100 year ARI) flood.

6) Industrial/Commercial - New Development

- a) Floor levels shall be at least 0.5m above the 1% AEP (100 year ARI) flood or the buildings shall be flood-proofed to a least 0.5m above the 1% AEP (100 year ARI) flood. If floor levels are below the 1% AEP (100 year ARI) flood the matters listed in section 7 i) – vii) shall be addressed.
- b) Flood safe access and emergency egress shall be provided to all new developments.

7) Industrial/Commercial - Extensions and Infill Development

- a) Where the application is for an extension to an existing building on land at or below the flood planning level or for new development that can be classed as infill development, Council may approve of the development with floor levels below the 1% AEP (100 year ARI) flood if it can be demonstrated by the applicant that all practical measures will be taken to prevent or minimise the impact of flooding. In considering such applications and determining the required floor level, Council shall take into account such matters as:
 - i) The nature of the business to be carried out;
 - ii) The frequency and depth of flooding;
 - iii) The potential for personal and property loss;
 - iv) The utility of the building for its proposed use;
 - v) Whether the filling of the site or raising of the floor levels would render the development of the property unworkable or uneconomical;
 - vi) Whether the raising of the floor levels would be out of character with adjacent buildings; and
 - vii) Any risk of pollution of water from storage or use of chemicals within the building.
- b) Any portion of the proposed building extension subject to inundation shall be built from flood compatible materials.

8) Change of Use of Existing Buildings

- a) Development consent for change of use of an existing building with floor levels below the 1% AEP (100 year ARI) flood will only be given where it can be demonstrated by the applicant that:
 - i) There is no foreseeable risk of pollution associated with the proposed use of the building in the event that the 1% AEP (100 year ARI) flood occurs;
 - ii) All practical measures shall be taken to minimise the risk of flood damage to the property within the building by the 1% AEP (100 year ARI) flood. These measures could include:
 - Flood proofing the building to the level of the 1% AEP (100 year ARI) flood by either construction of a wall or levee bank or some other means of preventing water entry;

- Raising the floor level of the building to the level of the 1% AEP (100 year ARI) flood; and/or
- Storing all equipment, machinery and stock above the 1% AEP (100 year ARI) flood level.

9) Rural Uses

- a) Applications for minor extensions to existing buildings and new buildings associated with rural uses that are below the 1% AEP (100 year ARI) flood (other than residential buildings) will be considered on their merits having regard to the proposed use and the potential for property loss.

10) Subdivision

- a) Generally, subdivision of land below the flood planning level will not be supported. Further provisions relating to the proposed subdivision of such land can be found in the Subdivision Section of this Plan.

11) Residential Accommodation and Caravan Parks

- a) Applications for residential accommodation, defined in the LEP, with the exception of dwelling houses, will be treated as per subdivisions. Applications for caravan parks will also be treated as per subdivisions. Other land uses which may attract large numbers of people.
- b) Council will generally not support an application for any land use which may attract large numbers of people (including schools, function centres, child care centres, hostels, etc.) on land below the flood planning level and on land that cannot be safely and effectively evacuated during a 1% AEP (100 year ARI) flood event.

12) Storage of Potential Pollutants above 1% AEP (100 year ARI) Flood

- a) All potential pollutants that are stored or detained on-site (such as on-site effluent treatment plants, pollutant stores or on-site water treatment facilities) should be stored above the 1% AEP (100 year ARI) flood. Details must be provided as part of any application to Council.

13) Overland Flow Flooding

- a) Council has undertaken a Penrith Overland Flow Flood 'Overview' Study. Consideration must be given to the impact on any overland flow path. Generally, Council will not support development obstructing overland flow paths. Development is required to demonstrate that any overland flow is maintained for the 1% AEP (100 year ARI) overland flow. A merit based approach will be taken when assessing development applications that affect the overland flow.
- b) Council's *Stormwater Drainage Specification for Building Developments* provides information on the details required in the preparation of an overland flow study.

14) Filling of Land At or Below the Flood Planning Level

- a) Council will not grant consent to filling of floodways or high hazard areas. The filling of other land at or below the flood planning level will generally not be supported; however, Council will adopt a merits based approach. In particular, an application to fill land shall also

describe the purpose for which the filling is to be undertaken. Council may consider such an application when the following criteria are met:

- i) Flood levels are not increased by more than 0.1m by the proposed filling;
 - ii) Downstream velocities are not increased by more than 10% by the proposed filling;
 - iii) Proposed filling does not redistribute flows by more than 15%;
 - iv) The potential for cumulative effects of possible filling proposals in that area is minimal;
 - v) There are alternative opportunities for flood storage;
 - vi) The development potential of surrounding properties is not adversely affected by the filling proposal;
 - vii) The flood liability of buildings on surrounding properties is not increased;
 - viii) No local drainage flow/runoff problems are created by the filling; and
 - ix) The filling does not occur within the drip line of existing trees.
- b) The above criteria can only be addressed and satisfied by the submission of a detailed flood study report by an appropriate consulting engineer. The flood study report would involve both hydrologic and hydraulic analysis of the watercourse and the effects of the proposed filling on flood levels, flow velocities and distribution of flows as listed in i) to iii) above. In addition, the report needs to address items iv) to ix) listed above. Any filling of land also needs to be in accordance with the other provisions in this Plan.

15) Rezoning of Land

- a) Council will not support the rezoning of any land located in a floodway or high hazard area.
- b) Council will generally not support the rezoning of rural land situated below the 1% AEP (100 year ARI) flood where the development of that land may require or permit the erection of buildings or works even if the surface of the land can be raised to a level above the 1% AEP (100 year ARI) flood by means of filling.
- c) Where land below the flood planning level is currently zoned to permit urban development, Council will generally not support the rezoning of land to permit a higher economic use or an increase in the density of development.

D. Other Information

People seeking further information on flood planning lands or preparing development applications may wish to refer to the following:

- Penrith City Council's *Stormwater Drainage Specification for Building Developments*
- NSW Government's *Flood Prone Land Policy* and associated *Floodplain Development Manual (2005)*
- Penrith City Council's *Sustainability Blueprint for urban release areas (June 2005)*
- *Standard - Construction of Buildings in Flood Hazard Areas* and accompanying handbook, developed by the Australian Building Codes Board (2012).

3.6. Stormwater Management and Drainage

A. Background

Stormwater is a term used to describe water that originates primarily from rainfall or from runoff water that enters the stormwater system. Stormwater that does not soak into the ground becomes surface runoff, which either flows into surface waterways or is channelled into stormwater systems. In Penrith, stormwater generally drains to the street drainage system or drainage easements in urban areas.

There are two main issues in relation to stormwater - one related to the volume and timing of runoff water (flood control and water supplies) and the other related to potential contaminants that the water is carrying (water pollution).

Because impervious surfaces (parking lots, roads, buildings) do not allow rain to infiltrate into the ground, more runoff is generated than in the undeveloped condition. This additional runoff can erode watercourses as well as cause flooding when the stormwater collection system is overwhelmed. Excess water can also infiltrate soils and raise water tables resulting in additional salinity issues.

One solution to address stormwater issues is on-site detention. On-site detention is the provision of depressed areas or specific storage in paved or landscaped areas, with relatively small stormwater outlets, that detain a volume of water for a short duration during more intense storms. This prevents or mitigates any increase in peak stormwater flow rates from development and delays the peak volume of runoff. It is important to note that on-site detention systems are required to release water after the peak storm event to provide capacity for future events. Therefore, on-site detention systems do not include rainwater tanks, water retention basins or dams. These are dealt with later in this section of the DCP.

In addition, to help address stormwater issues, drainage structures off-site may need to be upgraded as a result of new development. Generally, the developer is responsible for the full or partial cost of upgrading structures where it can be demonstrated that the proposed development overloads the existing drainage system.

The aim of these controls is to ensure that developments minimise their impact on the water cycle by minimising impervious surfaces, providing on-site storage for stormwater to reduce peak events and ensuring that stormwater systems are upgraded to manage any additional stormwater flows.

Relevant Stormwater Drainage Policy

Council has adopted the Stormwater Drainage Specification for Building Developments. This policy provides guidance to ensure that stormwater drainage for building developments is designed to provide a robust, safe and low maintenance system to manage stormwater impacts on the drainage network and surrounding properties in a holistic manner that is incorporated aesthetically with the overall development.

This policy sets out Council's minimum requirements for the provision of stormwater drainage principally to building development sites, and should be used in conjunction with the Penrith DCP and other policies referred to in the Stormwater Drainage Specification for Building Developments.

B. Objectives

- a) To prevent damage by stormwater to the built and natural environment;

- b) To ensure that new development does not generate stormwater discharges that exceed the capacity of the existing drainage network;
- c) To ensure that an adequate and environmentally acceptable method of removing surface water and stormwater is implemented;
- d) To minimise nuisance flows of stormwater from one property to adjoining properties;
- e) To maximise reasonable on-site detention, to provide opportunities for rainwater re-use;
- f) To minimise hardstand and impervious areas on developed land to minimise run off;
- g) To provide a stormwater system which can be maintained economically;
- h) To provide a stormwater system which utilises open space in a manner compatible with other uses;
- i) To control flooding and enable access to allotments, stabilise the land form and control erosion; and
- j) To minimise urban runoff pollutants to watercourses.

C. Controls

1) Natural Environment

- a) Runoff must not be discharged into bushland areas, including threatened ecological communities.
- b) Pipe outlets shall be treated with measures to dissipate stormwater velocity, except where waters enter a formed channel or similar structure that is unlikely to be damaged by water flowing in at high velocity.
- c) Permeable ground surfaces are to be maintained as far as possible, and where suitable conditions exist, stormwater is to be infiltrated on-site.

2) Drainage

- a) Council's Stormwater Drainage Specification for Building Developments provides details on drainage requirements including on-site detention, new drainage systems and the like.
- b) The development of any lot should take into account the existing drainage patterns of the area, including any localised ponding, and whether the proposed development is likely to affect:
 - i) Access to the site;
 - ii) Drainage on adjoining properties;
 - iii) Localised nuisance flooding on adjoining properties; and
 - iv) Natural overland flow or drainage paths.
- c) In areas where there are no defined drainage patterns, Council may require the applicant to liaise with the adjoining owners regarding the construction of a drain or channel to an existing watercourse. This may include the provision of drainage easements.
- d) Depending on the scale of the proposed development, the applicant may be required to address the following matters in their application:
 - i) The drainage capacity available for the site (e.g. if the site is connected to a centralised stormwater system, the existing drainage network capacity);

- ii) Where capacity may be limited, appropriate drainage measures, including possible on-site detention (determined by liaising with Council's Development Engineering Unit and receiving detailed advice from a qualified engineering consultant);
 - iii) If the site is affected by drainage constraints, the current stormwater discharge and likely future discharge. In this regard, a report prepared by a qualified engineer will be required and should demonstrate that the development will not overload trunk drains during peak storm events or cause localised flooding;
 - iv) If the proposed development will result in additional pollutant loading (and the appropriate licences have been obtained from the relevant government authorities), details demonstrating that the drainage systems have adequate capacity for those pollutants and runoff will comply with the water quality requirements referred to in this Plan; and
 - v) Any required easements across neighbouring properties. Where easements are required, Council requires the submission of the adjoining owner's consent with the development application.
- e) If the site does not have access to Council's stormwater drainage system, all drainage should be designed to ensure that the intensity, quantity and quality of surface runoff is not detrimental to downstream properties and watercourses. A legal point of discharge will be required.
 - f) If the site has access to Council's stormwater drainage system, all roof and surface water that is not recycled for use on the site must be discharged into Council's stormwater drainage system. No surface drainage will be permitted to discharge across Council's footways or reserves or enter adjoining land.
 - g) The applicant should demonstrate how existing soil type and associated constraints (e.g. salinity and poor percolation) have been considered in the drainage design).

On-Site Stormwater Detention (OSD)

- a) Council's *Stormwater Drainage Specification for Building Developments* provides details on drainage requirements for on-site detention.
- b) Adequate stormwater systems shall be designed and constructed to ensure that, for all rainwater events up to and including the 1:100 Average Recurrence Interval (ARI) event, new developments and redevelopments do not increase stormwater peak flows in any downstream areas.
- c) On-site stormwater detention systems must release water after any rainfall event to maximise future capacity and, therefore, cannot include rainwater tanks, water retention basins or dams.
- d) Detention storage is to be located at a level that is above the 1:5 ARI flood level.
- e) On-site detention systems are to be designed using a catchment wide approach. Advice should be sought from Council's Development Engineering Unit in this regard.
- f) On-site stormwater detention mechanisms should have a maintenance program in place.
- g) Onsite stormwater detention mechanisms should be placed on the title of the relevant allotment/property to ensure their retention and maintenance.

New Drainage Design

- a) Any new piped drainage system shall be designed to control minor stormwater flows under normal operating conditions for an ARI of 5 years.
- b) Any new drainage system shall be designed to control major stormwater flows under normal operating conditions for an ARI of 100 years.
- c) Council's *Stormwater Drainage Specification for Building Developments* provides details on drainage requirements for on-site detention.

D. Lifting the Bar

The following represent some ways in which applicants can demonstrate additional commitment to the stormwater management principles expressed in this Plan. Demonstration of this commitment may lead to Council considering variation of development controls. Applications that vary the development controls listed in this section will need to demonstrate that the proposed development complies with the objectives relevant to the development controls it seeks to vary.

- a) Stormwater detention on site should have capacity to improve the quality of water leaving the site from pre-development state. This may involve treatment of water flowing into the site from upstream properties.

E. Other Information

People seeking further information on stormwater management and drainage or preparing development applications may wish to refer to the following:

- Penrith City Council's *Stormwater Drainage Specification for Building Developments*
- *Australian and New Zealand guidelines for fresh and marine water quality (2000)*
Australian and New Zealand Environment Conservation Council
- National Water Quality Management Strategy No 10: *Australian Guidelines for Urban Stormwater Management (2000)*
- *Penrith City Council's Water Sensitive Urban Design Policy*, (December 2013)
- Penrith City Council's *Water Sensitive Urban Design Technical Guidelines*, (December 2013).

3.7. Water Retention Basins/Dams

A. Background

Relevant Policies for Water Harvesting

The NSW Farm Dams Policy (harvestable right dams' policy) allows rural landholders to harvest a basic volume of water (10% of runoff), store and use that water for any purpose without the need to obtain a licence under the *Water Management Act 2000*. The policy has a number of exceptions, exemptions and location variations and advice from the Office of Water should be sought. Any take of water over and above 10% runoff would require a water access licence and an approval.

Information on water sharing and how to calculate harvestable rights can be found on the Office of Water website <http://www.water.nsw.gov.au/>.

Relevant Policies for Dam Construction and Safety

Dams that are classified as prescribed under the *Dams Safety Act 1978* need to be registered with the Dam Safety Committee. Prescribed dams are those dams that have a

significant impact on community interests in the event of dam failure. All dams higher than 15m are prescribed. For smaller dams, the Dam Safety Committee determines whether prescription is necessary based on the consequence of dam failure occurring in the:

- event of a natural flood (Flood Consequence Category); and
- absence of a natural flood (Sunny Day Consequence Category).

Although registration is required for very few dams, proposed dams should be checked with the Dam Safety Committee.

Dam safety can be a major issue depending on the stability of the geology/soils, the size of the dam and the size and characteristics of the dam's catchment. Specific advice on the construction of dams can be obtained from the Office of Water.

Factors to be considered include:

- a) The location of the dam in relation to local water flows;
- b) Dam construction – wall design, heights, method of construction, etc;
- c) Volume of water and extent of the land inundated when the dam is at capacity;
- d) The relative height and dimensions of the by-wash to control the dam's capacity or the provisions to ensure that inundation of land does not exceed the specified extent; and
- e) Provision for passing flows.

Information on the type, size, location and consequence category (i.e. failure consequences) of new dams is critical for the Dam Safety Committee's consideration to determine the need, or otherwise, to prescribe the dam. The Dam Safety Committee's website provides a form to assist with enquiries. Once approved, the dam design or location should not be altered without the agreement of the Dam Safety Committee.

B. Objectives

- a) To provide controls for water harvesting to limit the impacts on the natural water cycle and ensure water flows to natural waterways and river systems;
- b) To allow water harvesting to support essential rural land uses, especially agricultural uses;
- c) To ensure that water retention basins and dams are designed and constructed in accordance with the relevant State policies and guidelines for safety.

C. Controls

- 1) Council's consent is required to construct or form a dam, pond, lake or water retention basin where it will collect more than 10% of surface run-off (as determined by a hydraulic engineer and/or by Council).
- 2) The design and location of any water retention basin/dam should be carefully considered within the catchment area of the site to protect natural flows to natural waterways and river systems.
- 3) Dams need to be appropriately constructed to ensure they will not have an adverse impact on surrounding properties either by ponding water back up onto upstream properties or by concentrating water to any downstream properties.
- 4) Where possible, water retention basins/dams should seek to minimise disturbance to existing vegetation. Where possible, they should also be landscaped to minimise visual impact and provide shade to minimise evaporation losses and reduce algae growth.

- 5) If a dam is to be breached intentionally, an analysis of the sediment in the dam must be carried out prior to breaching to identify potential pollutants. If necessary, a remediation action plan or plan for disposal of contaminated sediment must be developed. Dam breaching must be carried out in a manner which does not impact on downstream properties.

3.8. Rainwater / Storage Tanks

A. Background

This section aims to ensure that the location, types, materials and colours for any rainwater or other storage tanks are considered as part of the entire site design and are sympathetic to the rural and landscape character of the area. Use of rainwater tanks is consistent with the NSW State Government's objective of reducing the amount of potable (drinking) water consumed for non-potable uses, like flushing toilets and in gardens. Therefore, provision of a rainwater tank can form part of a BASIX commitment listed within the BASIX certificate to meet reduced water consumption targets.

If water in rainwater tanks is intended for human consumption, the tank must be appropriately maintained. Refer to the Australian Government's *Guidance on use of rainwater tanks* (2010) produced by the Environmental Health Committee for further information.

B. Objectives

To ensure that rainwater or other water storage tanks and associated structures are:

- a) Appropriately located and designed (with appropriate types, materials and colours) to minimise the visual impact on any rural, scenic or landscape character of any area;
- b) Integrated into the design of any cluster of buildings or as part of the primary dwelling during the site planning and design process;
- c) Designed and/or constructed in accordance with the necessary guidelines to ensure safety and structural stability;
- d) Designed to minimise the entry of contaminants into any water that may be harvested for drinking purposes.

C. Controls

1) General Requirements

In many cases, rainwater tanks may be exempt development under *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* and development consent may not be required. Where development consent is necessary, the following additional requirements apply:

- a) Rainwater tanks must not exceed 3m in height above ground level (including stand).
- b) Rainwater tanks must not collect water from a source other than gutters or down pipes on a building or a water supply service pipe.
- c) Rainwater tanks must be structurally sound.
- d) The rainwater tank, and any stand for the tank, must:
 - i) Be assembled and installed in accordance with the manufacturer's specifications; and

- ii) Not rest on a footing of any building or other structure on the property including a retaining wall.
- e) Rainwater tanks must utilise prefabricated materials or be constructed from prefabricated elements designed and manufactured for the purpose of construction of a rainwater tank.
- f) A rainwater tank must be enclosed and inlets screened or filtered to prevent the entry of foreign matter or creatures.
- g) A rainwater tank must utilise a non-reflective finish. Materials and colours should complement those used on the dwelling house and any other buildings on the land.
- h) Plastic rainwater tanks are not to be used in bushfire prone areas.
- i) Rainwater tanks on land zoned E3 Environmental Management or E4 Environmental Living must have a maximum total capacity for the entire property of:
 - i) 90,000 litres (where the property has an area of 10 hectares or greater); or
 - ii) 45,000 litres (where the property has an area of less than 10 hectares).

D. Other Relevant Information

People seeking further information on rainwater/storage tanks may wish to refer to the following:

Penrith City Council's Stormwater Drainage Specification for Building Developments