PART 5 – ENVIRONMENTAL MANAGEMENT

As development through the City of Parramatta (the City) continues to expand, maintaining the health of the environmental must be at the forefront of considerations to be made during construction and post-development.

This part recognises the impact of climate change on the environment, with each section addressing these impacts to minimise the environmental impact through development. These are addressed under the following headings:

Water Management – with flooding posing significant risk from the Parramatta River and its tributaries, addressing the risk this poses on property and lives through appropriate environmental controls is provided.

Hazard and Pollution Management – as development poses a potentially significant environmental impact to sites and surrounding areas. To address this, environmental controls have been prepared specific to the City.

Environmental Performance – using industry lead tools and guidelines, controls to transition towards more environmentally friendly uses in both residential and non-residential development have been prepared to reflect more sustainable uses.

This Part of this DCP applies to all types of development, both residential and non-residential.

In addition to the specific provisions that are specified in this Section, this Section should be read in conjunction with relevant sections of this DCP, including:

Part 2 - Design in Context

Part 3 - Residential Development

Part 4 – Non-Residential Development

Part 6 - Traffic and Parking

Part 7 – Heritage and Archaeology

CONTENTS

5.1 WATER MANAGEMENT

This Section of this DCP provides controls on critical site and environmental considerations to ensure appropriate measures are taken to address water management across the City. This includes flooding, water sensitive urban design, stormwater management, on-site detention and groundwater.

5.1.1 FLOODING

Flooding is a significant issue that affects existing and future property and infrastructure development in the City of Parramatta. This Section establishes Council's development controls relating to flood prone land for the whole City. The controls in this Section are to be read in conjunction with the New South Wales Government's Flood Policy, current Floodplain Development Manual, and Council's Floodplain Risk Management Policy and Plan.

The criteria for determining applications for proposals potentially affected by flooding are risk-based and structured to recognise that different controls are applicable to different land uses and levels of potential flood inundation and hazard. Flood affectation can be a determinative issue in the assessment of a development which can lead to refusal. As a first step in the Development Application process, proponents are strongly advised to seek flood information for their site from Council and consult with Council officers at a pre-lodgement stage, particularly for proposals located in the medium and high flood risk categories.

"Risk of harm" is the product of likelihood and consequence. The likelihood is usually 1% Annual Exceedance Probability (AEP) but may include rarer, more intense events up to the Probable Maximum Flood (PMF). The consequence or harm describes the impact of the flow of floodwaters on people, property, buildings, and the environment.

Hazard or 'hydraulic hazard' describes the behaviour of floodwaters and particularly the amount of flow, the extent, velocity and depth of that flow. This is primarily modelled for 1% AEP floods but may also be required for other floods up to the PMF, particularly in regard to shelter in place planning and for risk assessment of 'sensitive' and 'critical' uses.

The hazard categories H1-H6 briefly describe these impacts (see below) and show the relationships between floodwater velocity and depth and consequent hazard for each level. This methodology also summarises the risk of harm for each hazard level.

Such hazard, risk and safety assessments will underpin Development Application assessment by Council and must be adequately addressed in any DA application affected by mainstream or overland flow flooding. Often more detailed examination of hazard, risk and potential harm for a specific site and its proposed development will be required. Council reiterates the need for discussion with Council at the pre-lodgement stage for sites affected by flooding.

Should there be an absence of site-specific flood controls in this DCP, flood impact will still require assessment against the flood objectives of this DCP. Should there be any inconsistency between this Section and any other part of this DCP, this Section prevails to the extent of the inconsistency.

FLOODPLAIN RISK MANAGEMENT

Objectives

O.01 Manage the floodplain in an economically, environmentally and socially sustainable manner.

O.02 Allow development in the floodplain that is appropriate to the flood hazard and risk at a particular location.

O.03 Ensure that development minimises the risk to life and property from flooding and its impacts.

O.04 Deliver a risk-based approach to floodplain development and mitigation of potential harm based on a merit assessment consistent with the current Floodplain Development Manual.

O.05 Ensure the proponents of development and the community in general are aware of the potential flood hazard and consequent risk associated with the use and development within the floodplain.

O.06 Ensure that the proposed development does not expose existing development to unacceptable risks or impacts associated with flooding.

O.07 Require hazard, risk and safety assessments to demonstrate how risk and potential for harm to people, property, buildings, and the environment from floodwaters will be adequately mitigated.

O.08 Ensure development does not adversely increase the potential flood affectation on other development or properties, either individually or in combination with similar developments that are likely to occur within the same catchment.

O.09 Ensure development on flood prone land does not result in unreasonable impacts upon the amenity or ecology of an area.

O.10 Ensure buildings and uses are compatible with the identified flood risk. Development with a lower sensitivity to the flood hazard may be considered for location within the floodplain subject to appropriate design and siting controls provided that the potential risks and consequences that could still arise from flooding remain acceptable.

O.11 Ensure early site planning and consideration of flood conditions to achieve an integrated flood response that manages flood risk and provides optimum development design outcomes to provide adequate amenity on and off site, and interface with the public domain.

O.12 Avoid intensification of development and land use within high flood risk or floodways.

O.13 Achieve adequate, safe flood conveyance and management of floodwaters while providing for the rehabilitation, conservation, embellishment, naturalisation of floodways and other flood affected lands where appropriate.

O.14 Ensure the risks associated with car park basements in flood prone areas are adequately mitigated.

O.15 Prevent any changes to landform that would adversely impact flood behaviour or the course of its natural conveyance.

Controls

C.01 Development is to be compatible with any relevant Floodplain Risk Management Plan and consistent with the current NSW Floodplain Development Manual, unless otherwise accepted by Council.

C.02 Any increased risk to life from development must be mitigated to Council's satisfaction.

C.03 The Flood Planning Level under normal circumstances shall be the higher of the 1% AEP riverine flood level or the 1% AEP overland flow flood level, as accepted by Council, plus a minimum 500mm freeboard safety factor. Council may require additional freeboard to manage risk in exceptional circumstances.

C.04 Significant filling or excavation of land below the Flood Planning Level is generally not permitted. If required by Council, development proposals must demonstrate, through detailed hydraulic modelling, that any proposed filling or excavation of land above the Flood Planning Level up to the Probable Maximum Flood (PMF) will not adversely impact flood behaviour.

C.05 Council may require proposals for raising structures to provide a report from a suitably qualified structural engineer demonstrating that the raised structure will not be at risk of failure from the forces of floodwaters.

C.06 Fencing, landscaping and public domain works are to be constructed in a manner that does not significantly affect the flow of floods.

C.07 New development is only permitted where reliable access is available for the evacuation of an area potentially affected by floods to an area free of risk from flooding. Evacuation should be consistent with any relevant flood evacuation strategy.

C.08 Council requires an applicant to make a Flood Enquiry Application where this information is available. The information supplied to an applicant via a Flood Enquiry Application will inform the applicants DA flood model where deemed necessary.

C.09 Where hydraulic flood modelling is required, flow hazard categories H1 to H6 as set out in Figure 5.1.1.1.1 must be identified and adequately addressed in the design of the development. Where available, Council will issue flood and hazard levels to be adopted in any hydraulic flood modelling, unless an alternative approach is agreed with Council. Flood modelling will need to account for any projected changes to flood levels or behaviour as a result of climate change over the design life of the development.

C.10 Council may require an additional overland flow study to support an application on sites where such flooding is expected to be dominant over flooding from waterways (riverine flooding). Increases in local rainfall intensity and other rainfall and flood behaviour resulting from climate change should be factored into any overland flow modelling undertaken.

C.11 Development with high sensitivity to flood risk (e.g. critical public utilities) must be sited and designed to provide reliable access and an acceptably minimal risk from flooding.

C.12 Design responses as part of flood mitigation measures associated with new and existing developments should not result in significant impacts upon the amenity of an area by way of unacceptable overshadowing of adjoining properties, privacy impacts (e.g. unsympathetic

house raising) or by being incompatible with the streetscape or character of the locality (including heritage).

C.13 Development must be planned and designed to respond to both riverine (mainstream) flooding and overland flow flooding.

C.14 Development must not divert flood waters, nor interfere with floodwater storage, nor the natural function of waterways.

C.15 In general, Council will not support proposals for flood flow-through or flood storage chambers within or beneath a new building, and alternate design solutions will be required.

C.16 Sensitive Uses and Facilities' and 'Critical Uses and Facilities,' as defined in Table 5., in general, not permitted on land subject to flooding in a PMF event.

C.17 The following 'Sensitive Uses and facilities' being centre-based child care and aged care facilities that occupy land subject to flooding in a PMF event, may be considered provided Council can be satisfied that:

- occupants and visitors will not be subject to significant risk of harm caused by flooding at or near the site in a PMF event.
- a Flood Emergency Response Plan is prepared, designed and implemented in perpetuity to provide adequate emergency services access and evacuation of the centre or facility.
- Building access and egress does not require people to traverse hazardous floodwaters – that is Hazard Level H3 and above in any flood between the 1% AEP and the PMF.

C.18 Unless otherwise advised by Council, all development in the floodplain involving the construction of a new building or significant alterations to an existing building, and or intensification of a use must be supported by flood hazard modelling that is:

a) based on the 'General Flood Hazard Vulnerability Curves' in Figure 5.1.1.1 for the 1% AEP flood and the PMF.

b) is assessed in terms of the following hazard categories and risks of harm:

- H1 – generally safe for people vehicles and buildings
- H2 – unsafe for small vehicles
- H3 – unsafe for vehicles, children and the elderly. This includes all floodwaters greater than 0.5m depth.
- H4 – unsafe for people and vehicles
- H5 – unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 – unsafe for vehicles and people. All building types considered vulnerable to failure.

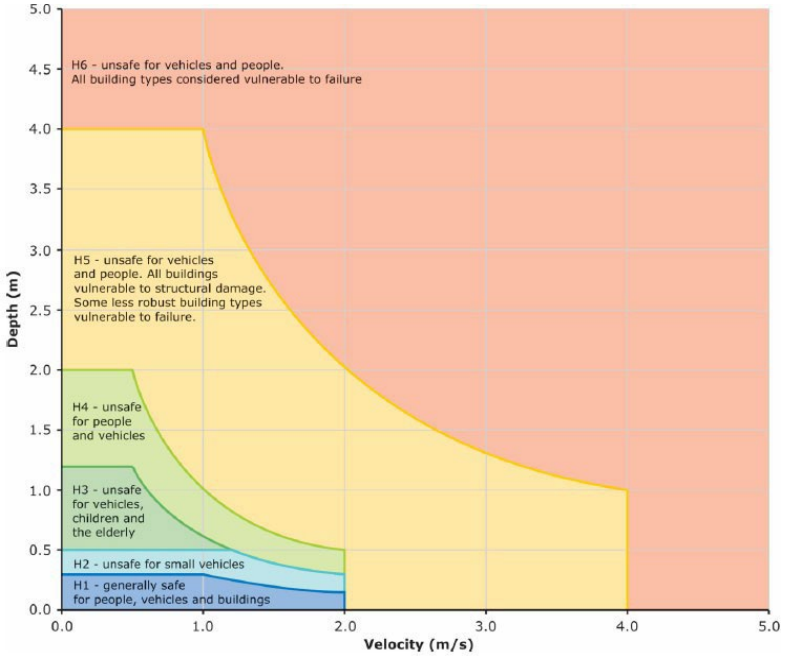

Figure 5.1.1.1 – General flood hazard vulnerability curves

Source: Australian Disaster Resilience Guideline 7-3 Flood Hazard (AIDR 2017)

C.19 Unless otherwise advised by Council, all development in the floodplain involving the construction of a new building or significant alterations to an existing building, and or intensification of a use is to be supported by a merit-based flood hazard and flood impact risk assessment that:

a) Presents evidence-based analysis of the hazard, risk and harm to occupants and those in the surrounds and demonstrates how harmful factors will be mitigated.

b) Includes information on the following aspects as necessary, to enable Council to assess risk and potential for harm:

- 1% AEP and 5% AEP flood levels, flood extents, flow rates, depths and velocities for mainstream and overland flow floods;
- PMF levels, hazard, extent and behaviour for mainstream floods (not overland flow floods);
- modelled hydraulic hazard levels, (H1-H6), extent and behaviour for 1% AEP mainstream and overland flow floods;
- warning times and duration of flooding;
- available warning systems (if any);
- characteristics and vulnerabilities of future occupants;
- likelihood of multiple storms – and multiple flood peaks;
- 'horizontal' evacuation pathways including accessibility considerations;
- 'vertical' evacuation opportunities and shelter in place facilities above the pmf where permitted;
- emergency services access availability;

- local terrain;
- the development in context; and
- the proposed use and occupation of the development.

C.20 Basement car parks on properties within the floodplain are strongly discouraged and alternate design options should be discussed with Council at the pre-lodgement stage. Where a basement car park on a property within the floodplain is proposed, it must be demonstrated that the proposed basement car park has been protected from all flooding up to and including the PMF event. An adequate flood emergency and risk management plan must also be provided where basement car parks are proposed in the floodplain, please see Flood Warning and Emergency Response Planning section below for requirements.

C.21 Where Council allows basement car parking in flood prone land the proposal must demonstrate:

a) effective floodproofing and flood exclusion of the basement against all floods up to the PMF;

b) adequate safety for occupants of the basement and building including a flood free evacuation path (stairway or other suitable method) from the basement levels to a safe refuge above the PMF;

c) adequate safety for occupants at ground and ground floor levels of the building including a flood free evacuation path (stairway or other suitable method) from the ground floor levels to a safe refuge above the PMF; and

d) consistency with other Council objectives (such as traffic management).

C.22 Demonstrate the appropriateness of a basement car park within a flood prone area, the following details must be included as a minimum in the Development Application:

a) Demonstration that high hazard floodwaters (H3 or greater) will not occur in a 1% AEP event in the area adjacent to the driveway.

b) The basement must be protected from the ingress of floodwater by passive measures at least up to the flood planning level. These measures are likely to include provision of a driveway crest at or above the flood planning level with associated wing / or bund walls to this level to prevent floodwaters flowing into the basement.

c) The basement must be protected from the ingress of floodwater via the driveway up to the Probable Maximum Flood level. These measures are likely to include provision of a self-triggering and self-powered flood gate at or near the driveway crest that reaches the level of the PMF, together with corresponding wing wall bunds etc. to the- same PMF level.

d) The basement must be protected from the ingress of floodwater via stairwells and other openings up to the Probable Maximum Flood level. These measures are likely to include a combination of a self-closing flood doors, flood gates and bund walls. Flood doors may also be fire doors.

e) Provision of flood-free escape stairs from the basement up to a place of refuge within the building above the PMF level with adequate facilities for users during and after a flood.

f) Provision of adequate car parking for the disabled and an escape path that can be followed to safety.

g) Submission of a comprehensive Flood Emergency Response Plan incorporating all of the above.

C.23 The Building Management System and Plan for the development with a proposed basement car park within a flood prone area must include all necessary measures to maintain, test and operate the flood protection devices including flood gates, doors and barriers, flood sensors, flood refuges and FERP.

Floodplain Development Matrix

C.24 All proposals are to have regard to the relevant controls applicable to the proposed land use category and flood risk category, as specified in Table 5.1.1.1. The procedure to determine which controls apply to proposed development involves:

Step 1: Identify the land use category of the development from Table 5.1.1.1;

Step 2: Determine which flood risk categories apply to the land (refer to Catchment Management Unit of Council for the relevant flood risk mapping or carry out flood modelling as required by Council) and then refer to Table 5.1.1.2.

Step 3: Apply the relevant controls outlined in the planning matrix at Table 5. as applicable to the floodplain and land use category.

Additional guidelines relating to flood risk management and flood prone land are contained in Council's Local Floodplain Risk Management Policy.

Table 5.1.1.1 – Land Use Category Definitions

Land Use Categories	**Identifies Land Uses**
Sensitive uses and facilities	• Community facilities or Public administration buildings which may provide an important contribution to the notification and evacuation of the community during flood events; • Early education and care facilities; • Hospitals; • Residential care facilities; • Seniors housing; • Educational establishments, • Emergency services facilities.
Critical uses and facilities	• Hazardous industries; • Heavy industrial storage establishments; • Offensive industries; • Public utility undertakings which may cause pollution of waterways during flooding, are essential to evacuation during periods of flood or if affected during flood events would unreasonably affect the ability of the community to return to normal activities after flood events; • Telecommunication facilities; • Waste management facilities.
Residential	• Attached dwellings; • Dual occupancies; • Dwelling houses; • Multi dwelling housing; • Neighbourhood shops;

	• Backpackers accommodation; • Bed and breakfast establishments; • Boarding houses; • Camping grounds; • Caravan parks; • Community facilities (other than sensitive uses/facilities);	• Group homes; • Health consulting rooms; • Home based child care; • Home businesses; • Home industries; • Home occupations; • Hostels;	• Residential flat buildings; • Secondary dwellings; • Semi-detached dwellings; • Serviced apartments; • Public utility undertakings (other than critical uses and facilities).
Commercial or Industrial	• Advertising structures; • Agriculture; • Amusement centres; • Business Premises; • Car parks; • Correctional centres; • Crematorium; • Depots; • Entertainment facilities; • Food and drink premises; • Freight transport facilities; • Funeral homes; • Function centres; • Hardware and building supplies; • Health consulting rooms; • Heavy industries; • Hotel accommodation; • Industries; • Information and education facilities;	• Industrial retail outlets; • Kiosks; • Landscape and garden supplies; • Light industries; • Markets; • Materials recycling or recovery centres; • Medical centres; • Mixed use development; • Mortuaries; • Office premises; • Passenger transport facilities; • Places of public worship; • Public administration buildings (other than essential uses and facilities); • Pubs; • Recreation facilities (indoor); • Recreation facilities (major); • Registered clubs;	• Restricted premises; • Retail Premises; • Service stations; • Sex services premises; • Shop top housing; Signage; Specialised retail premises; • Storage premises; • Transport depot; • Truck depot; • Tourist and visitor accommodation; • Vehicle body repair workshops; • Vehicle repair stations; • Vehicle showrooms; • Veterinary hospitals; • Warehouse or distribution centres; • Waste or resource management facilities; • Wholesale supplies.
Open space or Non-urban uses	• Animal boarding and training establishments; • Boat launching ramps; • Boat repair facilities; • Boat sheds; Cemetery; • Charter and tourism boating facilities;	• Environmental facilities; • Environmental protection works; • Helipad; • Jetty; • Marinas; • Mooring;	• Port facilities; • Water recreation structures; • Recreation areas and minor ancillary structures (e.g. Toilet blocks or kiosks); • Recreation facilities (outdoor)
Subdivisions	Subdivision of land which involves the creation of additional allotments.		
Filling of flood prone land	The net importation of fill material onto a flood prone site is not permitted, except where: i) final surface levels are raised by no more than 100mm over no more than 50% of the site; or ii) filling is to be no more than 800mm thick beneath a concrete building slab, provided this does not significantly affect the floodway conveyance or flood storage.		
Concessional Development	Concessional development is any development or redevelopment that would normally not be permitted under this Plan, but may be permitted as a concession provided it: i) is kept clear of any floodway; and ii) involves an acceptably small (see below for limits) addition or alteration to an existing development that will not cause a significant increase in potential flood losses, risks or have an adverse impact on adjoining properties; or iii) redevelopment for the purposes of substantially reducing the extent of flood affectation to the existing building; provided that such redevelopments incorporate to the fullest extent practical, design features and measures to substantially reduce the existing potential for flood losses and personal risks, and avoid any adverse impacts		

	on adjoining properties – especially obstruction or diversion of floodwaters and loss of flood storage. In the case of residential development, the maximum size of a concessional development is: i) a once-only addition or alteration to an existing dwelling of no more than 10% or 30m² (whichever is the lesser) of the habitable floor area which existed at the date of commencement of this Policy or Plan; or ii) the construction of an outbuilding with a maximum floor area of 20m². In the case of other development categories, the maximum size of a concessional development is a once- only addition to existing premises of no more than 10% of the floor area which existed at the date of commencement of this Policy or Plan.

Note: Refer to the *Parramatta LEP 2023* for definitions of each land use. Should a particular use not be identified in the table above, the nearest or closest best fit use would be applied

Table 5.1.1.2 – Floodplain Matric Planning and Development Controls

Flood Risk Precincts (FRPs)	**Planning Consideration**	Floor Level	Building Components	Structural Soundness	Flood Affectation	Car Parking & Driveway Access	Evacuation	Management & Design
High Flood Risk	Sensitive Uses & Facilities	X	X	X	X	X	X	X
	Critical Uses & Facilities	X	X	X	X	X	X	X
	Residential*	X	X	X	X	X	X	X
	Commercial & Industrial	X	X	X	X	X	X	X
	Open Space & Non-Urban	1,	1	1	1	2, 4, 6, 7	1, 4	2, 3, 4
	Subdivision	X	X	X	X	X	X	X
	Filling	X	X	X	X	X	X	X
	Concessional Development	4,	1	1	1	1, 5	3, 4, 6	2, 3, 4
Medium Flood Risk	Sensitive Uses & Facilities	X	X	X	X	X	X	X
	Critical Uses & Facilities	X	X	X	X	X	X	X
	Residential*	2,	1	1	1	1, 3, 5, 6, 7	3, 4, 6	2, 3, 4
	Commercial & Industrial	2,	1	1	1	1, 3, 5, 6, 7	3, 4, 6	2, 3, 4
	Open Space & Non-Urban	1,	1	1	2	2, 4, 6, 7	1, 4	2, 3, 4
	Subdivision				1		3, 4, 5	1
	Filling	X	X	X	X	X	X	X
	Concessional Development	4,	1	1	1	1, 5	2, 5	2, 3, 4
Low Flood Risk	Sensitive Uses & Facilities	X	X	X	X	X	X	X
	Critical Uses & Facilities	3	2	2	2	1, 3, 5, 6	2, 4, 6	2, 3, 4
	Residential*	2,			2	1, 3, 5, 6	3, 4	
	Commercial & Industrial	2,			2	1, 3, 5, 6	4	

Flood Risk Precincts (FRPs)	Planning Consideration	Floor Level	Building Components	Structural Soundness	Flood Affectation	Car Parking & Driveway Access	Evacuation	Management & Design
	Open Space & Non-Urban					2, 4, 6, 7		
	Subdivision				2		5	1
	Filling				1			
	Concessional Development							

*For redevelopment of existing dwellings refer also to 'Concessional Development" provisions

Legend

		Not relevant	X		Unsuitable Land Use

i. Freeboard equals an additional height of 500mm.

ii. The flood level is usually the higher of that level adopted by Council for fluvial flooding (from rising rivers, creeks, tributaries) for a 1% Annual Exceedance Probability event (1% AEP), or the modelled overland flow flood level (from rainfall in the local catchment) for an event with the same probability (1% AEP). The Flood Planning Level is usually the 1% AEP Flood Level plus a 500mm freeboard safety factor.

iii. The *Parramatta LEP 2023* identifies development permissible with consent in various zones. Notwithstanding, constraints specific to individual sites may preclude Council granting consent for certain forms of development on all or part of a site. The above matrix identifies where flood risks are likely to determine where certain development types will be considered "unsuitable" due to flood related risks.

iv. Filling of the site, where acceptable to Council, may change the FRP considered to determine the controls applied in the circumstances of individual applications.

v. Any fencing that forms part of a proposed development is subject to the relevant Flood Effects and Structural Soundness planning considerations of the applicable land use category.

vi. Development within the floodplain may be subject to Clause 6.7 Foreshore Building Line in the *Parramatta LEP 2023.*

vii. Additional controls apply to basement carparking within the floodplain, please see Car Park Basements associated controls above.

viii. Where a flood warning and emergency response plan is required, requirements set out below under *'Flood Warning and Emergency Response Planning'* must be achieved.

Table 5.1.1.1.3 – Matrix Development Controls

FLOOR LEVEL
1 All non-habitable floor levels (including in-ground swimming pools) to be equal to or greater than the 5% AEP (20 year ARI) flood level plus 0.5 metre freeboard.
2 All habitable floor levels to be equal to or greater than the 1% AEP (100 year ARI) flood level plus 0.5 metre freeboard.
3 All habitable floor levels to be equal to or greater than the Probable Maximum Flood levels.
4 Habitable floor levels to be equal to or greater than the 1% AEP (100 year ARI) flood level plus 0.5 metre freeboard. Where this is not practical due to compatibility with the height of adjacent buildings, or compatibility with the floor level of existing buildings, or the need for access for persons with disabilities, a lower transition floor level may be considered. In these circumstances, the transition floor level is to be as high as practical, and the transition floor area as small as practical, when undertaking alternations or additions, no lower than the existing floor level.
BUILDING COMPONENTS AND METHOD
1 All structures to have flood compatible building components and construction below the 1% AEP (100 year ARI) flood level plus freeboard.
2 All structures to have flood compatible building components and construction below the PMF.
STRUCTURAL SOUNDNESS
1 Unless otherwise approved by Council, a structural engineer's report is required to certify that the

	structure can withstand the forces of floodwater, debris and buoyancy up to and including a 1% AEP (100 year ARI) flood level plus freeboard.
2	A structural engineer's report is required to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including the PMF level.
FLOOD AFFECTATION	
1	A hydraulic engineer's report is required to certify that the development will not increase flood affectation elsewhere, having regard to: (i) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulative impact of multiple potential developments in the vicinity.
2	The impact of the development on flooding elsewhere is to be considered having regard to: (i) loss of flood storage; (ii) changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) the cumulative impact of multiple potential developments in the vicinity.
CAR PARKING AND DRIVEWAY ACCESS	
1	The minimum surface level of unenclosed parking spaces or carports shall be as high as practical, but no lower than 0.1 metres below the 1% AEP (100 year ARI) flood level. In the case of garages and other enclosed parking areas for less than 3 motor vehicles, the minimum surface level shall be as high as practical, but no lower than the 1% AEP (100 year ARI) flood level, plus 0.15 metres freeboard.
2	The minimum surface level of unenclosed parking spaces or carports shall be as high as practical and shall not significantly interfere with the overland flow path.
3	Garages, and other enclosed car parking areas, capable of accommodating more than 3 motor vehicles, must be protected from inundation by floods equal to or greater than the 1% AEP (100 year ARI) flood. Ramp levels to be no lower than 0.5m above the 100 year ARI flood level. Where below ground car parking is proposed additional measures must achieve protection up to the PMF.
4	The driveway footpath crossing providing access between the road and property boundary shall be as high as practical and generally rising in the egress direction, providing this does not obstruct or displace floodwaters.
5	Unless otherwise approved by Council and provided this does not obstruct or displace floodwaters, the level of the driveway providing access between the road and parking spaces shall be no lower than 0.2 metres below the 1% AEP (100 year ARI) flood level.
6	Enclosed car parking, and car parking areas accommodating more than 3 motor vehicles, with a floor below the 1% AEP (100 year ARI) flood level, shall have adequate warning systems, signage, exits and evacuation routes. Refer to Flood Warning and emergency Response Planning section for requirements.
7	Restraints or vehicle barriers to be provided to prevent floating vehicles leaving a site during a 1% AEP (100 year ARI flood.)
EVACUATION	
1	Reliable access and egress for pedestrians is required during a 5% AEP (20 year ARI) flood.
2	Reliable access for pedestrians and vehicles required to a publicly accessible location during the PMF peak flood.
3	Reliable access for pedestrians required from the site to an area of refuge (including shelter in place) above the PMF level, on site (eg. second storey) or off site.
4	Applicant is to demonstrate the development is consistent with any relevant flood emergency response plan, flood risk management plan or similar plan.
5	Applicant is to demonstrate that evacuation in accordance with the requirements of this DCP is available for the potential development resulting from the subdivision.
6	Adequate flood warning is to be available to allow safe and orderly evacuation without increased reliance upon SES or other authorised emergency services personnel.

MANAGEMENT AND DESIGN	
1	Applicant is to demonstrate that potential development as a consequence of a subdivision proposal can be undertaken in accordance with this DCP and the relevant FRMS and FRMP.
2	Flood emergency response plan required where the site is affected by the 1% AEP (100 year ARI) flood level. Plan is to detail procedures that would be in place for an emergency (such as warning systems, signage and evacuation emergency drills) and should consider the following aspects: (i) preparing for a flood, (ii) responding when a flood is likely, (iii) responding during a flood, and (iv) recovery after a flood. Must be consistent with Flood Warning and Emergency Response Planning requirements outlined in DCP.
3	Applicant is to demonstrate that sufficient area is available to store goods above the 1% AEP (100 year ARI) flood level plus 0.5 metre freeboard.
4	No storage of materials below the Flood Planning Level (1% AEP flood plus 0.5 metre freeboard) which may cause pollution or be potentially hazardous during any flood.

FLOOD WARNING AND EMERGENCY RESPONSE PLANNING

Evacuation plans, flood warning systems and flood emergency response plans are all important elements for reducing risk of harm during a flood event. However, it is necessary to recognise that flood emergency response plans *"…cannot be solely relied upon to be effective in all flood events and therefore cannot be considered to reduce the hydraulic hazard. At best they reduce flood risk in events where they operate effectively and as such, flood emergency response plans should not form the basis of development consent" – Floodplain Development Manual (2005).*

Objectives

O.16 Ensure flood warning and emergency response planning is undertaken for flood prone developments to assist in reducing risk of harm. This includes:

- Flood Emergency Response Plan (FERP).
- Flood warning system.
- Evacuation planning (horizontal and vertical) and emergency access and Shelter In Place.

Controls

C.25 If required by Council all development in the floodplain involving the construction of a new building or significant alterations to an existing building, and or intensification of a use must be supported by a FERP.

C.26 FERPs submitted with Development Applications must include:

- both warning and evacuation measures (horizontal or vertical) for all building occupants (residents, workers and visitors) that include the most appropriate 'safe areas' and 'safe evacuation routes';
- measures to prevent evacuation from the site by private vehicle;
- the most appropriate emergency response for flood and fire events that occur together;

- a building flood emergency response plan, similar to a building fire evacuation drill, and measures to ensure this is tested at least annually;
- a statement about the consistency of the submitted FERP with any applicable Council FERP for the locality; and
- evidence of consultation undertaken with relevant state and local agencies in the preparation of the FERP.

C.27 Horizontal evacuation measures are preferred for all building occupants (residents, workers and visitors) where the following can be satisfied:

- Pedestrians can evacuate safely from a building via a flood free pedestrian access on a 'rising road' to an area of refuge located above the PMF. The evacuation pathway must not require passage through deepening or high hazard (H3 to H6) floodwaters.
- An exit from a building is provided above the PMF that is accessible internally to all occupants.
- Address requirements for accessibility and be available for all occupants.
- If feasible, beneficial and architecturally appropriate, provide a link to a neighbouring building by means of an internal access or a bridge, connecting buildings and leading occupants to an exit above the PMF.
- Not rely on lifts, elevators etc.
- Address access into the property during floods by Emergency Services such as SES, Ambulance, Fire and Rescue.

C.28 Where shelter in place or vertical evacuation is required and is permitted in the Floodplain Development Matrix, all building occupants (residents, workers and visitors) that offers access to a safe indoor area of refuge or 'shelter in place' above the PMF where they can remain until the flood event has passed and any subsequent disruption after the flood has been rendered safe and serviceable.

C.29 Shelter in place or vertical evacuation measures must satisfy the following requirements:

a) Refuge shelters must be adequate and fit for purpose (size, design, equipment, supplies) and maintained as such in perpetuity.

b) Unless otherwise advised by Council, facilities must be designed for a refuge stay of at least 48 hours, with longer time periods addressed in design, equipment and provisioning.

c) It is recommended, and may in some cases be required, that large and high-rise residential buildings be provided with emergency back-up power, water supply and sewerage for all residential units and common facilities including lifts. This must be provided in the context of an overarching Emergency Response Plan that includes flooding, power outages, extreme weather events and other incidents.

d) Where the building design and back-up systems enable some residents to safely remain in their own apartments for extended periods during floods, all such residents must still have access to a communal refuge area of adequate size where support from other residents and emergency supplies are available.

e) The communal safe area of refuge must be permanently provided with as a minimum:

- emergency electricity supply, and lighting,
- clean water for drinking, washing and toilet flushing,
- working bathroom and toilets,
- suitable food,
- personal washing facilities,
- medical equipment including a first aid kit,
- a battery-powered radio and relevant communications equipment, and
- a comfortable, safe, indoor, sheltered environment (corridors, lobbies, balconies, al-fresco areas, car parks etc are not acceptable).

C.30 Requirements for the communal safe area of refuge must be detailed in the Flood Emergency Response Plan supporting the DA and must address:

- Numbers of people likely to need the facility and consequent size, equipment and provisioning requirements.
- Means to ensure ongoing services such as power, water disposal, wastewater disposal, and communications.
- Long term maintenance as part of the building management system.
- Dual use of the refuge area for other non-emergency communal functions (if practical).

C.31 All safe areas of refuge (residents own apartment or a communal area) must have:

a) fail safe access to the safe area of refuge from anywhere in the building including the basement (lift access is not allowed) that is protected from floodwaters up to the PMF by suitable flood doors, flood gates and the like; and

b) fail safe access to an exit/entry point located above the 1% AEP flood level plus 0.5m freeboard that enables people to exit the building during a fire and/or flood and allows emergency service personnel to enter a building to attend to a medical emergency.

C.32 Development is to be compatible with any relevant Floodplain Risk Management Plan and consistent with the current NSW Floodplain Development Manual, unless otherwise accepted by Council.

C.33 Any increased risk to life from a development must be mitigated to Council's satisfaction.

Glossary

Annual Exceedance Probability (AEP) is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage

Flood Hazard is a flood that has the potential to cause harm or conditions with the potential to result in loss of life, injury and economic loss

Flood Planning Level (FPL) is the level of the governing 1% AEP flood event plus 500mm freeboard. The governing 1% AEP flood is the higher of the mainstream (river or creek) flood level and the overland flow flood level. The freeboard is a fixed safety factor which allows for modelling variation and factors such as waves and turbulence. It does not include an allowance for Climate Change.

Flood prone land is land susceptible to flooding by a PMF event.

Probable Maximum Flood (PMF) is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation (PMP), and where applicable, snow melt, coupled with the worst flood producing catchment conditions.

Further Information

Flood Risk Management Plan, Flood Studies, Sub-Catchment Management Plans and Council's *Floodplain Risk Management Policy (2014)* are available from the City of Parramatta Council.

NSW Government's *Floodplain Development Manual 2005*: www.dnr.nsw.gov.au/floodplains/manual.shtml

NSW Government, *Floodplain Risk Management Manual 2022*

Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia, 2019

Australian Disaster Resilience Handbook 7 - Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia, Australian Institute for Disaster Resilience.

5.1.2 WATER SENSITIVE URBAN DESIGN

In the City, all developments are required to implement the principles of Water Sensitive Urban Design (WSUD). This is an approach that aims to minimise the impacts of development upon the water cycle and achieve more sustainable forms of urban development. WSUD works at all levels including, individual lot, street, precinct and regional scales. It aims to integrate stormwater management systems into the landscape in a manner that provides multiple benefits including stormwater retention and detention, whilst addressing the pre-development considerations of flooding, waterways and groundwater protection, habitat, and improving visual amenity.

Objectives

O.01 Use WSUD to manage stormwater, particularly for rainfall events up to 1 in 1.5 year probability.

O.02 Reduce overall discharge of stormwater from a site to less than pre-development levels where possible.

O.03 Ensure appropriate treatment and re-use of stormwater where possible.

O.04 Implement successful WSUD and stormwater quality improvements for private developments and the public domain at all scales.

O.05 Ensure that on-site stormwater management measures can be operated and maintained in accordance with design specifications.

O.06 Use simple landscape-based WSUD solutions wherever appropriate that achieve water management objectives without unusual or complicated maintenance demands, and mindful of other stormwater management requirements outlined in this DCP.

O.07 Use WSUD to increase evapotranspiration, urban heat reduction and to reduce uncontrolled runoff.

Controls

C.01 All developments must implement rainwater retention and a WSUD approach. The extent and types of this will be proportional to the scale of development.

C.02 WSUD principles are to be integrated into the development through the design of stormwater drainage, on-site detention, and landscaping and in the orientation of the development rather than relying on 'end of pipe' treatment devices prior to discharge.

C.03 Impervious surfaces are to be minimised and soft landscaping used to promote infiltration and reduce stormwater run-off. Permeable surfaces must be genuinely permeable in the long term and appropriately designed to withstand compaction, sediment accumulation and scour and be provided with adequate subsurface flow capture and drainage.

C.04 WSUD elements should be located and configured to treat as much impermeable area as possible.

C.05 Rainwater harvesting and use is encouraged in any water management system for individual lots and for the public domain. Development should maximise the capture and reuse of rainwater from roofs. Rainwater tanks must be connected to separate non-drinking water systems including irrigation, car washing, toilets, water features, washing machines and cooling towers.

C.06 Rainwater storage and tanks are encouraged for all developments including provision of greater capacity than minimum BASIX requirement for residential developments.

C.07 Council may require that rainwater tanks or other alternative water sources are designed to meet the following criterion:

- Rainwater or other alternative water sources need to meet 80% of demands for irrigation, car washing, toilets, water features, washing machines and cooling towers.

C.08 Use WSUD to ensure runoff water quality is within acceptable limits and only rely on mechanical treatment technology if necessary,.

C.09 Run-off entering directly to waterways or neighbouring bushland is to be avoided. Options may exist where run-off is treated to reduce weed invasion, nutrient and seed dispersal, erosion and sedimentation, scour and altered flow regimes.

C.10 Unless otherwise advised by Council, WSUD systems shall generally be designed to treat storm events up to the 1 in 1.5 year average recurrence interval. Low flows of this frequency must be separated from higher flows that will be diverted into OSD and other stormwater quantitative management systems.

C.11 Developments of any size that would affect rainwater and stormwater behaviour must use a range of practical measures to achieve WSUD Objectives and Controls. Landscape based WSUD measures are preferred. Methods to achieve this may include the following:

Roof	• Compact development typologies/small footprints; • Rainwater and stormwater harvesting connected to appropriate use; • Green walls. • Roof gardens • Roof rain storage for evaporative cooling systems
Hardstand	• Diversion of runoff to deep soil/landscaped areas; • Bioretention; • Stormwater harvesting • Permeable paving and absorption/infiltration
Driveways, carparks, and footpath crossings	• Diversion of runoff to deep soil/landscaped areas; • Permeable paving and absorption/infiltration; • Bioretention. • Stormwater quality treatment should not solely rely on Tree-Pits instead standard bio-retention need to be incorporated as far as practicable.

Landscaped areas	• Infiltration into deep soil; • Irrigation from on-site rainwater tanks; • Wetlands and waterbodies (where appropriate); • Bioretention; • Use of dips and concave spaces in the landscape to encourage water retention.
Open Space – Private and Public Domain provided by the developer.	• Infiltration into deep soil; • Irrigation with collected water from regional/precinct stormwater harvesting; • Estate/precinct scale stormwater harvesting and irrigation; • Wetlands and waterbodies; • Bioretention. • Except GPT, proprietary products are not supported as WSUD in public domain. If it is un-avoidable, prior consent needed from Council. • Stormwater quality treatment should not solely rely on Tree-Pits instead standard bio-retention need to be incorporated as far as practicable.
Roads - Private and Public Domain provided by the developer.	• Passively irrigated street trees; • Bioretention in medians and road edges • As advised by Council • Except GPT, proprietary products are not supported as WSUD in public domain. If it is un-avoidable, prior consent needed from Council. • Stormwater quality treatment should not solely rely on Tree-Pits instead standard bio-retention need to be incorporated as far as practicable.

C.12 Utilise the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) (or equivalent modelling tool, subject to agreement by Council) to determine total runoff quantity for pre and post development scenarios and pollution load reduction, using suitable modelling parameters for the City; and the following requirements outlined in Table 5.1.2.1.

Table 5.1.2.1 – Required for specific development types

Response Required	Land Use	Development Type	Water Sensitive Design measures
No Requirement	Residential	Minor alterations and additions with new roof less than 40m² – no requirements.	• A rainwater tank strongly encouraged. If installed must be connected for garden irrigation. Connection to toilet and laundry hot water is encouraged.
Minor WSD Response	Residential	Alterations and additions with new roof area greater than or equal to 40m² but less than 150m².	• Provide a rainwater tank connected to the roof area, with a volume of at least 2,000 litres, or compliance with BASIX if applicable which prevails in the event of any inconsistency. • WSUD principles followed where possible, particularly in landscape design.
	Residential	Alterations and additions with new roof area >150m² New single dwellings, dual occupancies and residential developments up to 4 dwellings including secondary dwellings with roof area >150m².	• Annual outflow equal or lower than pre development outflow where practicable. • A rainwater tank connected to the roof area, with a volume of at least 5,000 litres (2,000 litres for secondary dwellings), or compliance with BASIX which prevails in the event of any inconsistency. • WSUD principles followed where possible, particularly in landscape design.
	Subdivision	Residential subdivision of 4 or more lots and including buildings.	• Annual outflow equal or lower than pre development outflow where practicable. • Where an existing dwelling is to be retained on site, a rainwater tank connected to the roof area, with a volume of at least 5,000 litres for each dwelling, or compliance with BASIX which prevails in the event of any inconsistency.
	Commercial, Industrial and other non-residential	Minor development including alterations and additions where the increase in the roofed and /or impervious area* is less than 150m².	• A rainwater tank connected to the roof area, with a volume of at least 5,000 litres. WSUD principles followed where possible, particularly in landscape design and site planning
Major WSD Response	Residential	Residential development on lots of 750 - 1,499m², or consisting of 5 or more dwellings including multi dwelling house, residential flat buildings and mixed use development (excluding dual occupancy)	• Annual outflow 10% or lower than pre development outflow where practicable. • A rainwater tank connected to the roof area, with a volume of at least 5,000 litres, or compliance with BASIX which prevails in the event of any inconsistency. Retention and WSUD measures must achieve the water

Response Required	Land Use	Development Type	Water Sensitive Design measures
			pollution reduction targets listed below Table 5.1.2.2
	Residential	Residential development on lots of 1500m^2 or more, including any type of mixed use development	• A site specific water sensitive urban design and management plan integrated with the site landscape design and stormwater system. • Annual outflow 10% or lower than pre development outflow where practicable. • A rainwater tank connected to the roof area, with a volume of at least 5,000 litres, or compliance with BASIX which prevails in the event of any inconsistency. Retention and WSUD measures must achieve the water pollution reduction targets listed below in Table 5.1.2.2.
	Commercial, Industrial and other non-residential	New or altered commercial and industrial developments where the increase in the roofed and/or impervious area is equal to or greater than 150m^2	• A site specific WSUD and management plan integrated with the site landscape design and stormwater system Annual outflow at least 10% less than pre development outflow where practicable. • Retention and WSUD measures to achieve the targets listed below in Table 5.1.2.1. • Include a rainwater tank or a water reuse device connected to at least 90% of the roof area and with a minimum volume of 10,000 litres.
Dependent WSD Response	Other development not listed above		• WSD response as determined by Council and dependent on development type.

NOTE: *Additional impervious area includes building footprint (including roof area), vehicle access ways and parking space

Table 5.1.2.2 – Water Pollution reduction targets

Parameter	**Water pollution reduction targets**
Gross Pollutants	90% Reduction in the post development mean annual load of total gross pollutants load (greater than 5mm)
Total Suspended Solids	85% reduction in the post development mean annual load of Total Suspended Solids (TSS)
Total Phosphorus	65% reduction in the post development mean annual load of Total Phosphorus (TP)
Total Nitrogen	45% reduction in the post development mean annual load of Total Nitrogen (TN)
Hydrocarbons, motor oils, oil and grease	90% reduction in the post development mean annual load of hydrocarbons, oils and grease.

Note: Reductions in pollutant loads are relative to the pollution generation from the same development without treatment.

5.1.3 STORMWATER MANAGEMENT

Stormwater management is a fundamental component of development and must be considered as early as possible by the proponent in the evolution of projects.

This Section of this DCP includes objectives and controls to support stormwater systems that provide an appropriate balance between engineering objectives, landscaping and general planning amenity principles.

Objectives

O.01 Manage and drain stormwater adequately to avoid or minimise local area flooding and associated damage to downstream properties and Council assets.

O.02 Protect waterways from erosion, pollution and sedimentation.

O.03 Maintain or improve water quality in aquatic habitats and ensure that downstream flora and fauna are protected from stormwater impacts during and post construction.

O.04 Ensure that stormwater management is considered in a cumulative and long-term context to maintain and improve the flow of stormwater.

O.05 Ensure that stormwater runoff from the site is collected and conveyed to a legal point of discharge without adverse impacts in accordance with Council's Development Engineering Design Guidelines.

O.06 Support the long-term viability of stormwater management measures within the City.

O.07 Support the long-term viability of natural watercourses, ecosystems and habitats in Parramatta and beyond.

O.08 Support the return of swimming to the Parramatta River and other waterways.

Controls

C.01 Development is to be sited and built to minimise disturbance of the natural drainage system.

C.02 Operating practices and technology are to be employed to prevent contamination of stormwater.

C.03 Impervious surfaces are to be minimised and soft landscaping maximized to promote infiltration and reduce stormwater run-off.

C.04 Development should maximise the capture and reuse of rainwater from roofs. Rainwater tanks should be connected to irrigation, car washing, toilets, water features, washing machines and cooling towers.

C.05 Adequate provision is to be made for the control and discharge of stormwater run-off from the site to ensure that it has no adverse impact on Council's stormwater drainage systems, waterways, the development itself, or adjoining properties.

C.06 Stormwater, including overland flows entering and discharging from the site, must be managed. The site drainage network must provide the capacity to safely convey stormwater run-off resulting from design storm events listed in Development Engineering Design Guidelines.

C.07 Council will generally not permit the construction of stormwater drainage lines through public reserves.

C.08 Minimise the spread of weeds caused by urban stormwater from urban areas flowing into bushland and waterways.

C.09 The discharge of polluted waters from the point sources to Council's stormwater system is not permitted.

C.10 Run-off entering directly to waterways or bushland is to be avoided or treated to reduce erosion and sedimentation, nutrient and seed dispersal.

C.11 Stormwater drainage is to be designed in accordance with this DCP and Development Engineering Design Guidelines.

C.12 The location of the On-Site Detention System, WSUD and other water storage facilities shall not impact on the operation, functionality and safety of any proposed development.

C.13 Stormwater is to be discharged in the general direction as determined by the predevelopment topography of the site and within its natural catchment/sub-catchment. Filling of sites to achieve discharge by gravity is not supported.

C.14 Stormwater runoff must not adversely impact surrounding properties and Council infrastructure and assets through the diversion and concentration of flows.

C.15 For developments that connect to the existing site stormwater drainage system, a plan indicating the layout and details of the existing stormwater drainage system and a Certificate from a qualified and practicing plumber Certifying the functionality and condition of the existing system must be submitted with the Development Application.

C.16 All systems (major/minor) shall be designed with consideration to the major/minor design principle in Australian Rainfall & Runoff as described in Council's Development Engineering Design Guidelines.

C.17 All developments, where the site is to be disturbed, shall include details of Erosion and Sedimentation Control measures designed in accordance with the Soil and Water Management for Urban Development – NSW Department of Housing, as described in Council's Development Engineering Design Guidelines.

C.18 Connection to Council's Kerb and Gutter must comply with requirements outlined in Council's Development Engineering Design Guidelines.

C.19 Connection to Council's Underground Piped Drainage Network (inc. pits and pipes) in accordance with Council's Development Engineering Design Guidelines.

C.20 Discharge to a natural waterway or creek in accordance with Council's Development Engineering Design Guidelines.

C.21 Where no Council pipe exists in the immediate vicinity, disposal will require a suitably designed and constructed pipeline to the nearest available Council drainage system (generally not exceeding 15 metres).

C.22 Discharge of stormwater to Council infrastructure must be by gravity. Charged lines are only permitted for single dwellings and must be designed in accordance with the criteria outlined in Council's Development Engineering Design Guidelines.

C.23 Absorption trenches are only permitted for single dwellings and must be designed in accordance with the criteria outlined in Council's Development Engineering Design Guidelines.

C.24 Pump out systems can only be considered as a method of stormwater discharge for draining basement car parks and garages. Pump out systems must be designed in accordance with the criteria outlined in Council's Development Engineering Design Guidelines.

C.25 Development that requires on site detention on sites that fall away from the street or are flat are required to drain via an easement over a downstream property/ies to a legal point of discharge and must be designed in accordance with Council's Development Engineering Design Guidelines.

C.26 Private drainage easements must be designed and located in accordance with Council's Development Engineering Design Guidelines.

C.27 Drainage through Council owned land (including parks, creeks and reserves) is not permissible unless determined by Council as outlined in Council's Development Engineering Design Guidelines. Easements through Council land require a resolution of the elected Council.

C.28 Easements shall be located on the lower side of the property and must be designed to be free of any building encroachments, including eave overhangs and footings, and trees

C.29 Standard easement widths must comply with requirements outlined in Council's Development Engineering Design Guidelines.

C.30 Average recurrence intervals shall be used for stormwater drainage design and comply with Council's Development Engineering Design Guidelines.

5.1.4 ON-SITE DETENTION MANAGEMENT

On-Site Detention (OSD) of stormwater helps reduce downstream flooding and avoids or minimises adverse impact upon natural and constructed drainage assets.

OSD is required for all multi-unit residential development, including dual occupancies, all commercial development and all community focused facilities, such as places of worship, community centres, childcare centres and the like, unless it can be demonstrated that OSD will increase flooding. In these circumstances alternate stormwater management is to be considered in line with WSUD principles and this Section of this DCP.

Objectives

O.01 Ensure OSD design and the method of discharge are appropriate to the site and its surroundings and consistent with Council design requirements.

O.02 Ensure OSD systems are designed to provide adequate hydraulic performance and longevity.

O.03 Maximise soft landscaping by requiring on site detention systems to be provided in below ground tanks unless otherwise allowed with this DCP.

O.04 Maintain and improve the flow of stormwater in a cumulative and long-term context.

O.05 Maintain an appropriate level of safety for persons and property.

O.06 Prevent any increase in downstream peak flows resulting from new developments or redevelopments by temporarily storing on-site the additional and quicker runoff generated.

O.07 Integrate OSD systems with the architectural and landscape design and layout of the development.

Controls

C.01 Above ground OSD basins are not allowed for residential development, unless excepted by the provisions below.

C.02 On site detention systems are be designed in accordance with the Upper Parramatta River Catchment Trust (UPRCT) On Site Detention Handbook Editions 3 or 4, SEPP BASIX, Australian Rainfall & Runoff Council's Development Engineering Design Guidelines unless otherwise exempted by other controls in this DCP.

C.03 OSD is to be in the form of below ground tanks for all dual occupancy and other forms of multi-unit residential and/or mixed use residential development; however, where circumstances exist which physically prevent all volume being detained in a below ground tank, an OSD system can be a combination of above and below ground detention tanks (not basins), provided:

- the below ground tank holds a minimum 60% of the site's required storage volume, and
- the above ground tank is located behind the front building line and away from rear yard outdoor recreation areas, where the design is as recessive and slimline as possible, and

- the tank is engineered for a product lifecycle matching that of the dwelling/s on site, and
- the design parameters set out in Council design and development guidelines are fully complied with, and
- storage volume as calculated using the Upper Parramatta River Catchment Trust (UPRCT) On Site Detention Handbook (for areas covered by the Handbook) or, other applicable methodology, is fully achieved, and
- in addition to that provided for the underground detention tank, any above ground storage tank must include an orifice plate, discharge control pit and overflow and any other design requirements for OSD tanks required under Council design and development guidelines and for applicable areas, the UPRCT OSD Handbook, and
- designed by a registered and experienced hydraulic/civil engineer designs any OSD system, and
- all relevant LEP and DCP planning and landscaping requirements, including building envelope controls and soft and deep soil coverages are complied with, without exception.

C.04 For residential development on flat sites only, above ground basins up to a maximum depth of 300mm can be considered for ground level drainage. Other detention options could be considered for flat sites in conjunction with detention basins if needed to achieve appropriate detention volume.

C.05 The dedicated air space only of rainwater tanks may be considered as a partial offset for detention volume requirements in line with calculations and design requirements under the Upper Parramatta River Catchment Trust Handbook 4th Edition.

C.06 Above ground OSD basins can be considered for non residential developments, provided the ponding depth of any above ground basin does not exceed 300mm.

C.07 The location of the On-Site Detention System, WSUD and other water storage facilities shall not impact on the operation, functionality and safety of the proposed development. In this regard On-Site Detention Systems and other water storage facilities shall not be located within the subfloor of any habitable areas of residential dwellings, commercial buildings and childcare facilities. Surcharging, ventilation and access grates of these systems shall not be located in, nor impact upon, required play areas for child care facilities.

C.08 All OSD Systems must discharge by gravity to Council's stormwater infrastructure.

C.09 Where discharge of OSD Systems by gravity to the street frontage of a site is not possible, an inter-allotment drainage easement/s will be required. Where the available drainage point is through Council land and is not permitted by Council due to classification of that land, applications will be assessed on individual merits and environmental constraints.

C.10 Stormwater is to be discharged in the general direction as determined by the predevelopment topography of the site and within its natural catchment/sub-catchment. Filling of sites to achieve discharge by gravity is not supported.

C.11 OSD design parameters are to be in accordance with:

a) Council Design and Development Guidelines.

b) For applicable areas, the Upper Parramatta River Catchment Trust Handbook and Council design and development guidelines.

c) Minimal landform modification, such as excavation (other than for below ground storage) and/or fill, is to be incorporated into any stormwater management system.

d) Pump out systems cannot be used in lieu of OSD or to drain OSD systems wholly or in part*.

e) Absorption trenches or similar cannot be used in lieu of OSD or to drain OSD systems wholly or in part.

f) For developments with a total site discharge greater than 30 l/s, discharge must be to Council's piped street system.

g) Discharge of ground water into Council's stormwater system, other than minor seepage, is not permitted.

*Note: Pump-out is allowed for the drainage of basements only.

C.12 Standard easement widths must comply with requirements contained in Council's Development Engineering Design Guidelines.

C.13 Pump out systems can only be considered for draining rainwater seepage and surface runoff into basements and garages. Pump out systems must be designed in accordance with the criteria outlined Council's Development Engineering Design Guidelines. Pump out systems cannot be used in lieu of OSD or to drain OSD systems wholly or in part. Absorption trenches cannot be used in lieu of OSD or to drain OSD systems wholly or in part.

C.14 An OSD system comprising of only above ground tanks is not allowed as:

a) Above ground tanks can only capture roof area.

b) The size of above ground tanks to accommodate the site storage requirements will necessitate large structurally designed tanks located in areas where amenity, site function and landscaping are likely to be compromised.

C.15 OSD requirements apply to certain types of developments and redevelopment as outlined in Council's Development Engineering Design Guidelines.

C.16 Ensure that the permissible site discharge and site storage requirements are aligned with the relevant catchment and parameters as outlined in Council's Development Engineering Design Guidelines.

C.17 OSD design must comply with requirements as outlined in Council's Development Engineering Design Guidelines.

C.18 Above ground storages must only apply and comply with requirements as outlined in Council's Development Engineering Design Guidelines.

C.19 Underground tanks must comply with requirements as outlined in Council's Development Engineering Design Guidelines.

C.20 OSD must be legally protected from alteration and regularly maintained to guarantee continued operation over the entire life of the development.

C.21 Emergency overflows must be accommodated and designed for and shall include such flows resulting from storm events that exceed the design capacity of the OSD system and for flows resulting from a failure of the system (incl. the OSD facility, pit and pipes belonging to and as part of the system and pit and pipes and flow paths within a stormwater drainage easement).

For additional references and definitions, refer to Council's **Development Engineering Design Guidelines**.

5.1.5 GROUNDWATER

Groundwater is a valuable natural resource and its extraction and use requires careful consideration through the development process. The management of groundwater can have implications for design and construction requirements for developments where interception of groundwater will occur. Pre-lodgement discussions should be held with Council for any development which may encounter groundwater.

This Section must be read in conjunction with Council's "Groundwater Management Guidelines" which contains requirements that applicants must consider as part of the development assessment process.

Objectives

O.01 Protect and/or improve groundwater quality, flows and drainage patterns during demolition, construction and ongoing operation phases of a development.

O.02 Control and regulate groundwater usage in a sustainable manner.

O.03 Ensure that long term protection of groundwater quality is an essential consideration for all development.

O.04 Ensure Council stormwater drainage infrastructure is not used for the discharge of ground water.

O.05 Ensure adequate treatment of groundwater prior to discharge and/or re-use of groundwater.

O.06 Design development to avoid or minimise interception of groundwater.

Controls

C.01 All Development Applications proposing excavation for below ground structures such as basements must demonstrate whether or not they will encounter groundwater.

C.02 Discharge of groundwater into council stormwater infrastructure is not permitted post development.

C.03 Council may permit discharge of managed groundwater into Council's drainage system only during construction for a specified period of time, and provided certain safeguards are met, including as follows:

a) Operating practices and technology including dewatering shall not contaminate groundwater or adversely impact adjoining properties and infrastructure.

b) Council infrastructure can accommodate anticipated groundwater volumes over the period of construction.

c) Council may require the preparation of a Construction Environmental Management Plan (CEMP) to support a DA which will include management, storage, monitoring, treatment and disposal of groundwater in the construction phase. Such a CEMP will also seek to mitigate

other environmental impacts of construction including those required to be addressed by Council and other Government Agencies. The CEMP must be consistent with Council's 'Groundwater Management Guidelines' and 'Minimum requirements for building site groundwater investigations and reporting', NSW DPIE 2021 and any other necessary approvals and licences.

C.04 Where groundwater will be encountered, the proposal must demonstrate that the below ground structures will be constructed in a water-proof manner (e.g. tanked construction) at all levels where groundwater could be encountered. Water-proofed basements are required because:

- Council stormwater infrastructure has limited capacity.
- Drained basements require ongoing maintenance for the treatment and pump out of groundwater with energy use and operational cost implications for occupiers.
- Failure of mechanical systems to treat and pump groundwater creates structural and environmental risks.
- Retention of natural groundwater levels is environmentally sustainable.

C.05 Council may consider drained basements where it can be demonstrated that all groundwater taken can be re-used on site for irrigation and/or other uses such as toilet flushing. All groundwater must be treated to the relevant standard for the intended re-use. Where this option is proposed it must also consider potential loss of opportunity for rainwater re-use on site and adjust the proposal accordingly to minimise increased stormwater flows off site. Excess groundwater cannot be discharged to Council stormwater infrastructure.

Further Information

NSW DPIE 2021 - Minimum requirements for building site groundwater investigations and reporting.

5.2 HAZARD AND POLLUTION MANAGEMENT

This Section of this DCP provides controls to address the environmental impact of development on sites and surrounding areas to ensure hazard and pollution is managed appropriately throughout the City. These include:

- Developmental impact on soils. Controlling the erosion of soil and sedimentation run off during and after construction is addressed in this Section. As well as this, the impacts of acid sulfate soils, salinity, earthworks and sloping sites and land contamination are further addressed within this Section. While this Section addresses the impact that development may have on these matters, it also addresses the impact that poor land management may have when developing on affected sites.
- Air quality and ensuring that appropriate site controls are implemented to reduce the impact that development has on its surroundings.
- Bush fire prone land. With areas of the City at risk of bush fire, ensuring protection through controls designed in compliance with relevant NSW Rural Fire Service publications has been essential.

5.2.1 CONTROL OF SOIL EROSION AND SEDIMENTATION

Earthworks and development which expose soil to the elements have the potential to run off site and impact adjoining properties, water systems and impact habitats for plants and animals.

This Section of this DCP includes controls to help minimise erosion and manage development to avoid potential adverse impacts on the City's waterways and drainage systems, environmental health, and biodiversity.

Objectives

O.01 Ensure through effective site controls during, and after demolition and construction, that development does not contribute to sedimentation of waterways and drainage systems, or cause windblown soil loss.

O.02 Ensure that development does not result in environmental damage of waterways and bushland in the City.

Controls

C.01 Development is to be designed and constructed to integrate with the natural topography of the site so as to minimise the need for cut and fill.

C.02 Soil loss from development is to be minimised through effective site management practices that reduce the impact of sedimentation on downstream waterways and drainage systems and that minimise windblown soil loss.

C.03 Development is to minimise site disturbance, including impact on vegetation and significant trees. Construction, particularly on larger sites, is to stage site disturbance so as to minimise the area of the site that is not stabilised and exposed to erosion at any one time. Overland stormwater flow must be diverted around any exposed areas of the site.

C.04 Development that is likely to result in erosion and sedimentation is to be accompanied by details of the proposed method of on-site erosion and sediment control. Such details are to follow the guidelines in the NSW Landcom (2004) Managing Urban Stormwater: Soils and Construction and Council's Design and Development Guidelines, as per Figure 5.2.1.1 - Figure 5.2.1.4.

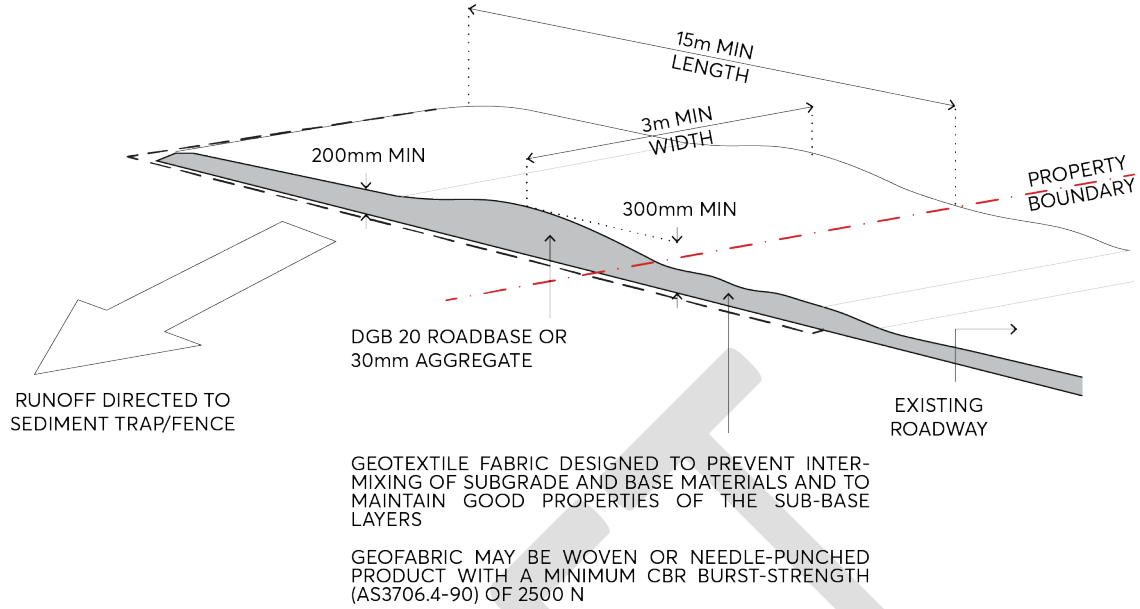

Figure 5.2.1.1 – Stabilised Site Access (Source: Soils and Construction: Managing Urban Stormwater, Landcom, March 2004)

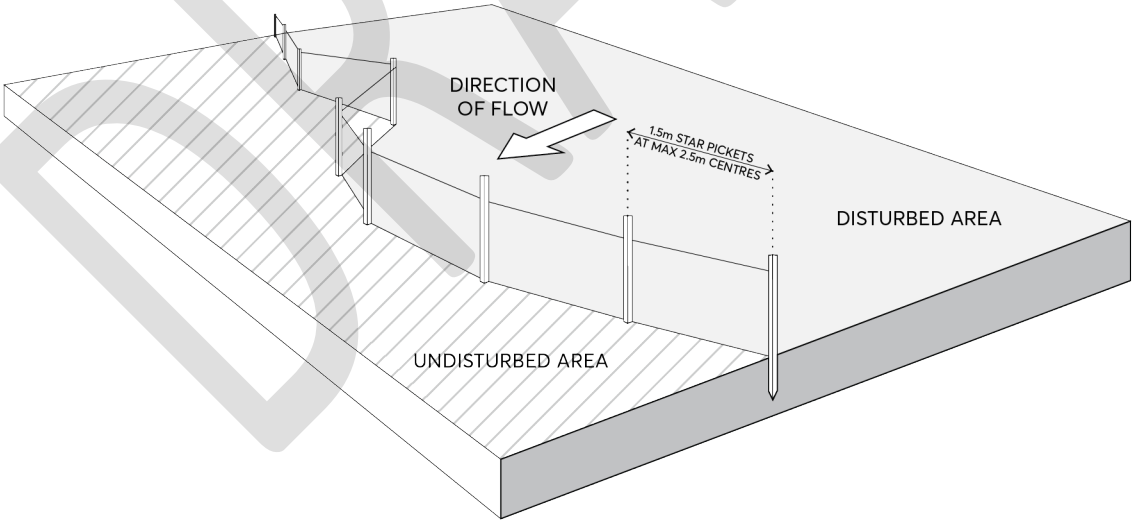

Figure 5.2.1.2 – Sedimentation fencing (Source: Soils and Construction: Managing Urban Stormwater, Landcom, March 2004)

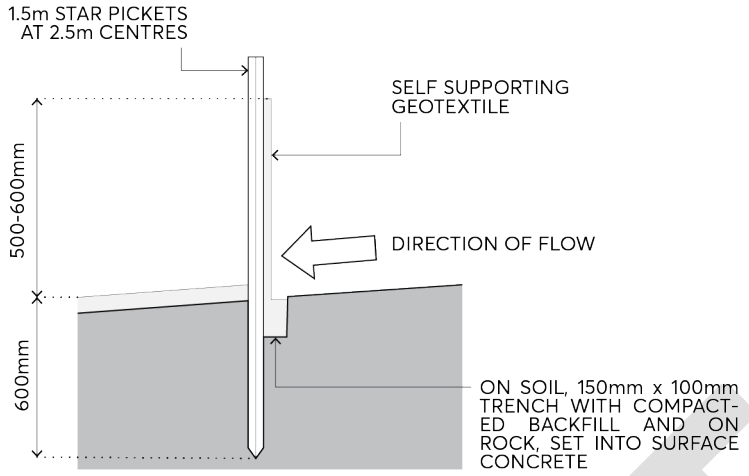

Figure 5.2.1.3 – Section - Sedimentation fencing (Source: Soils and Construction: Managing Urban Stormwater, Landcom, March 2004)

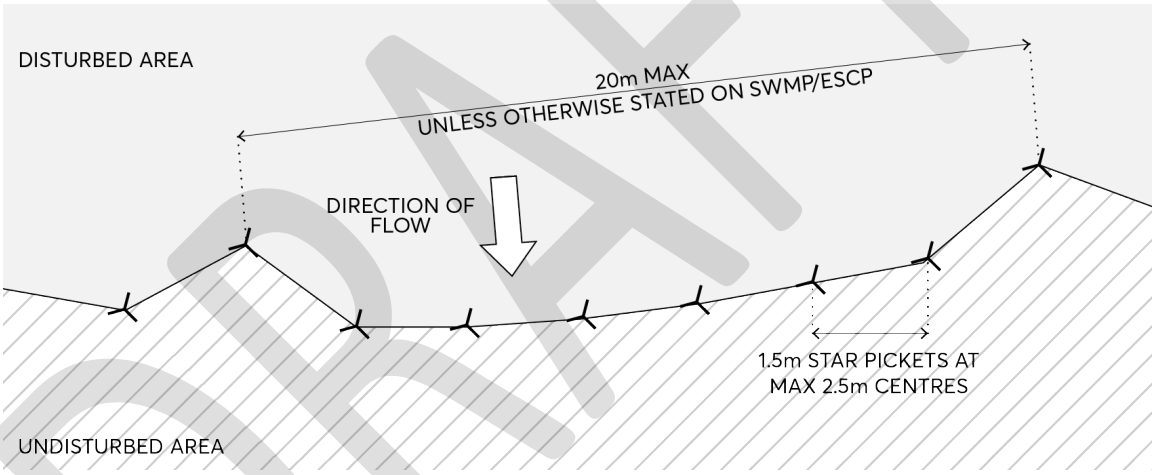

Figure 5.2.1.4 – Plan - Sedimentation fencing (Source: Soils and Construction: Managing Urban Stormwater, Landcom, March 2004)

5.2.2 ACID SULFATE SOILS

Acid sulfate soils are a result of soil that is close to sea level and is impacted by minerals which alter its pH. When the pH raises significantly, these soils may impact on development and risk damaging structural integrity, environmental and conservation works and public facilities.

This Section of this DCP includes controls to ensure the effective management and monitoring of acid sulphate soils to reduce risk and impacts on development.

Objectives

O.01 Ensure the environmental value and ecological health of waterways are protected from the release of acid water from exposed acid sulfate soils.

Controls

C.01 Development is to ensure that sites with potential to contain acid sulfate soils are managed in a manner consistent with the provisions contained in the *Parramatta LEP 2023*.

5.2.3 SALINITY

Salinity in urban areas is recognised as an issue that can potentially cause significant economic, environmental, and social costs in many areas of NSW. The build-up of salt in soils can have adverse impacts on native flora and fauna habitat, the quality of water systems, and structural integrity of buildings.

This Section of this DCP includes controls to ensure the effective management of salinity within both the natural and built environment.

Objectives

O.01 Ensure that soil or groundwater salinity does not impact on the structural integrity of a development.

O.02 Control the impact of the development on prevailing and potential soil or groundwater salinity in the City.

Controls

C.01 Construction techniques are to be employed that prevent structural damage to the development as a result of salinity. Where the potential risk of salinity is identified by using the Map of Salinity Potential in Western Sydney 2022 further investigations in accordance with the Western Sydney Salinity Code of Practice 2003 are to be undertaken.

C.02 Protection measures to mitigate the impact of the development on soil salinity are to be employed.

Further Information

Map of Salinity Potential in Western Sydney, (former) Department of Infrastructure, Planning and Natural Resources, 2003

Western Sydney Salinity Code of Practice, Western Sydney Regional Organisation of Councils, 2003

5.2.4 EARTHWORKS AND DEVELOPMENT ON SLOPING LAND

Development on land which is sloping has an increased risk of erosion of soil and run-off into surrounding waterways. Cut and fill increases the risk of this occurring and determining the appropriate earthworks on sites, if required, can reduce this impact.

This Section of this DCP includes controls to ensure the effective management of earthworks resulting from development to minimise impact on the natural and built environment.

Objectives

O.01 Protect and minimise disturbance to natural landforms.

O.02 Encourage buildings that are designed to respond sensitively to natural topography.

O.03 Minimise the amount of cut and fill and therefore disruption to natural drainage patterns.

O.04 Maintain privacy for adjoining residents.

O.05 Reduce bulk and scale of dwellings.

O.06 Minimise soil loss through effective site management practices.

O.07 Reduce the impact of sedimentation on downstream waterways and drainage systems.

Controls

C.01 Sloping sites with a gradient in excess of 20% require certification from a geotechnical engineer as to the stability of the slope in regard to the proposed design.

C.02 Cut and fill shall not create a detrimental impact on overland flows through the site.

C.03 Cut and fill should not occur on or adjacent to, or have adverse impacts on, sensitive environments, such as waterways, riparian land, wetlands, bushland or significant vegetation.

C.04 Cut is restricted to a maximum of 1 metre from the existing ground level when it is not for the provisions of a basement.

C.05 Notwithstanding the above, cut is limited to a maximum of 450mm from existing ground level where it occurs within 900mm of rear or side boundaries.

C.06 Fill is restricted to a maximum of 500mm from the existing ground level. A maximum fill of 1.0m may be considered where;

a) it is demonstrated that site conditions require it, and,

b) fill does not create any adverse effects to adjoining properties, and

c) objectives O.01-O.07 above are demonstrated to be achieved, and

d) any fill above 500mm is contained within the building envelope.

C.07 Notwithstanding the above, fill is limited to a maximum of 300mm from existing ground level where it occurs within 900mm of rear or side boundaries.

C.08 Contaminated fill, either imported or found on site, is not permitted.

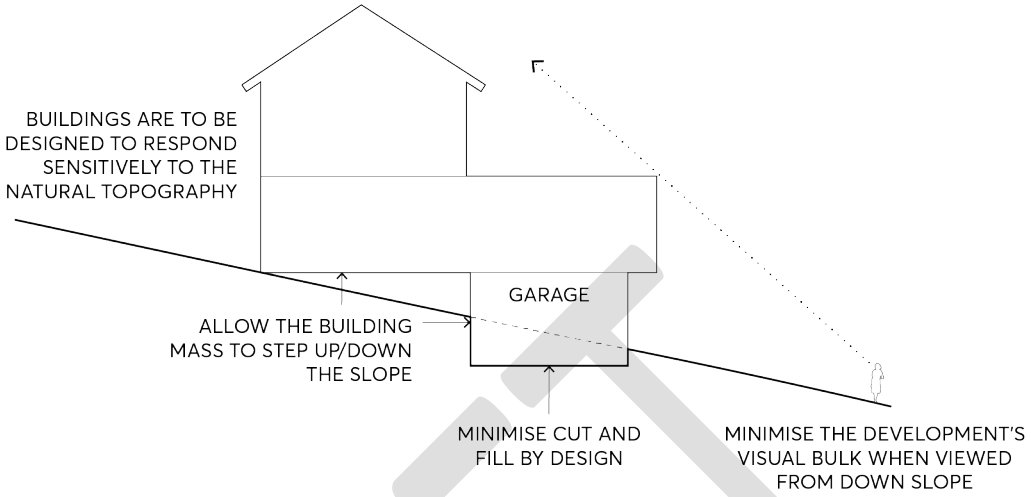

Figure 5.2.4.1 – Development on sloping land

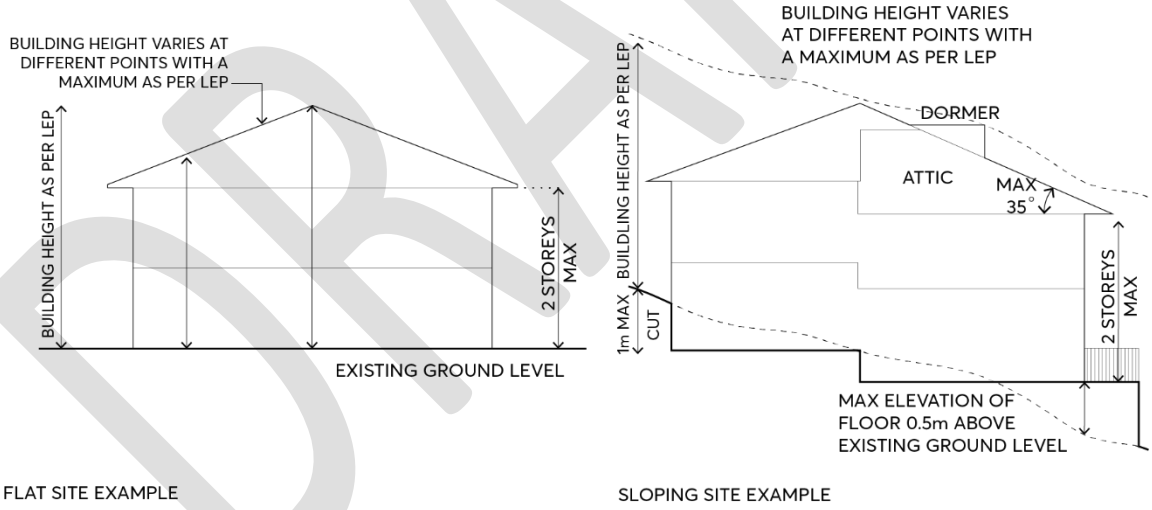

Figure 5.2.4.2 – Explanation of building height controls

C.09 Buildings are to be sited and designed to take into account the slope of the land to:

- minimise the visual bulk of the development, particularly when viewed from down slope,
- minimise the need for cut and fill by designs which minimise the building footprint and allow the building mass to step up/down the slope, and
- minimise the impact of development on the privacy of adjoining land.

5.2.5 LAND CONTAMINATION

'Contaminated land' has the same meaning as in the *Environmental Planning and Assessment Act 1979* and is defined as follows:

> **Contaminated land** means *land in, on or under which any substance is present at a concentration above the concentration at which the substance is normally present in, on or under (respectively) land in the same locality, being a presence that presents a risk of harm to human health or any other aspect of the environment.*

Land contamination is most often the result of past uses. It can occur as a result of poor environmental management and waste disposal practices or accidental spills in industrial or commercial activities. The poor planning and management of contaminated land can present a risk to public health and the environment.

Development proposals for land that is or has previously been used for a purpose which is likely to have contaminated the site must address the requirements of *State Environmental Planning Policy (Resilience and Hazards) 2021* (Resilience and Hazards SEPP). References are made to the *Resilience and Hazards SEPP* in the following provisions and should be referred to for further information and clarification.

This Section of this DCP provides controls to ensure land contamination is appropriately managed across the development process to manage and mitigate any risk from previous land uses.

Objectives

O.01 Ensure that changes of land use will not increase the risk to public health or the environment.

O.02 Ensure that any redevelopment of land for sensitive uses considers the potential contamination of the land.

O.03 Avoid inappropriate restrictions on land that could otherwise be remediated.

O.04 Consider the likelihood of land contamination as early as possible in the planning process.

O.05 Link decisions about the development of land with the information available about contamination.

Controls

C.01 Prior to the submission of a Development Application an assessment is to be made by the applicant under Clause 4.6 of the *Resilience and Hazards SEPP* as to whether the subject land is contaminated.

Note: The following guidelines prepared by NSW Environmental Protection Authority, where relevant, must be used in preparing preliminary assessments and all levels of contaminated site reports:

- Contaminated Sites: Sampling Design Guidelines, 1995
- Contaminated Land: Guidelines: for Consultants Reporting on Contaminated Land, 2020
- Contaminated Sites: Guidelines for Assessing Service Station Sites, 1994
- Contaminated Land Guidelines: Assessment and Management of Hazardous Ground Gases 2020
- Contaminated Land Guidelines: Guidelines for the Assessment and Management of Groundwater Contamination 2007
- Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme, (3rd Edition) 2017

C.02 Council under Clause 4.6 (1) of the *Resilience and Hazards SEPP* a consent authority must not consent to development unless it has considered whether land is contaminated, and if the land is contaminated is suitable for the proposed purpose or is satisfied that the land will be appropriately remediated. Where land is proposed to be subject to remediation, adequate documentation is to be submitted to Council supporting the categorisation.

Development consent for remediation work

C.03 Development consent is required for remediation work in sensitive areas (Category 1 remediation works) under Clause 4.8 of *Resilience and Hazards SEPP*.

C.04 Development consent is not required for other remediation work (Category 2 remediation work) under Clause 4.11 of *Resilience and Hazards SEPP*. However, under Clause 4.13 of the *Resilience and Hazards SEPP*, notice is required to be given of the proposed work to Council before commencement of works.

Activities that may cause contamination

C.05 Some activities that are likely to cause land contamination are listed below. For further information, refer to the *Managing Land Contamination Planning Guidelines*.

Some activities that may cause contamination include:

- Asbestos production and disposal
- Acid/alkali plant and formulation
- Agricultural/horticultural activities
- Airports
- Chemicals manufacture and formulation
- Defence works
- Drum re-conditioning works
- Dry cleaning establishments
- Electrical manufacturing (transformer)
- Electroplating and heat treatment premises
- Engine works

- Explosives industry
- Gas works
- Iron and steel works
- Metal treatment
- Mining and extractive industries
- Oil production and storage
- Paint formulation and manufacture
- Pesticide manufacture and formulation
- Power stations
- Railway yards
- Scrap yards
- Service stations
- Sheep and cattle dips
- Smelting and refining
- Tanning and associated trades
- Waste storage and treatment
- Wood preservation
- Works on known James Hardie Legacy Contamination sites, such as earth works

Source: The Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, ANZECC and NHMRC 1992.

Note: It is not sufficient to rely solely on the contents of this list to determine whether a site is likely to be contaminated or not. The list is a guide only. A conclusive status can only be determined after a review of the site history and, if necessary, sampling.

Further Information

Contaminated Land Management Act 1997

Contaminated Land Management Regulation 2022

National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) National Environment Protection Council (NEPC 2013)

Managing Land Contamination - Planning guidelines, Department of Urban Affairs and Planning (DUAP), NSW Environment Protection Authority (NSW EPA), 1998 (DUAP 1998)

Contaminated Sites: Sampling Design Guidelines, NSW EPA, 2022 (EPA 2022)

Australian & New Zealand Guidelines for Fresh & Marine Water Quality, Water Quality Australia (ANZG 2018)

PFAS National Environmental Management Plan (NEMP), Heads of EPAs Australia and New Zealand (HEPA), January 2022 (NEMP 2022)

Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme, 3rd Edition, NSW EPA, 2017

(EPA 2017)

Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination, NSW DEC, March 2007 (DEC 2007)

Guidelines for Managing Risks in Recreational Water, NHMRC, 2008 as amended 2019 (NHMRC 2008)

Contaminated Land Guidelines: Consultants Reporting on Contaminated Land 2020

5.2.6 AIR QUALITY

Promoting healthy air quality for the protection of residents and visitors to Parramatta can be achieved through appropriate land use planning.

This Section of this DCP includes controls to protect air quality and reduce exposure to air pollution.

Objectives

O.01 Protect air quality and enhance environmental amenity.

O.02 Minimise air quality impacts on the occupants of residential development and other sensitive land uses.

Controls

C.01 Development that is likely to result in the emission of atmospheric pollutants, including odours, is to include operating practices and technology to ensure that the development does not contribute to increased air pollution.

C.02 Effective site controls during and after demolition and construction are to ensure that development does not contribute to increased air pollution.

C.03 Sensitive land uses adjoining a major road are to include siting and design measures to ameliorate the potential air quality impact of vehicle emissions on the site.

C.04 An Air Quality Assessment report that takes into account the provisions of *State Environmental Planning Policy (Transport and Infrastructure) 2021* be provided for 'air quality sensitive land uses' within 100 metres of a classified road. 'Air quality sensitive land uses' include residential accommodation (excluding a single dwelling house on an existing lot), early education and care facilities, seniors housing, hospitals, offices or public recreation areas.

C.05 All development must be undertaken in accordance with the *Protection of the Environment Operations Act 1997 No 156*, the *Protection of the Environmental Operations (Clear Air) Regulation 2021, State Environmental Planning Policy (Transport and Infrastructure) 2021*, relevant Australian Standards and any other requirements of the NSW Environmental Protection Authority, such as *Protection of the Environment Operations (Clean Air) Regulation 2021* and the Technical Framework: Assessment and Management of Odour from Stationary Sources in NSW and Approved Methods of Modelling and Assessment of Air Pollutants in New South Wales.

C.06 Discharges from premises of any matter, whether solid, liquid, or gaseous is required to conform to the *Protection of the Environment Operations Act 1997* and its Regulations, or a pollution control approval issued by the NSW Office of Environment and Heritage for Scheduled Premises.

5.2.7 BUSH FIRE PRONE LAND

With the risk of bush fires in parts of the City, ensuring that development complies with the NSW Rural Fire Services' *Planning for Bush Fire Protection 2019* is essential to minimise the risk to life and property.

This Section of this DCP provides general controls for bush fire hazard and applies to all forms of development.

Objectives

O.01 Ensure that development is located and designed to minimise the risk to life and property from bush fires.

O.02 Ensure that development balances the conservation of tree canopy, native vegetation, and bush fire hazard management.

Controls

C.01 Development on land identified as bush fire prone on Council's Bush Fire Prone Lands Map should address the bush fire protection measures in the publication *Planning for Bush Fire Protection 2019*.

C.02 Development should be located and designed to minimise the need for bush fire hazard reduction within native vegetation.

C.03 Bush fire asset protection zones should be located entirely within the development site.

C.04 Measures, such as higher fire-resistant construction standards, improved access and water supplies should be considered for infill developments where they would reduce the need for removal of significant vegetation, provided the development still complies with Planning for Bush Fire Protection 2019.

5.3 PROTECTION OF THE NATURAL ENVIRONMENT

The City of Parramatta (the City) has approximately 820 hectares of bushland made up of important remnant native vegetation. This is almost 10% of all land within the City, and includes critically endangered ecological communities, endangered populations, and threatened flora and fauna species.

There are also significant remnants of ecologically significant trees and vegetation present in parks, along streets, and on private property. This vegetation all contributes to the City of Parramatta's biodiversity and provide important habitat.

The City also has over 65 kilometres of creeks and rivers, including significant assets like Parramatta River and Lake Parramatta. These waterways are valuable natural assets that contribute a range of economic, social, and environmental benefits that are essential to support our quality of life and sustain native flora and fauna.

Council recognises the importance of protecting and conserving its locally occurring plants, animals, and other living organisms. This includes their habitat, and the way they interact, to ensure that biodiversity is sustained and enhanced now and in the future. Council also has the ambition to significantly improve water quality and make the Parramatta River swimmable again.

This Section of this DCP is designed to ensure the City's natural environment is sustainably managed as part of the development process; and measures are implemented to minimise the impact of development on the City's unique biodiversity, waterways and riparian zones, and trees and vegetation.

5.3.1 BIODIVERSITY

The City's natural environment is home to 600 unique species of flora and 230 unique specifies of fauna. Of these, 12 species are considered endangered ecological communities and 32 are considered threatened species of fauna. The protection and maintenance of the City's unique flora and fauna is important in conserving the City's biodiversity, environmental health, and wellbeing.

This Section of this DCP includes controls to ensure the protection of the City's biodiversity remains a primary consideration during the assessment of development. Development should aim to avoid potential adverse impacts on the City's flora and fauna, and where not possible, should aim to minimise and/or mitigate its impact on the City's biodiversity.

Objectives

O.01 Minimise the impact of development on the City's biodiversity by:

- minimising the removal of native vegetation and naturally occurring soils;
- conserving significant locally indigenous trees, particularly remnant and hollow bearing trees; and
- establishing buffer zones and encouraging planting of locally indigenous plants, including trees on private property.

O.02 Retain and protect areas of existing biodiversity value, particularly key vegetation links, threatened ecological communities, and fauna corridors.

Controls

C.01 In relation to locally indigenous flora and fauna (including canopy trees and understorey vegetation), development is to be sited and designed to:

- avoid potential adverse impacts;
- minimise impacts, if impacts cannot be avoided;
- mitigate impacts, if the impacts cannot be minimised.

C.02 Development is to have regard to direct and indirect impacts on biodiversity and natural areas. Council will require the submission of a Statement of Flora and Fauna Impact (SFFI) for all development in or adjacent to bushland and/or waterways, including vegetation mapped as 'Biodiversity' or 'Riparian Land and Waterways' on the *Parramatta LEP 2023 Natural Resources Map*. The SFFI is to be prepared by a suitably qualified ecologist and must determine whether the development triggers the Biodiversity Offsets Scheme (BOS) as per Part 7 of the *Biodiversity Conservation Regulation 2017*.

C.03 Where the BOS is triggered, a Biodiversity Development Assessment Report (BDAR) must be prepared following the Biodiversity Assessment Method (BAM) by an accredited assessor.

C.04 Where a SFFI identifies species, populations or ecological communities listed under Schedules 1 and 2 of the *Biodiversity Conservation Act 2016* and/or Schedules 4, 4A and 5 of the *Fisheries*

Management Act 1994, and the BOS is not triggered, a 'Test of Significance' must be prepared by a suitably qualified ecologist as per Section 7.3 of the *Biodiversity Conservation Act 2016* and submitted to Council in addition to the SFFI.

C.05 Development should avoid the fragmentation of existing native vegetation.

C.06 Development should seek to retain unique environmental features of the site, including:

- rock outcrops,
- wetlands and the like,
- watercourses,
- drainage lines and riparian land,
- groups of significant trees and vegetation, and
- mature hollow-bearing trees and other fauna habitat features on the site.

C.07 Preference is to be given to landscaping elements that provide and promote native faunal habitats, e.g. natural rock and frog ponds.

C.08 Preference is to be given to the planting of species indigenous and/or endemic to the vegetation communities of the local area as per Table 5.3.1.1. However, exotic species appropriate to the landscaping setting may also be considered.

Table 5.3.1.1 – Endemic species to be considered in planting in the City of Parramatta.

Botanical Name	**Common Name**
Acmena smithii	Lillypilly
Angophora costata	Smooth-barked Apple
Angophora floribunda	Rough-barked Apple
Angophora hispida	Dwarf Apple
Banksia serrata	Old Man Banksia
Callicoma serratifolia	Callicoma
Ceratopetalum apetalum	Coachwood
Ceratopetalum gummiferum	NSW Christmas Bush
Corymbia gummifera	Red Bloodwood
Elaeocarpus reticulatus	Blueberry Ash
Glochidion ferdinandi	Cheese Tree
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus baueriana	Blue Box
Eucalyptus botryoides	Southern Mahogany
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus eugenioides	Thin-leaved Stringybark
Eucalyptus fibrosa	Broad-leaved Ironbark
Eucalyptus haemastoma	Scribbly Gum
Eucalyptus moluccana	Grey Box
Eucalyptus paniculata	Grey Ironbark
Eucalyptus pilularis	Blackbutt
Eucalyptus piperita	Sydney Peppermint
Eucalyptus resinifera	Red Mahogany
Eucalyptus robusta	Swamp Mahogany
Eucalyptus saligna	Sydney Blue Gum

Eucalyptus sieberi	Silver-top Ash
Eucalyptus tereticornis	Forest Red Gum
Eucalyptus umbra	Broad-leaved White Mahogany
Livistona australis	Cabbage-tree Palm
Melaleuca decora	White Feather Honeymyrtle
Melaleuca linarifolia	Snow-in-summer
Melaleuca styphelioides	Prickly-leaved Paperbark
Syncarpia glomulifera (	Turpentine
Tristaniopsis laurina	Water Gum

All suitable trees must be planted with a minimum setback of 3.5 metres to the outside wall of a legally constructed building and be a minimum 2 metres from any proposed or existing drainage line.

C.09 Development is to be sited and designed to minimise the impact on cultural heritage trees and plantings and consideration is to be given to further planting of cultural landscapes where appropriate.

C.10 Pruning or removal of trees and vegetation must be in accordance with Section 5.3, Protection of the Natural Environment, Section 5.3.4 Tree and Vegetation Preservation of this DCP.

C.11 Development should not compromise the ability of native flora and fauna to respond to climate change.

C.12 Consideration must be given to the impacts of lighting and overshadowing on flora and fauna species and their habitat.

C.13 Development is to provide and maintain a setback of at least 10 metres from land zoned C2 Environmental Conservation or identified as 'Biodiversity' on the *Parramatta LEP 2023* Natural Resources Map. Development should not include buildings, structures and earthworks within the required buffer zone. Refer to further controls in Part 5 – Environmental Management, Section 5.3.3, Development on Land Adjoining Land Zoned C2 Environmental Protection Or W1 Natural Waterways Zone of this DCP.

C.14 Landscaping within the buffer zones should comprise trees, shrubs, understorey and groundcover indigenous to the adjoining vegetation community.

5.3.2 WATERWAYS AND RIPARIAN ZONE

The City of Parramatta has 65 km of waterways traversing through its natural and built environment. These include rivers, creeks, streams, gullies, and wetlands, with two of the largest being the Parramatta River and Duck River. The land alongside the waterways (known as the riparian zones) help support vegetation, waterway bank stability, and biodiversity. Both waterways and riparian zones are vulnerable to the impacts of development on surrounding land both during the development stage but also from pollution that may result from certain land uses.

The health of the City's interconnected network of waterways and riparian zones is dependent on the effective management of development to minimise the risk of erosion, waste, and pollution entering the water system.

This Section of this DCP includes controls designed to mitigate the impact of development near waterways and riparian zones and promote ecological sustainability.

Objectives

O.01 Ensure development contributes to the protection and rehabilitation of waterways in order to:

- improve waterway health, and
- develop and maintain ecologically sustainable waterways.

O.02 Development in and near floodways, riparian zones and naturalised channels requires careful planning and detailed design to protect occupants and people in the locality while supporting flood conveyance requirements, beneficial environmental outcomes and optimising development opportunities.

O.03 Encourage naturalisation and semi-naturalisation of concrete floodway channels and creeks where feasible.

Controls

C.01 Development is to make provision for buffer areas for the preservation and maintenance of floodway, riparian corridors and habitat protection. Refer to *Clause 6.7 Foreshore Building Line* and *Clause 6.5 Water Protection* in the *Parramatta LEP 2023*.

C.02 Development on land subject to *Clause 6.5 Water Protection* in the *Parramatta LEP 2023* or that abuts a waterway is to provide and maintain a vegetated riparian zone (VRZ) landscaped with local indigenous species, to protect bushland, aquatic habitat, wildlife corridors and soften the interface between the natural landscape and the urban environment. This riparian vegetation is also important to stabilise the bed and banks of waterways and attenuate flood flows.

C.03 A VRZ of at least 10 metres, measured from the top of the highest bank, is to be provided to creeks (1st order waterways). A larger VRZ will be required to higher order waterways, such as Parramatta River, consistent with the NSW Department of Industry's *Guidelines for controlled activities on waterfront land – Riparian corridors*:

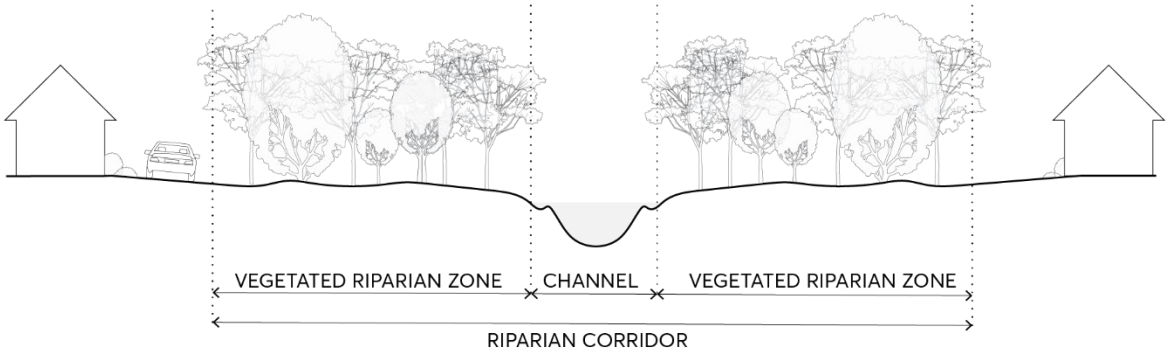

Figure 5.3.2.1 – Riparian corridor

Source: Guidelines for controlled activities on waterfront land – Riparian corridors (NSW Department of Industry, 2018)

C.04 Works should not cause bed and bank instability and any bank stabilisation measures should preferably use soft engineering techniques.

C.05 The piping, enclosing or artificial channelling of natural watercourses and drainage channels is not permitted. Consideration is to be given to naturalising piped or lined drainage systems wherever feasible.

C.06 Opportunities for fauna habitat are to be considered in the design of any waterway protection measures. Watercourses should be linked with other areas of indigenous vegetation, wildlife corridors and/or natural or visually important site features.

C.07 Development is to ensure that natural channel design principles are incorporated in any works on or in waterways. Refer to Figure 5.3.2.2.

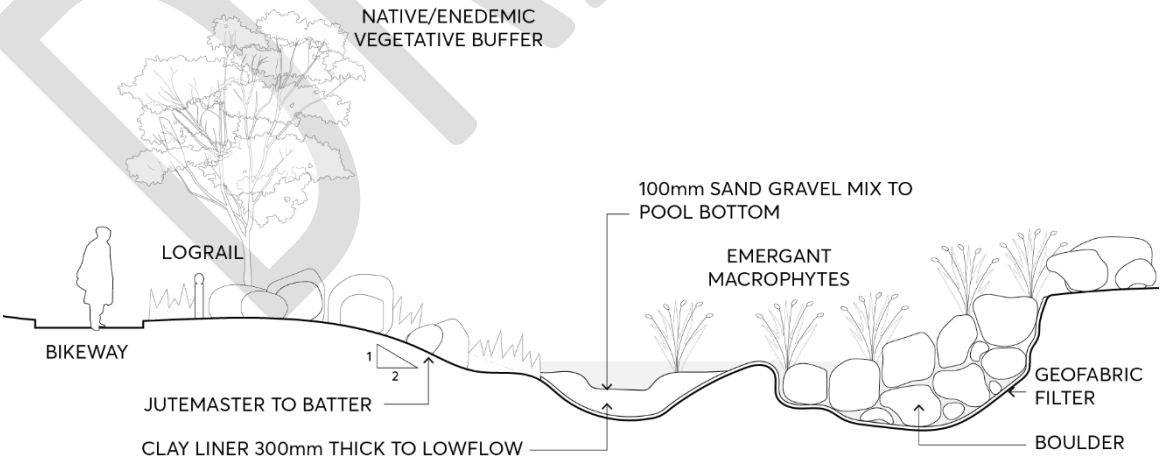

Figure 5.3.2.2 – Elements of the Natural Drainage System

Source: Stormwater outlets in parks and waterways (Brisbane City Council, 2011)

C.08 Ongoing maintenance costs are to be considered in the design of any waterway protection measures.

C.09 New stormwater outlets into natural waterways within Council parks and reserves will generally not be permitted. Any stormwater outlets proposed in the vicinity of a natural watercourse should:

- point downstream to minimise the potential for erosion and scouring,
- be located to avoid existing native vegetation and significant trees,
- provide a natural and stable transition from a constructed drainage system to a natural flow regime, and
- be designed in accordance with NSW Office of Water *Guidelines for outlet structures on waterfront land*. Refer to Figure 5.3.2.3.

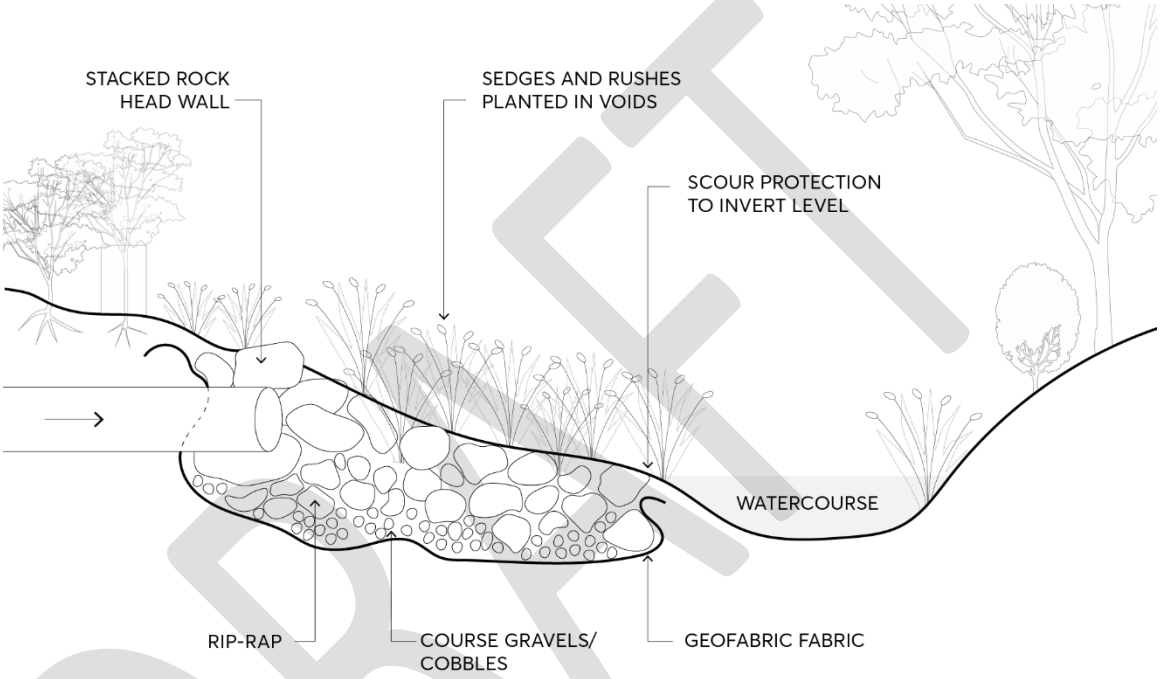

Figure 5.3.2.3 – Stormwater outlets into natural waterways

Source: *Guidelines for outlet structures on waterfront* land (NSW Office of Water)

C.10 Design of new waterways and rehabilitation of existing waterways and creeks must maximise habitat, ecological and landscape values, both in the aquatic and riparian environments, while ensuring hydraulic functions are not diminished.

C.11 Development adjoining creeks and rivers must incorporate protection and conservation of riparian zones, as well as facilitating human access, amenity and public safety as appropriate.

C.12 The overall development must provide for public safety, evacuation and such matters as bank stability and erosion control, riparian vegetation and so on.

C.13 Design must provide for effective flood warning and evacuation pathways suitable for the frail, disabled and other vulnerable people.

Further Information

Natural Channel Design Guidelines, Brisbane City Council, 2000.

Guidelines for Controlled Activities on Waterfront Land: Riparian Corridors, NSW Department of Industry 2018.

5.3.3 DEVELOPMENT ON LAND ADJOINING LAND ZONED C2 ENVIRONMENTAL PROTECTION OR W1 NATURAL WATERWAYS ZONE

Further to the controls contained in Section 5.3.2 designed to manage waterways and riparian zones, this Section of this DCP includes specific controls to manage development on land adjoining land zoned C2 Environmental Protection or W1 Natural Waterways under the *Parramatta LEP 2023*. The objectives of these zones broadly are to protect and manage areas of high ecological and aesthetic value and prevent development that could have an adverse effect on those values.

This Section of this DCP includes controls designed to reduce the impact of development on land adjoining these protected land uses, and to support the continued protection and management of the City's natural environment.

Objectives

O.01 Preserve aquatic biodiversity, protect and enhance water quality, and maintain the stability of a creek and its bank.

Controls

C.01 Development on land abutting land within the C2 Environmental Protection zone and W1 Natural Waterways zone must take into consideration all of the following:

- the need to retain and protect any bushland and/or marine vegetation on or adjoining the land;
- the effect of the proposed development on bushland and/or marine vegetation, including the erosion of soils, the siltation of creeks and waterways and the spread of weeds and exotic plants within the bushland, overshadowing, overland flows and stormwater runoff, and the removal or degradation of existing vegetation;
- the requirement for provision of a buffer zone on the abutting land to protect the bushland and/or riparian corridor;
- the protection of threatened ecological communities, populations, and species listed under the *Biodiversity Conservation Act 2016* and/or *Fisheries Management Act 1994*; and any other matters which are relevant to the protection and preservation of the bushland and/or riparian areas.

Further Information

Environmental Planning and Assessment Act 1979 (Section 1.7)

Environment Protection and Biodiversity Conservation Act 1999 (Cth.)

Biodiversity Conservation Act 2016

Fisheries Management Act 1994

City of Parramatta Environmental Sustainability Strategy 2017

State Environmental Planning Policy (Biodiversity and Conservation) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021

5.3.4 TREE AND VEGETATION PRESERVATION

Trees play an important role in 'greening' the City of Parramatta (the City). Trees provide many benefits to residents and the community by:

- contributing to the amenity and green leafy character of local neighbourhoods;
- helping to keep communities cool by mitigating the impact of urban heat; and
- maintaining natural ecosystems to provide habitats for native fauna.

Preserving the City's well-established tree coverage is important in protecting the amenity, character, and liveability of neighbourhoods. As almost half of the of City's tree coverage is located within private land, tree and vegetation preservation controls are critical in protecting the City's mature trees and green corridors.

This Section of this DCP is made in accordance with Chapter 2 of *the State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) and aims to protect the biodiversity values and amenity of trees and other vegetation within the City. This Section of this DCP describes the trees and vegetation that require a permit or approval for clearing to occur to a tree specified in these controls. The trees and vegetation declared by this Section of this DCP are protected under Part 2.3 of the *Biodiversity and Conservation SEPP* and consent from Council must be obtained before any works can occur to a tree as specified in these controls.

Table 5.3.4.1 – Type of Tree Application required

Location	Extent of Works	Form of Application
Heritage Item	Council is satisfied that the works to a tree are minor (considered pruning in excess of exemptions prescribed in DCP section below).as described by Section 2.10 (3) of the *Biodiversity and Conservation SEPP* and Clause 5.10(3) of the HLEP	Tree Permit
	Major work to any tree (considered removal of tree)	Development Application
Land within a Heritage Conservation Area	Council is satisfied that the works to a tree are minor (considered pruning in excess of exemptions prescribed in DCP section below) as described by Section 2.10 (3) of the *Biodiversity and Conservation SEPP* and Clause 5.10(3) of the HLEP	Tree Permit
	Major work to any tree (considered removal of tree)	Development Application
Other land - tree removal or pruning	Removal or pruning of trees not subject to BOS	Tree Permit
Other land - work within a Tree	Work within the Tree Protection Zone not subject	Tree Permit

Protection Zone of a protected tree and/or a tree located on other land Work includes Construction (driveways, concrete slabs, retaining walls) and earthworks (changes in soil levels, embankments, trenching)	to BOS	
Work that is contrary to a development consent that requires trees to be retained	Work to any prescribed tree	Section 4.55 Application

Objectives

O.01 Maintain and enhance the amenity of the City through the preservation of appropriate trees and vegetation.

O.02 Retain the Ctiy's urban forest cover particularly its street tree and parkland tree population to alleviate urban heat impact.

O.03 Appropriately manage trees and vegetation in order to ensure their health and long-term retention.

O.04 Conserve trees of ecological, heritage, aesthetic and cultural significance.

O.05 Protect and manage individual and stands of trees as an important community asset.

O.06 Establish the procedural framework and requirements governing the pruning, removal and subsequent replacement of trees and vegetation within the City.

O.07 Ensure all new development considers and protects existing trees and vegetation on development sites and provides opportunity for the healthy growth of newly planted trees to reach maturity.

O.08 Protect native fauna habitat.

Controls

Prescribed trees and vegetation

C.01 The prescribed trees and vegetation protected by Chapter 2 of the *Biodiversity and Conservation SEPP* and/or Clause 5.10 of the *Parramatta LEP 2023* and this Section of this DCP include:

- Any tree or palm - whether indigenous, endemic, exotic or introduced species with a height equal to or exceeding five (5) metres;
- Any tree, bushland, or mangrove vegetation located on public land, irrespective of size.
- Any tree that is or forms part of an Aboriginal object, or that is within an Aboriginal place of heritage significance, or that is located on land mapped 'high sensitivity' on the Aboriginal sensitivity map.

- Any tree with a height equal to or exceeding three (3) metres or any tree capable of growing to a height of 3 metres (where the tree with a height less than 3 metres has been intentionally planted):
- that is or forms part of a heritage item, or that is within a heritage conservation area; or
- that is located within a Special Character Area as defined by this DCP.
- Vegetation on land identified as 'Biodiversity' on the *Parramatta LEP 2023* Natural Resources Map.

C.02 To damage, prune, or remove any prescribed trees or vegetation identified in C.01 in this Section of this DCP is prohibited without the written consent of Council (via either a Tree Permit Application or Development Application for tree works subject to location of tree).

- An arboricultural assessment report by a suitably qualified Australian Qualification Framework (AQF) Level 5 Arborist, and other specialist reports and information may be required to be submitted as part of the application assessment process as evidence to support the pruning or removal of the tree(s).
- If works are carried out in accordance with the exemptions prescribed in this Section of this DCP, written consent from Council is not required.

Further information regarding tree management consent process may be found in https://www.cityofparramatta.nsw.gov.au/living/trees.

Offset Program

C.03 Where a tree is approved to be removed, Council will seek the replanting of a suitable canopy replacement tree or trees in a suitable location on the site. Any replacement trees will need to be grown to maturity and replaced if the planting fails to survive and thrive. In circumstances when there is no suitable location on site (for example, in the case of small backyards), a financial contribution will be required to be paid to support public tree planting. Offset fees are contained within Council's published fees and charges.

Notes: Under the *Biodiversity and Conservation SEPP*, clearing of NSW native vegetation above certain thresholds triggers an alternate approval pathway through the Native Vegetation Panel and will require a Biodiversity Development Assessment Report (BDAR) prepared by an accredited assessor using the Biodiversity Assessment Method. The thresholds (i) the clearing of ANY NSW native vegetation in areas that have been mapped on the Biodiversity Value Map by the Department of Planning and Environment (www.lmbc.nsw.gov.au/BVMap), or (ii) clearing an area of NSW native vegetation that exceeds the area threshold trigger (generally more than 2,500m^2) More information on the Policy and the Native Vegetation Panel is available online at https://legislation.nsw.gov.au/view/html/inforce/current/epi-2021- and www.nvp.nsw.gov.au.

Trees on sites listed on the New South Wales State Heritage Register require Heritage Council approval or exemption from this approval prior to any pruning or proposed removal. Exemptions may be granted for pruning up to 30% of the canopy of a tree on a State Heritage Register listed site within a two year period. More information on Heritage Council approvals and exemptions is available online at https://www.heritage.nsw.gov.au/applications/state-heritage-items/Penalties

Penalties, including fines, may be issued to a person found guilty of contravening these controls. In addition to a penalty, the Court may also order the repair, remedial pruning or replacement of a damaged, destroyed, poisoned or severely pruned or removed tree and impose an order to maintain such replacement to maturity.

Exempt tree and vegetation works

C.04 Tree works on a tree on land under the care, control or management of Council are exempt works and do not require a tree permit, provided the works are undertaken by Council or Council authorised agents.

C.05 The following are exempt tree and vegetation works and do not require approval from Council, subject to the criteria at C6:

a) The tree is of a species Populus spp. - (Poplar), Salix spp. - (Willow), Cinnamommum camphora - (Camphor Laurel) and Liquidambar styraciflua - (Sweetgum), where the trunk of such tree is located within 5 metres of any sewer pipe or:

- the outside enclosing wall of a legally constructed building; or
- the outside edge of the coping of a legally constructed in-ground swimming pool.

b) Neighbour's trees - This exemption does not apply to a tree on adjoining land. The tree and the building or other structure referred to above must both be on the same land for the exemption to apply.

c) Tree works on any tree listed in Table 5.3.4.2.

Table 5.3.4.2 – Exempt tree species in City of Parramatta LGA

Botanical Name	**Common Name**
Ailanthus altissima	Tree of Heaven
Celtis sinensis	Hackberry
Cotoneaster spp.	Cotoneaster
Eriobotrya japonica	Loquat
Erythrina spp.	Coral Trees
Gleditsia triacanthos	Honey Locust
Ligustrum lucidum & cus	Large Leafed Privet
Ligustrum sinense	Small Leafed Privet
Nerium oleander	Oleander
Olea europaea var. africana	African Olive
Populus nigra Italica	Lombardy Poplar
Pyracantha spp.	Firethorn
Rhus toxicondendron	Rhus / Sumac Tree
Schefflera actinophylla	Umbrella Tree
Syagrus romanzoffianum	Cocos Island / Queen Palm

Note: The trees listed above are identified by their botanical name (common names are provided as reference only). Cultivated varieties (cvs.) of the trees listed are not included for exemption except where specified.

C.06 The exemptions above listed in C.05(a) do not apply to:

Any work to a tree that is or forms part of a heritage item, heritage conservation area, Aboriginal object or Aboriginal place of heritage significance, or

The exemptions listed at C.05(a) and C.05(b)above do not apply to:

- All lands mapped as 'Biodiversity' on the *Parramatta Local Environmental Plan 2023* Natural Resources Map; or
- Threatened ecological communities or land that provides or has the potential to provide habitat for native fauna or fauna classified as vulnerable or threatened under the *Biodiversity Conservation Act 2016* or the *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth); or
- Work that is contrary to a development consent that requires trees to be retained, or
- A tree and vegetation on public land.

Note. Certain legislation allows trees to be removed under certain circumstances without the need for a Tree Permit. This includes:

- Tree works carried out on a tree by the State Emergency Service or Rural Fire Service in response to an emergency or severe natural event,
- Tree works required under the provisions of the *Electricity Supply Act 1995*.
- Trees that are required to be removed as part of a Section 66 Directive under the *Rural Fires Act 1997* or the provisions provided under the *10/50 Vegetation Clearance Code of Practice for New South Wales*.

Exemptions applying to trees which are considered to be dangerous

C.07 A tree permit application is not required to be submitted to Council for removal of a tree if Council is satisfied a tree is considered to be:

- Dead or dying, and is not required as the habitat of native animals and/or not located on land mapped as 'Biodiversity' under *Parramatta Local Environmental Plan 2023*; or
- Posing an imminent risk to human life or property as per Clause 2.7 Clearing that does not require permit or approval of the *Biodiversity and Vegetation SEPP*.

C.08 Before any tree works are undertaken, Council will issue a letter to the owner of the tree confirming that the tree is exempt from the requirement for a tree permit and tree works may be undertaken. Council may require a replacement tree to be planted to ensure that in time this tree is replaced.

C.09 Trees removed under this clause are required to be supervised by an Australian Qualification Framework (AQF) Level 3 Arborist in accordance with *Safe Work NSW Code of Practice 'Amenity Tree Industry' – 1998* to manage the risk of tree removal and pruning work.

In determining if the tree is posing an imminent risk to human life or property, a tree risk assessment will be undertaken that will consider:

- likelihood of failure

- likelihood of impacting a target
- consequences of impact

Exempt Pruning Works

C.10 The following pruning works do not require approval from Council if carried out in accordance with Australian Standard AS4373 – 2007, 'Pruning of Amenity trees' and SafeWork NSW Code of Practice 'Amenity Tree Industry' – 1998:

C.11 The removal of dead branches from a tree, or

- Selective pruning for building clearance, being only minor pruning to remove branches no larger than 50mm diameter at the nearest branch collar where branch encroachment is within 2m of such, and where the owner of the land where the tree originates, provides written consent, or
- Pruning of trees to remove branches no larger than 50mm diameter at the nearest branch collar to maintain distance clearances to powerlines as set out under *the Electricity Supply Act 1995*, or
- Crown modification pruning of a hedge by no more than 20% of its height and or width in any one year, or
- Crown maintenance pruning of trees in accordance with the *Roads Act 1993* and in accordance with *AS4373 2007*, or
- Selective pruning of branches or foliage emanating over public land from privately owned trees where access is required to be restored or created by Council or the State Emergency Services, or
- Selective pruning to remove any species of parasitic mistletoe or parasitic plant from any part of a tree.

C.12 The following issues do not usually warrant removal / pruning of trees:

- A tree is shedding leaves, fruit, bark, cones, twigs or minor dead wood.
- A tree is causing minor damage, such as footpaths or driveways.
- There are fears about healthy trees failing.
- A tree is causing shading to structures such as to solar panels and washing lines.
- A tree is causing blockage to pipes, unless the damage is serious and recurring. Root pruning, replacement of old dilapidated pipes, concrete encasing or use of root barriers may solve the problem (evidence would need to be provided with a tree permit application if the problem is serious).
- A tree is blocking or partially blocking amenity views.
- A tree that is dead or dying that provides habitat to native animals and is not posing a risk to human life or property.
- There are concerns about bush fire hazard, where the land is not within bush fire prone land, as defined by Council's Bush Fire Prone Land Map (removal of trees or other vegetation for bush fire hazard reduction is governed by the *Rural Fires Act 1997*).

Publicly Owned Land

C.13 The following provisions apply to trees located on publicly owned land, including council parks, reserves and road reserves:

- Council, or its duly authorised servants or agents, may carry out the pruning or removal of a tree/s including bushland vegetation from Council owned or controlled land.
- All tree works conducted by Council will comply with relevant Australian Standards and specifications as determined by the Council policies. The cost of all non-essential tree works for trees located on public land will be the responsibility of the applicant. Council or an authorised agent will carry out any such approved works.
- Where a Council Public Works project requires tree/s to be pruned or removed, consent must be sought at the planning stage in consultation with Council's Parks and Open Space Group. Any removals will be subject to offset planting to ensure canopy replacement.

C.14 Public consultation on the removal of public trees will be undertaken in accordance with City of Parramatta Council's Community Engagement Strategy.

Note. Tree permit applications will not be accepted for trees on publicly owned land.

Definitions

In this Part:

Aboriginal Object means any deposit, object or other material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of an area of New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction and includes Aboriginal remains.

Aboriginal Place of Heritage Significance means an area of land, the general location of which is identified in an Aboriginal heritage study adopted by the Council after public exhibition, that is:

- The site of one or more Aboriginal objects or a place that has the physical remains of pre-European occupation by, or is of contemporary significance to, the Aboriginal people. It may (but need not) include items and remnants of the occupation of the lands by Aboriginal people, such as burial places, engraving sites, rock art, midden deposits, scarred and sacred trees and sharpening grooves; or
- A natural Aboriginal sacred site or other sacred feature. It includes natural features such as creeks or mountains of long-standing cultural significance, as well as initiation ceremonial or story places or areas of more contemporary cultural significance.

Note: The term may include (but is not limited to) places that are declared under section 84 of the *National Parks and Wildlife Act 1974* to be Aboriginal places for the purposes of that Act.

The Aboriginal Heritage Information Management System includes all registered sites of significance. For more information, visit https://alc.org.au/ahims/

Bushland has the same meaning as that defined in *State Environmental Planning Policy (Biodiversity and Conservation) 2021.*

Contributory Item means a tree that makes a contribution to a heritage item or conservation area including streetscape and parkland trees. This contribution may be visual, aesthetic functional (e.g. wind protection, provision of scale, shelter, etc.).

Dangerous Tree means a tree that will inflict imminent liability or harm to a person's life or property.

Dead Tree means a tree that is no longer capable of performing any of the following processes:

- Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
- Osmosis (the ability of the roots system to take up water);
- Turgidity (the ability of the plant to hold moisture in its cells);
- Epicormic shoots (the production of new shoots as a response to stress, generated from buds under the bark or from a lignotuber – an underground stem);
- Or is exhibiting any of the following symptoms:
- Permanent leaf loss in both deciduous and evergreen plants;
- Permanent wilting (the loss of turgidity which is marked by drying out of stems, leaves and roots);
- Shedding of the epidermis (bark dries out and peels off to the beginning of the sapwood – new wood).

Damage means to weaken the health or normal function of a tree through means such as administering of a chemical or artificial substance to a tree or part of a tree or, the alteration of the natural ground, level or soil hydrology which causes long-term damage to the tree (foliage, branches, trunk or roots). This includes any physical wounds especially by machinery on construction sites

Destroy means any immediate or ongoing process or activity leading to the death of a tree.

Dying Tree means a tree that has entered senescence and is unable to be restored to a former healthy condition.

Exempt means not subject to protection by Councils DCP controls.

Hedge means a dense line or row of trees planted as a screen, fence line or boundary indicator.

Height means the distance measured vertically between the horizontal plane of the lowest point of the base of the tree which is immediately above ground and the horizontal plane of the uppermost point of the tree.

Heritage Conservation Area means an area of land of heritage significance shown on a heritage map and described in a heritage schedule in a Local Environmental Plan, and includes any heritage items situated on or within that area.

Heritage Item means a building, work, place, relic, tree, object or archaeological site the location and nature of which is identified in a Heritage Study, described in a heritage schedule in a Local Environmental Plan, or the NSW State Heritage Register.

Imminent means a tree which is about to fall over, a tree which is heaving (moving at the base/ground level) or a large part of a tree which is broken and/or hanging about to fall and injure persons or property.

Legally constructed means built in compliance with environmental and planning legislation and instruments in force within the City of Parramatta Council at the time of construction.

Marine vegetation means mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water (other than fresh water).

Native vegetation has the same meaning as in *State Environmental Planning Policy (Biodiversity and Conservation) 2021*

Owner has the meaning ascribed to it in the *Local Government Act, 1993,*.

Pruning means the removal of any stem/s back to the intersection of another stem/s to a swollen area of the intersection called the branch collar. This also means any act or acts of severing any part of a tree so as to cause reduction of the air space occupied by the branches and foliage of a tree. All pruning is to conform to Australian Standard AS 4373 – 2007 "Pruning of amenity trees".

Removal and **Cutting Down** means the cutting down or dismantling of a tree so that the tree, including its branches, foliage, trunk, stump and root system will not regrow. This includes the poisoning of the stump and/or roots and/or removal or grinding out of its remains to prevent regrowth.

Transplant or **Transplanting** is the removal of a tree that is excavated from its place of origin from within the ground and is relocated within the ground of the same property or re- establishment within the ground or a container within another property.

Tree is a long-lived woody perennial plant with one or relatively few main stems with the potential to grow to a height greater than 3 metres (Australian Standard AS 4373-2007 "Pruning of amenity trees").

Tree Works means:

- any pruning of the crown of a tree;
- any removal of a tree
- any pruning or removal of roots (greater than 30mm in diameter); and/or
- any alteration (excavation, compaction or fill) to the natural ground and soil level within the Tree Protection Zone of a tree on the land or on adjoining land.

Tree Protection Zone or **TPZ** is a zone around a protected tree on, or adjacent to, a development site. The TPZ is a combination of the root area and canopy requiring protection from construction disturbance so that the tree remains healthy and viable.

Urban Forest is defined as the totality of trees and shrubs on all land around urban areas and is measured as a canopy cover percentage of the total urban area.

5.4 ENVIRONMENTAL PERFORMANCE

New development and growth increases energy and water demand, places increased stress on resources, and contributes to higher local temperatures and the urban heat island.

Reducing emissions and managing energy, water and waste efficiency to create better buildings and precincts is a key priority of the *City of Parramatta Environmental Strategy 2017* and our *Local Strategic Planning Statement 2036*. Central to achieving this is ensuring that new development delivers environmentally sustainable buildings that reduce energy, water and resource use, greenhouse gas emissions and urban heat.

This Section of this DCP provides controls on the best approach to energy and water efficiency, all electric buildings, urban cooling, solar reflectivity, natural refrigerants, bird friendly design, wind mitigation and waste management to promote the highest quality of environmental performance for the City of Parramatta.

5.4.1 ENERGY EFFICIENCY

Minimising the use of energy in new developments can be achieved through strategic use of buildings to maximise the use of the environmental provisions around them. Through the use of new technologies, this can be enhanced further.

This Section provides controls based on best in market energy performance benchmarks using the National Australian Built Environment Rating System (NABERS) database.

Objectives

O.12 Promote sustainable development which uses energy efficiently and minimises non-renewable energy usage in the construction and use of buildings.

O.13 Ensure that development contributes positively to an overall reduction in energy consumption and greenhouse gas emissions.

O.14 Reduce reliance on the main energy grid and the whole of life cost of energy services.

Controls

C.01 Where applicable, development is to demonstrate compliance with the design principles embodied in the Building Sustainability Index (BASIX). All commitments listed on a BASIX certificate must be marked on all relevant plans, specifications, and submitted with a Development Application.

C.02 All development not subject to BASIX will need to, as a minimum, comply with the *Building Code of Australia* energy efficiency provisions (Section J). A Section J report should be provided along with an annotated plan demonstrating compliance for fabric and services requirements.

Energy-efficiency performance targets for large-scale non-residential development

C.03 In addition to the above requirements, any proposed development for the purposes in Column 1 of the control table below, must achieve the minimum energy target in Column 2 of the control table below.

Table 5.4.1.1 – Energy Efficiency Targets

Column 1 (Proposed Development)	Column 2 (Energy Target)
New shopping centre/retail development with a gross lettable area retail (GLAR) of 15,000m^2 or more.	4.5 star NABERS Energy Rating (Shopping Centre rating*).
New development containing office premises with a net lettable area (NLA) of 1,000m^2 or more Significant alterations and additions to existing office premises with an estimate cost of works of $5 million or	5.5 star NABERS Energy Rating (base building*).

more, which increases total floor space by no less than 20%.	
Hotel or motel accommodation or serviced apartments	4.5 star NABERS Energy Rating (whole building*).
New industrial development with a GFA of 20,000m² or more.	5 star Green Star rating or equivalent

*Denotes the Federal Government's *National Australian Built Environment Rating System* (NABERS) terminology regarding ratings scope. Applicants should refer to NABERS for further information.

C.04 Energy target achievement must be verified through the provision of a signed National Australian Built Environment Rating System (NABERS) Commitment Agreement.

C.05 Evidence of a Green Star certification assessment may be accepted for industrial development taken to achieve the minimum required star rating.

C.06 Targets for mixed-use development will be determined based on the mix and proportion of land uses.

C.07 Adequate space for plant and infrastructure are to be made in the design of the building and its services and detailed in the Development Applications.

C.08 Documentation from a suitably qualified consultant is to be submitted with Development Applications for the development specified above, demonstrating the measures that will be used to achieve the relevant energy efficiency scheme rating. Evidence of a formal commitment agreement or registration with the relevant scheme administrator will be required to be submitted prior to the issuing of a construction certificate.

C.09 Smart technologies are to be integrated into developments to monitor building environment and operations (e.g. lighting, heat, ventilation, and air conditioning).

Requirements for photovoltaic solar panels

C.10 Non-residential development with a GFA of 5,000m² or more (including alterations and additions of 5,000m² or more), or with a roof area of 1,000m² or more, requires the installation of a solar PV system covering a minimum of 50% of the roof space that is not used for plant, green roof planting or to meet minimum open space requirements.

C.11 Where possible, solar PV should not be installed in areas of a roof that receive less than 3 hours of direct sunlight on 21 June.

Further Information

BASIX website: www.basix.nsw.gov.au

BASIX Design Guidelines, including *Thermal Insulation and Active Heating and Cooling Systems*

Green Building Council of Australia website https://new.gbca.org.au/

5.4.2 WATER EFFICIENCY

Due to Australia's harsh climate, minimising water use is a primary concern in development and property function. Through the use of new technologies, this can be enhanced further to ensure the best practice approach to water efficiency in the City of Parramatta.

This Section provides controls based on best in market water performance benchmarks using the National Australian Built Environment Rating System (NABERS) Water Rating database.

Objectives

O.00 Reduce consumption of drinking water.

O.01 Harvest rainwater and urban stormwater runoff for use.

O.02 Reduce wastewater discharge.

O.03 Increase resilience and water security by providing an alternative water supply to buildings.

O.04 Reduce the technical and financial barriers to upgrading buildings to connect to future non-drinking water supply infrastructure.

Controls

C.01 Where applicable, development is to demonstrate compliance with the design principles embodied in the Building Sustainability Index (BASIX). All commitments listed on a BASIX certificate must be marked on all relevant plans and specifications and submitted with a Development Application.

C.02 Include sub metering, smart technologies and fittings to minimise water consumption.

C.03 All development not subject to BASIX, including alterations and additions, is to incorporate the following water saving measures:

- Plumbing fixtures are to meet minimum Water Efficiency Labelling and Standards (WELS) Scheme Standards including 4 star rated showerheads, 4 star rated toilet cisterns, 5 star rated urinals and 6 star rated water tap outlets.
- Appliances (dishwashers, clothes washers etc) are to be 5 stars (WELS Scheme) or better rated with respect to water use efficiency.
- Water use within open spaces to be minimised by improved soils, passive irrigation and integration of vegetated stormwater treatment system into open spaces.

C.04 All development not subject to BASIX, including alternations and additions, is to provide rainwater capture and reuse. The rainwater tank is to be suitably sized to maximise the rainwater for reuse and minimise rainwater discharged into stormwater infrastructure. Refer to Section 5.1 – Water Management of this DCP for requirements.

C.05 Cooling towers are to be designed in accordance with best practice guidelines to reduce water consumption.

Water-efficiency performance targets for large-scale non-residential development

C.06 In addition to the above requirements, any proposed development for the purposes in Column 1 of the control table below, must achieve the minimum water target in Column 2 of the control table below.

Table 5.4.2.1 – Water Efficiency Targets

Column 1 (Proposed Development)	Column 2 (Water Target)
New shopping centre/retail development with a gross lettable area retail (GLAR) of 15,000m² or more.	3.5 star NABERS Water Rating (whole building*).
New development containing office premises with a net lettable area (NLA) of 1,000m² or more Significant alterations and additions to existing office premises with an estimate cost of works of $5 million or more, which increases total floor space by no less than 20%.	4.5 star NABERS Water Rating (whole building*).
Hotel or motel accommodation or serviced apartments	4.5 star NABERS Water Rating (whole building*).
New industrial development with a GFA of 20,000m² or more.	5 star Green Star rating or equivalent

*Denotes the Federal Government's *National Australian Built Environment Rating System* (NABERS) terminology regarding ratings scope. Applicants should refer to NABERS for further information.

C.07 Energy target achievement must be verified through the provision of a signed National Australian Built Environment Rating System (NABERS) Commitment Agreement.

C.08 Evidence of a Green Star certification assessment may be accepted for industrial development taken to achieve the minimum required star rating.

C.09 Targets for mixed-use development will be determined based on the mix and proportion of land uses.

C.10 Adequate space for plant and infrastructure are to be made in the design of the building and its services, and detailed in the Development Applications.

C.11 Documentation from a suitably qualified consultant is to be submitted with applications for development specified above, demonstrating the measures that will be used to achieve the relevant water efficiency scheme rating. Evidence of a formal commitment agreement or registration with the relevant scheme administrator will be required to be submitted prior to the issuing of a construction certificate.

Requirements for dual piping

C.12 All development to which C.06 applies, plus large-scale residential development of more than 50 dwellings, must install a dual water reticulation system to support the immediate or future connection to a recycled water network. If a recycled water network is not currently available, the design of the dual reticulation system is to be such that a future change-over to an alternative water supply can be achieved without significant civil or building work, disruption or cost. To facilitate this, the dual reticulation system is to have:

- One reticulation system servicing drinking water uses, connected to the drinking supply;
- One reticulation system servicing non-drinking water uses, such as toilet flushing, irrigation and washing machines. The non-drinking water system is to be connected to the rainwater tank with drinking water supply backup, until an alternative water supply connection is available. The non-drinking system is to be provided with a connection point adjacent the street boundary for easy connection to a future district non-drinking water supply; and
- Metering of water services is to be in accordance with the Sydney Water *Multi- level individual metering guide Version 9*, June 2020. Individual metering of the non-drinking water service is optional.

Further Information

BASIX Design Guideline: A-Rated Water Fittings and Appliances, BASIX website.

WELS Scheme: www.waterrating.gov.au

Best practice guidelines for water conservation in commercial office buildings and shopping centres - Part 2 Technical water saving information, Sydney Water, 2007.

5.4.3 ALL-ELECTRIC BUILDINGS

Buildings built today will be around for the next 30-100 years. Moving away from buildings that use on-site combustion of fossil fuels to power appliances is a key strategy for buildings to reduce emissions from the increasingly renewable grid supplied electricity, and transition to a low carbon future. All electric buildings also reduce construction and operating costs through the elimination of gas pipes and metering and ongoing connection and usage charges, as well as providing enduring health benefits to occupants.

This Section of this DCP provides controls based on 'Net Zero Plan' set by the State Government to reach net zero emissions by 2050 for NSW.

Objectives

O.01 Reduce the combustion of fossil fuels through electric only connected new buildings, that benefit from the progressive greening of grid supplied electricity in NSW.

O.02 Reduce indoor air pollutants associated with the onsite combustion of gas to improve air quality for occupants.

O.03 Operational cost savings to occupants through the avoidance of gas connection and ongoing connection charges.

O.04 Reduction in need for utility cabinets in the street and on street walls.

Development Controls

C.01 All non-residential development that is State Significant development specified in *State Environmental Planning Policy (Planning Systems) 2021, Schedule 1, Section 13-15* and all new commercial development are to use only electricity (grid provided and on-site renewables) for all energy requirements associated with normal operations.

C.02 Where it is demonstrated that the intended use of the building requires a process or equipment that is not able to be served by electricity, fossil fuels may be provided to service that service only. Evidence shall be provided with the application of market testing and equipment supplier advice to confirm that an electricity powered alternative is not technically possible.

5.4.4 URBAN COOLING

Urban heat (or the Urban Heat Island effect) refers to the higher temperatures experienced in urban areas compared to rural or natural areas. Urban heat impacts our communities, businesses and natural environment in many ways, including increasing demand for electricity and water, a less comfortable public domain for pedestrians and associated health impacts. On average, the City experiences more frequent hotter days than Sydney average (Australian Bureau of Meteorology).

As more development occurs across the City, the build-up of heat in the environment occurs through trapping of radiation in street canyons, increased hard surfaces, reduced vegetation, and heat rejection from buildings surfaces and air conditioning units. The build-up of heat is compounded as more dense urban environments reduce the amount of heat able to be removed by wind and re-radiation to the night sky, extending the period of discomfort.

This Section provides controls which will aid in cooling and removing heat from the urban environment in the City. These are innovative controls based on Australian and international evidence on cites and the urban heat island effect. The controls address the reflectivity of building roofs, podiums and facades, reducing the impacts of heat rejection sources of heating and cooling systems and green roofs or walls.

The following technical terms are used as part of controls in this Section of this DCP:

Solar heat reflectance is the measure of a material's ability to reflect solar radiation. A 0% solar heat reflectance means no solar heat radiation is reflected and 100% solar heat reflectance means that all of the incident solar heat radiation is reflected. In general, lighter coloured surfaces and reflective surfaces such as metals will have typically higher solar heat reflectance, with dark coloured surfaces or dull surfaces will typically have lower solar heat reflectance. External solar heat reflectance measured at the surface normal (90 degrees) is used in these controls.

Solar transmittance is the percentage of solar radiation which is able to pass through a material. Opaque surfaces such as concrete will have 0% solar transmittance, dark or reflective glass may have less than 10%, whilst transparent surfaces such as clear glass may allow 80 to 90% solar transmittance.

Solar Reflectance Index (SRI) is a composite measure of a materials ability to reflect solar radiation (solar reflectance) and emit heat which has been absorbed by the material. For example, standard black paint has a SRI value of 5 and a standard white paint has a SRI value of 100.

Reflective Surface Ratio (RSR) is the ratio of reflective to non-reflective external surface on any given façade.

Reflective surfaces are those surfaces that directly reflect light and heat and for the purposes of this DCP are defined as those surfaces that have specular normal reflection of greater than 5% and includes, but is not limited to, glazing, glass faced spandrel panel, some metal finishes and high gloss finishes. Note: for calculation in Table 5.4.4.1 and Table 5.4.4.2, RSR is to be expressed as a percentage between 1 and 100.

Non-reflective surfaces are those surfaces that diffusely reflect light and heat and for the purposes of this DCP are defined as those surfaces that have specular normal reflection of less than 5%.

Maximum External Solar Reflectance is the maximum allowable percentage of solar reflectance for the external face of a Reflective Surface. The percentage of solar reflectance is to be measure at a normal angle of incidence

Objectives

O.01 Reduce the contribution of development to urban heat in the City; and

O.02 Improve user comfort in the local urban environment (communal/private open space and the public domain).

Controls

C.01 Urban cooling objectives and controls contained within this Section apply to all new residential flat buildings and shop top housing 3 or more storeys; and non-residential development as defined below;

- New hotels and serviced apartments
- New development containing office premises with a net lettable area (NLA) of 1,000m² or more
- Significant alterations and additions to existing office premises with an estimate cost of works of $5 million or more, which increases total floor space by no less than 20%.
- New shopping centre/retail development with a GLAR of 15,000m² or more.
- New industrial development with a GFA of 20,000m² or more.

5.4.4.1 ROOF SURFACE

Objectives

O.03 Reflect and dissipate heat from roofs and podium top areas.

O.04 Improve user comfort of roof and podium top areas.

Controls

C.02 Where surfaces on roof tops or podiums are used for communal open space or other active purposes, the development must demonstrate at least 50% of the accessible roof area complies with one or a combination of the following:

a) Be shaded by a shade structure;

b) Be covered by vegetation consistent with the controls under Section 5.4.4.5 Green Roofs or Walls of this DCP;

c) Provide shading through canopy tree planting, to be measured on extent of canopy cover 2 years after planting.

C.03 Where surfaces on roof tops or podiums are not used for the purposes of private or public open space, for solar panels or for heat rejection plant, the development must demonstrate the following:

a) Materials used have a minimum solar reflectivity index (SRI) of 82 if a horizontal surface or a minimum SRI of 39 for sloped surface greater than 15 degrees; or

b) 75% of the total roof or podium surface be covered by vegetation; or

c) A combination of (a) and (b) for the total roof surface.

5.4.4.2 OPEN SPACE

Controls

C.04 At least 75% of the open site area must comprise of one or a combination of the following when assessed in plan view:

a) Vegetation,

b) Hardscaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels and photovoltaic panels;

c) Water bodies and/or water courses; or

d) Areas directly to the south of vertical building elements, including green walls and areas shaded by these elements at the summer solstice.

5.4.4.3 FACADES

Objectives

O.05 Minimise the reflection of solar heat downward from the building façade into communal/private open space or the public domain.

Controls

C.05 The facades must demonstrate a minimum percentage of shading calculated on 21 December and evidenced with the provision of shadow diagrams with the Development Application. The time and extent of shading required for each façade orientation is detailed in the Technical Requirements UHI façade shading as included in this DCP.

C.06 Shading may be provided by:

- External feature shading with non-reflective surfaces;
- Intrinsic features of the building form such as reveals and returns; and
- Shading from vegetation such as green walls that is consistent with the controls in Section 5.4.4.5 Green Roofs or Walls of this DCP.

C.07 Where multiple reflective surfaces or concave geometry of reflective surface introduce the risk of focusing of solar reflections into the public spaces:

- Solar heat reflections from any part of a building must not exceed 1,000W/m^2 in the public domain at any time;
- A reflectivity modelling report may be required to qualify extent of reflected solar heat radiation. The modelling is required to consider all aspects that influence the amount of solar heat reflected at any point in time, including three-dimensional geometry, façade articulation specularity and angular dependent reflectivity of surfaces.

TECHNICAL REQUIREMENTS - UHI FAÇADE SHADING

The following technical requirements provides the details for demonstrating the minimum required shading under C.05 above. The detailed technical requirements are provided to allow non-prescriptive design solutions to meet the minimum shading requirements for façade orientation and extent of Reflective surfaces and provide a simple means of confirming adequacy at the time of application.

Background

Unshaded facades reflect solar heat into streets and open space where is can be absorbed and contribute to the energy imbalance that causes the urban heat island effect. Modern glass often achieves energy efficiency by maximizing the amount of non-visible heat that is reflected from the glass, which reduces energy into the building but magnifies the amount of heat that is reflected into streets and open space. All glass and similar reflective materials also increase reflectivity of light and heat and low angles of incidence. It is these low angles of incidence where solar shading is most effective. The diagram below shows the amount of solar heat that 50% of solar heat would typically be reflected from best case untreated clear glass at a 10° angle of incidence without shading. Solar shading (right) performs well to reduce the amount of solar radiation that will be reflected into the streets and open space as it blocks both the sun from hitting the façade and solar reflections from the façade.

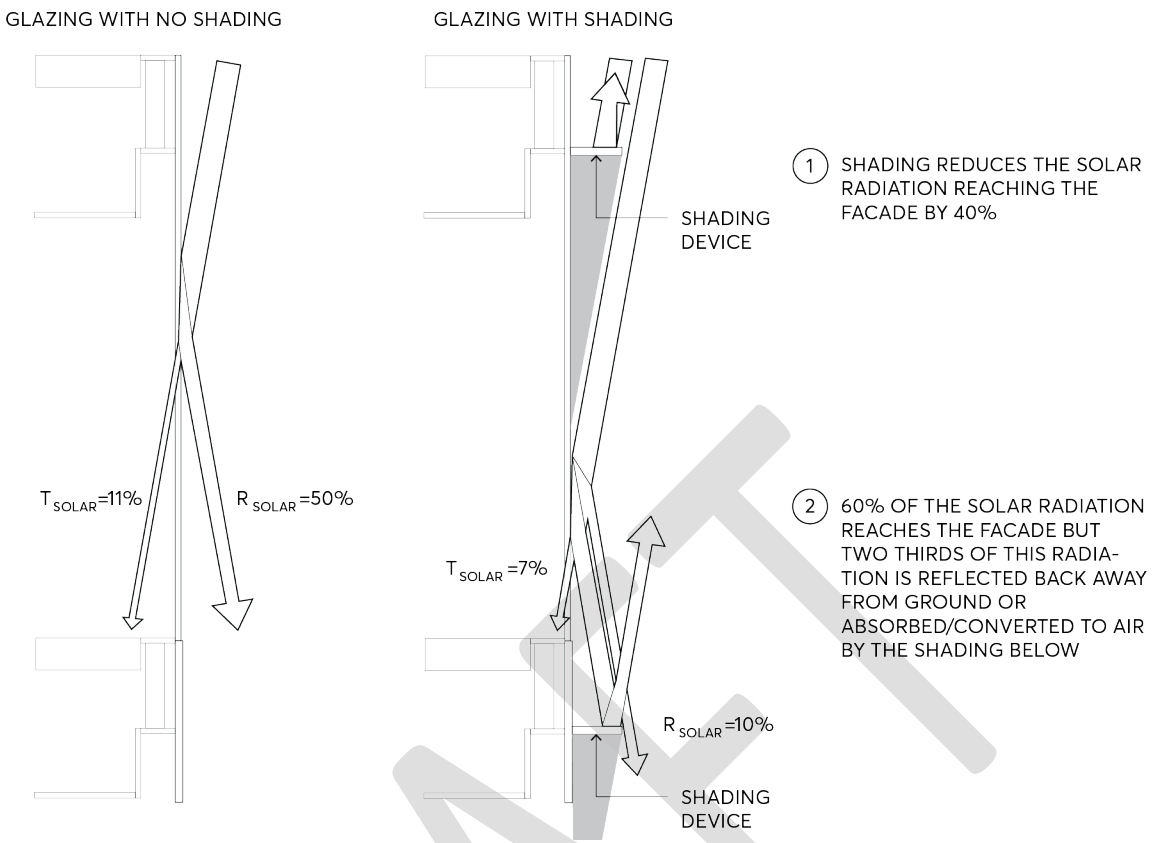

Figure 5.4.4.1 – Benefit of shading to reduce solar reflectance

FACADES REQUIRING SHADING

Facades with reflective surfaces must demonstrate a minimum percentage shading as determined in Table 5. and Table 5.4.4.2 for the 21 December, at the reference times included in Table 5..

Shading is not required on facades:

- Where the Reflective Surface Ratio (RSR) is less than 30%.
- That are orientated south of south-southeast and south-southwest.

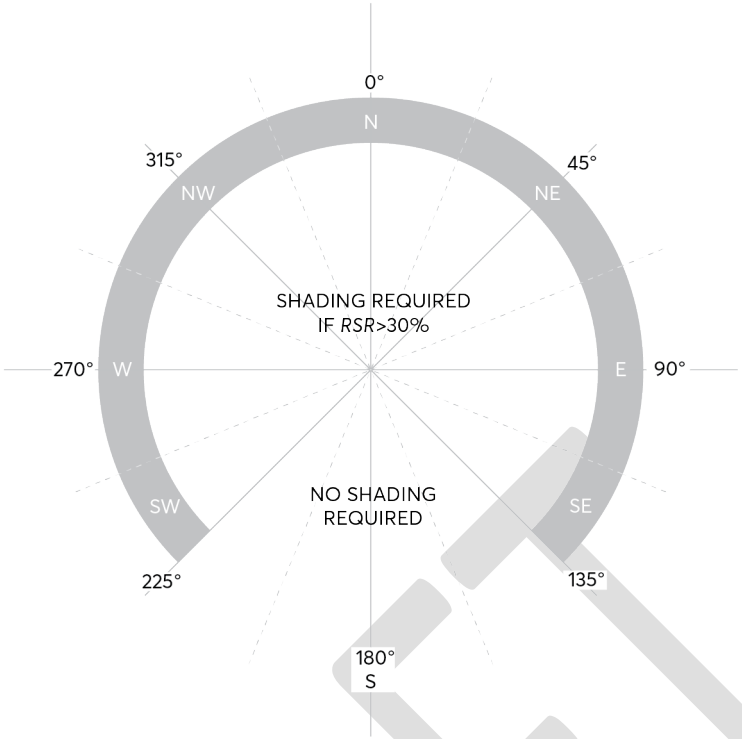

Figure 5.4.4.2 – Orientation and shading required

Figure 5.4.4.2 confirms the shading requirements for each facade orientation. Elements which can be counted to shading the facade may be:

- External feature shading with non-reflective surfaces
- Intrinsic features of the building form such as reveals and returns
- Shading from vegetation such as green walls that are consistent with the controls on green roofs and walls.

The following elements cannot be counted as shading to the shading requirements:

- Existing buildings.
- Existing structures.

PERCENTAGE OF SHADING REQUIRED

The percentage shading required to the *Reflective surfaces* to be shown in the shadow diagram is determined by the *Reflective Surface Ratio (RSR)* of each façade and the calculation tables below.

Reflective surfaces on street walls (or if no street wall, as measured from the first 21 meters from the ground plane) are to be provided with the minimum percentage shading in Table 5.4.4.1.

Table 5.4.4.1 – Calculation of minimum percentage shading for Reflective surfaces on street walls

Reflective Surface Ratio (RSR)	<30%	30%-70%	>=70%
Minimum percentage shading (%)	0	(1.5*RSR)-45	75

Reflective surfaces on tower façades (above the street wall or if no street wall, as measured above the first 21 metres from the ground plane) are to be provided with the minimum percentage shading in Table 5.4.4.2.

Table 5.4.4.2 – Calculation of minimum percentage shading for Reflective surfaces on tower facades

Reflective Surface Ratio (RSR)	<30%	30%-70%	>=70%
Minimum percentage shading (%)	0	(0.8*RSR)-24	40

SHADOW DIAGRAM REQUIREMENTS

Shadow diagrams must be submitted with the Development Application showing the extent of shading of *Reflective surfaces* at the nominated time for each relevant façade. The shadow diagrams are to include a calculation of the percentage of shading provided and the *RSR* for each façade. Table 5.4.4.3 provides the nominated sun angles and shadow diagram reference times for each façade orientation where shadow diagrams are required.

Table 5.4.4.3 – Shading sun angles

Orientation of façade	Time	Sun Angles
East ± 22.5°	10am AEDT	Sun elevation: 51° Sun Azimuth: 86°
Northeast/Southeast ± 22.5°	11:30am EDT	Sun elevation: 69° Sun Azimuth: 66°
North ± 22.5°	1pm AEDT	Sun elevation: 80° Sun Azimuth: 352°
Northwest/Southwest ± 22.5°	2:30pm AEDT	Sun elevation: 67° Sun Azimuth: 290°
West ± 22.5°	4pm AEDT	Sun elevation: 48° Sun Azimuth: 272°

Where it is demonstrated that shading cannot be achieved in accordance with the shading controls, a *Maximum External Solar Reflectance* as defined in Table 5.4.4.4 is generally acceptable.

Table 5.4.4.4 – Calculation of Maximum External Solar Reflectance

Reflective Surface Ratio (RSR)	<30%	30%-70%	>=70%
Maximum External Solar Reflectance (%)	No Max.	62.5-0.75*RSR	10

5.4.4.4 HEATING COOLING SYSTEMS – HEAT REJECTION

Objectives

O.06 Reduce the impact of heat rejection from heating, ventilation and cooling systems from contributing to the urban heat island effect in the City.

O.07 Avoid or minimise the impact of heat rejection from heating, ventilation and cooling systems on user comfort in private/communal open spaces and the public domain.

Controls

C.08 Residential apartments within a mixed-use development or residential flat building, and non-residential development must incorporate efficient heating, ventilation and cooling systems (HVAC) which reject heat from a centralised source.

C.09 The location of centralised heat rejection for buildings should be the roof.

C.10 For residential apartments within a mixed-use development or residential flat building with more than 8 residential storeys, and where it can be demonstrated that a rooftop location is not practical, the centralised heat rejection can be located in dedicated on-floor plant rooms that are sufficiently sized to provide efficient heat rejection and suitably screened to reduce visual and noise impacts.

C.11 Where the heat rejection source is located on the upper most roof, these must be designed in conjunction with controls in this Section of this DCP relating to Roof Surfaces and the controls under Section 5.4.4.5 Green Roofs or Walls of this DCP.

C.12 Heat rejection units must not be located on a street wall frontage.

5.4.4.5 GREEN ROOFS OR WALLS

Objectives

O.08 Ensure that green roofs or walls are integrated into the design of new development.

O.09 Encourage well designed landscaping that caters for the needs of residents and workers of a building.

O.10 Design green walls or roofs to maximise their cooling effects.

O.11 Ensure green walls and roofs are designed, located and maintained to respond to local climatic conditions and ensure sustained plant growth.

Controls

C.13 Green roof and wall structures are to be assessed as a part of the structural certification for the building. Structures designed to accommodate green walls should be integrated into the building façade.

C.14 Waterproofing for green roofs and walls is to be assessed as a part of the waterproofing certification for the building.

C.15 Where vegetation or trees are proposed on the roof or vertical surfaces of any building, a Landscape Plan must be submitted which demonstrates:

a) Adequate irrigation and drainage is provided to ensure sustained plant growth and health and safe use of the space;

b) Appropriate plant selection to suit site conditions, including wind impacts and solar access; and

c) Adherence to the objectives, design guidelines and standards contained in the NSW Department of Planning and Environment's Apartment Design Guide for 'Planting on Structures'.

C.16 Green roofs or walls, where achievable, should use rainwater, stormwater or recycled water for irrigation.

C.17 Container gardens, where plants are maintained in pots, may be an acceptable alternative, however, should demonstrate that the containers are of significant scale to support high quality vegetation growth for cooling and amenity.

C.18 Register an instrument of positive covenant to cover proper maintenance and performance of the green roof and walls on terms reasonably acceptable to the Council prior to granting of the Occupancy Certificate.

5.4.5 SOLAR LIGHT REFLECTIVITY (GLARE)

Improper measure to reduce solar light reflectivity can result in increased indoor temperatures for buildings, as well as causing a hazard for surroundings where reflected light produces glare. This glare can be produced from building roofs, podiums and facades, including windows.

This Section of this DCP provides objectives and controls to limit solar reflected light from windows and buildings to reduce the risk to pedestrians and people operating vehicles.

Objectives

O.00 Ensure that buildings in the City appropriately limit solar light reflected from buildings to the public domain, communal/private open spaces, occupants of buildings, road users, and transportation operators.

O.01 Ensure reflected light minimises discomfort glare.

O.02 Ensure reflected light does not result in disability glare.

Controls

C.01 New buildings or significant alterations to existing facades must not result in solar light reflectivity that:

- results in disability glare that is hazardous for road users and drivers of public transport.
- causes discomfort for pedestrians, occupants of other buildings or users of private/communal open spaces and public spaces.

C.02 Subject to the extent and nature of glazing and reflective materials used, a Reflectivity Report (as outlined in C.03 below) that analyses potential solar light reflectivity and resulting glare from the proposed development on pedestrians, motorists, or surrounding areas may be required.

C.03 Notwithstanding C.02, new buildings, or significant alterations to existing facades, greater that 40 metres in height require a Reflectivity Report that includes the quantification of solar light reflected from the building on the surrounding environment. Reflectivity reports are to include:

- Sufficiently detailed calculations to quantify likely sources of disability and discomfort glare.
- Where reflective surfaces are sloped or irregular/undulating, a 3D model should be used to model solar reflections.
- All calculations are to be based on a published method.
- Observer points tested should be sufficient to address all potential risks of disability glare and solar light reflections that might cause discomfort.
- All calculations are to consider the angular dependant solar light reflectivity of the proposed finishes.

- All calculations are to consider the full range of sun angles that may result in solar light reflections at receiver points and not include obstruction by vegetation outside the subject development or potential mitigation strategies of observers (sun visors, caps, etc).
- Where solar light reflections from the development exceed thresholds of disability glare and discomfort for any point of observation detailed analysis must be undertaken to determine the range or sun angles or times of day and year that thresholds are exceeded.

C.04 Generally, specular solar light reflectivity from building materials used on facades must not exceed 20% at the angle of incidence. This requirement does not ensure compliance with the requirements of C.01.

5.4.6 NATURAL REFRIGERANTS IN AIR CONDITIONING

Synthetic refrigerant gases commonly used in air conditioning systems have a very high Global Warming Potential (GWP). The GWP is the number of times the refrigerant is more harmful to the atmosphere than carbon. The best practice synthetic refrigerant available (R32) has a 675 GWP, meaning it is 675 times more harmful than carbon. Natural refrigerants generally have a much lower GWP, typically 2.3, meaning that it is 2.3 times more harmful than carbon.

Leakage from air conditioning systems or the improper disposal of refrigerant can be a significant source of greenhouse gas emissions. Using natural refrigerants with low GWP will reduce the impact of the emissions from air conditioning systems.

These impacts are recognised under the Montreal Protocol, which from 2016 commenced the global phase-down of Hydroflurocarbons (HFCs), the most common type of synthetic.

Objectives

O.01 Reduce the greenhouse gas emissions associated with the release to the atmosphere through leakage or the improper disposal, of synthetic refrigerant gases with high Global Warming Potential (GWP).

O.02 Future proof new HVAC (air conditioning) systems from the global phase-down of Hydroflurocarbon (HFC) under the Montreal Protocol.

Controls

C.01 All new air-conditioning and refrigeration equipment are to use refrigerants with a GWP of less than 10;

- if the equipment can be supplied on similar terms to conventional systems, and
- at a cost of not more than 10% higher than the market rate for conventional systems.

5.4.7 BIRD FRIENDLY DESIGN

Glass buildings are an increasing source of bird collisions resulting in significant numbers of mortalities and injuries. The primary cause of collisions is transparency and reflectivity associated with the high levels of glazing.

Birds, unlike humans, cannot perceive the external glazing and fly into it attempting to travel to the reflected view of open sky vegetation or parklands; potential perches, food or water sources; or other attractors. Incidents increase in times of drought as higher numbers of birds enter urban areas to forage. Nocturnal birds also fly into external glazing as they are attracted to internal lighting.

Documented bird fatalities from building collisions in the Sydney region include the critically endangered Swift Parrot, vulnerable Powerful Owl and White-Bellied Sea Eagle. The World Wildlife Fund (WWF) produced guidelines and recommendations for 'Swift Parrot-Safe Building Design' with support of the Australian Government in 2008.

Objectives

O.01 Minimise the risk of bird collisions due to high transparency, through treatment of external windows and other glazed building surfaces.

O.02 Require additional treatment, or reduced reflectivity and transparency of external windows and other glazed building surfaces, where buildings are located within 100 metres of waterways and parklands.

Controls

C.01 Treatment of all external windows and other glazed building surfaces of buildings is required to any new glazed surface (whether part of a new building or a building undergoing alterations and additions), when the glazed surface is:

- less than 6 metres from another glazed surface such as corners and skybridges,
- less than 6 metres from an internal planted area such as a green wall or planted atrium,
- projecting vertically more than 1 metre above the building roof line,
- projecting horizontally more than 1 metre beyond the building enclosed façade.

C.02 Where buildings are located within 100 metres of waterways and parklands treatment to 95% of glazing is required. Treatment to the glazing must be either:

- Bird strike UV patterning, such as Ornilux;
- Fritted, etched, channeled or translucent glass such as Silk-screen with a minimum untreated dimension of 100mm x 100mm; or
- External treatments such as angled, layers or recessed glazing, shading elements such as louvers, overhangs and awnings or mesh with a minimum open dimension of 100mm x 100mm.

5.4.8 WIND MITIGATION

Objectives

O.01 Ensure that the building form enables the provision of a safe and comfortable pedestrian level wind environment, including street frontages, outdoor eating areas, open spaces

O.02 Provide publicly accessible terrace areas within developments, as well as private communal terrace areas, and private balconies within developments

O.03 Ensure wind conditions promote outdoor planting, including green roofs and other landscaping elements.

Controls

C.01 Ensure comfort in and around new buildings, the wind speeds identified in Table 5. are to be exceeded for less than 5% of the time around new buildings for both hourly mean and gust equivalent mean wind speeds:

Table 5.4.8.1 – Wind Speed Exceedance Limits

< 2 m/s	Outdoor restaurant dining
< 4 m/s	Sitting (such as café style dining), or scheduled outdoor events
< 6 m/s	Standing, generally supports outdoor planting
< 8 m/s	Walking in retail areas / active street frontages
< 10 m/s	Walking / non-active street frontages (objective walking from A to B or for cycling)

C.02 Ensure public safety, a 3 second moving average gust wind speed of 23m/s is to be exceeded for less than 0.1% of time.

C.03 A wind assessment report must be submitted with the DA for all buildings greater than 20 m in height.

C.04 For buildings greater than 40 m in height, or sites with more than one building greater than 20m in height, the quantitative results from a wind tunnel test are to be included in the wind assessment report.

C.05 The wind study is to be conducted by an experienced professional wind engineer in accordance with the requirements outlined in the Technical Requirements – Wind Mitigation Performance Methodology.

Technical Requirements – Wind Mitigation Performance Methodology

C.06 Based on: CCP Wind Assessment for: City of Parramatta November 2016 CCP Project 9776

Expertise

C.07 A wind study shall be performed by a professional wind engineer with experience in wind issues in the built environment. It is recommended that the applicant or the wind engineer consults the City of Parramatta planning department to agree on the type and approach of the wind study required for the proposed development.

Wind data

C.08 Historical data of wind speed and direction collected over a minimum of 10 years shall be used as the basis of a pedestrian level wind study. Data from the Bankstown Airport Bureau of Meteorology anemometer starting earliest in 1993 shall be used and adequately corrected for the effects of differences in roughness of the surrounding natural and built environment. The use of wind data for daytime hours between 6am and 9pm is generally recommended and may be specifically requested by the City of Parramatta, however, wind data for all hours may be used as well, where appropriate. Climate data are to be presented in the wind study report.

Criteria

C.09 The criteria for pedestrian level wind comfort are based on published research, particularly on the criteria developed by Lawson (1990). Pedestrian safety is affected by both the mean and the gust wind speed. As such, the criteria defined below are to be applied to both the mean wind speed and the Gust Equivalent Mean (GEM), i.e. the 3s gust wind speed in an hour divided by 1.85.

Table 5.4.8.2 – Wind Speed Mean Exceedance Limits

Comfort (maximum of mean and gust equivalent mean (GEM†.) wind speed exceeded 5% of the time)	
< 2 m/s	Outdoor restaurant dining
2-4 m/s	Sitting (such as café style dining), or scheduled outdoor events
4-6 m/s	Standing, generally supports outdoor planting
6-8 m/s	Walking in retail areas / active street frontages
8 - 10 m/s	Walking / non-active street frontages (objective walking from A to B or for cycling)
> 10 m/s	Uncomfortable
Distress (maximum of mean or GEM wind speed exceeded 0.022% of the time)	

Note: †. The gust equivalent mean (GEM) is the peak 3s gust wind speed divided by 1.85.

C.10 The criterion for pedestrian safety is based on the Guidelines of the Australian Wind Engineering Society (2014)

Table 5.4.8.3 – Wind Speed Exceedance Safety Limits

Safety (maximum 3s moving average gust wind speed)	
<23m/s	not to be exceeded more than 0.1% of time per year

C.11 The wind study report shall show that the proposed development provides for adequate levels of comfort and safety in accordance with the above criteria taking into account the intended usage of a particular area. If the above criteria are not met, appropriate mitigation measures shall be identified, or the proposed building design is to be altered. Further, the existing wind conditions shall not be significantly degraded by a proposed development over the assessment area.

Mitigation Measures

C.12 If the wind study identifies areas that do not fulfil the comfort or safety criteria, mitigation strategies are to be developed and their effectiveness in improving the wind conditions to the required level is to be shown and tested in the wind tunnel. These measures may include, in order of preference:

1. Changes to the building massing or design including the addition or extension of podiums, tower setbacks, or
2. Addition of canopies or wind screens.
3. On-site vegetation may be used to improve the wind comfort for pedestrians, however, it is not an acceptable mitigation for exceedances of the safety criterion. To be accepted as a mitigation for wind comfort issues, the plants need to be effective at the time of installation and need to be able to provide improvement throughout the year.
    a) Furthermore, the plants shall require minimum maintenance and are to be able to thrive in the wind conditions of the site.
    b) The plants must be within the site boundary and not on public land.
4. Modifications of the usage of affected areas and provision of alternatives.

TYPE OF WIND STUDY

QUALITATIVE WIND STUDY

A qualitative wind study is generally required for developments with a building exceeding a height of 20 m above finished ground and less than 40m above finished ground and may be requested by the City of Parramatta on a case-by-case basis for smaller developments. A qualitative wind assessment can be performed as a desktop study, or by Computational Fluid Dynamics (CFD).

A desktop study shall estimate the wind speeds at relevant locations in and around the proposed development taking into consideration the wind comfort and safety criteria described in this DCP

Controls. The assessment is to be based on all prevailing wind directions and shall account for the frequency of occurrence.

CFD simulations shall appropriately represent the atmospheric boundary layer and model appropriate parts of the natural and built environment surrounding the proposed development. The study is to consider all prevailing wind directions as well as the frequency of occurrence.

Presentation of the results shall include horizontal planes at pedestrian level of approximately 1.5 metres, horizontal and vertical planes are required for outdoor planting, and details of the computational mesh and consistency of the wind conditions across the modelled domain.

QUANTITATIVE WIND STUDY

A quantitative wind study shall be performed in a boundary layer wind tunnel capable of simulating the atmospheric boundary layer and appropriate profiles. A quantitative study is required for developments with a building exceeding a height of 40 metres above ground and developments with more than 1 building exceeding 20 metres in height.

Physical modelling of the proposed development shall be done at an adequate scale, typically 1:300 or 1:400, and appropriate levels of surrounding natural and built environment of at least a 400 metre radius around the proposed development site shall be taken into account.

Wind speed measurements shall be performed in accordance with the Australasian Wind Engineering Society's Quality Assurance Manual (QAM) for Wind Engineering Studies of Buildings (AWES, 2001):

- Measurements shall be taken with instruments capable of measuring wind characteristics at adequate resolution, e.g. hot-wire or hot-film anemometers, Irwin probes.
- Measurements for pedestrians shall be taken at the equivalent full-scale height of approximately 1.5 m.
- Measurements for outdoor planting shall be taken to suit the proposed design
- Measurements shall be taken at a minimum of 1 location per 200m^2 of the plan area accessible for pedestrians or to be planted, and the selection of locations shall take into account the intended use of the space.
- The assessment area shall include the public and private outdoor areas to a minimum distance of D from the building envelope, with D being the lesser of half the building height or half the largest plan dimension of the building.
- Measurements shall be taken for at least 16 wind directions.

Configurations

To be able to compare the wind environment with the inclusion of the proposed development, measurements at representative locations are to be conducted in the existing configuration without the proposed development. This configuration shall include all existing surrounds, as well as developments that are approved or under construction. These surrounds shall also be applied in the proposed configuration. In specific circumstances the City of Parramatta may require additional testing of a future configuration to include future developments that may impact the wind conditions around the proposed development, e.g. developments currently in the approval process.

References

Quality Assurance Manual for Wind Engineering Studies of Buildings, AWES QAM – 1-2001

Lawson, T.V. (1990), *The Determination of the Wind Environment of a Building Complex Before Construction*, Department of Aerospace Engineering, University of Bristol.

5.4.9 WASTE MANAGEMENT

Council considers the management of waste to be of high importance for the protection and enhancement of both the natural and built environments within not only the City but on a state, national and global level. Waste is increasingly being treated as a valuable resource due to the potential to reuse, recycle and recover products derived from various waste streams.

This Section of this DCP provides controls designed to manage waste effectively and efficiently to deliver a sustainable future for the City.

Objectives

O.01 Reduce the quantity of waste and encourage the recycling of waste generated by demolition and the construction of new developments.

O.02 Encourage building design that will minimise waste generation over the lifetime of the building.

O.03 Ensure that the disposal of waste generated by a building's occupants over its lifetime is managed appropriately, efficiently and provides for maximum recovery, recycle or reuse.

O.04 Ensure that waste storage facilities are located appropriately and do not impact negatively on the streetscape.

O.05 Ensure that waste can be effectively collected and managed.

O.06 Assist in achieving Federal and State Government waste minimisation and resource recovery (landfill diversion) targets.

O.07 Minimise the overall environmental impacts of waste, in line with the principles of Ecologically Sustainable Development (ESD).

Controls

C.01 Development, including for demolition, construction, alterations and additions, and/or change of use, is to comply with the relevant provisions outlined in the Waste Management Guidelines for new Development Applications contained in Appendix 2 of this DCP. The Guidelines should also be used as a guide for development which falls under Part 5 of the *Environmental Planning and Assessment Act 1979*.

C.02 A Waste Management Plan (WMP) must be submitted with all Development Applications that involve demolition work, construction work, and/or the generation of waste. WMPs are to be prepared in accordance with Council's Waste Management Plan template and the *Waste Management Guidelines for new Development Applications* (refer to Appendix 2). Should the template not be used then the applicant must ensure that all of the required information outlined in Council's *Waste Management Guidelines for new Development Applications 2016* is provided.

Note: Please refer to the NSW Government's *Model Waste Not Development Control Plan Chapter 2008* for waste and recycling generation rates. For multi-unit Development Applications, please refer to EPA's *Better Practice Guide for Resource Recovery in Residential Developments 2019* for guidance on waste facility design and management.

Further Information

Business Recycling, PlanetArk, 2020.

Better Practice Guide for Resource Recovery in Residential Developments, NSW Environment Protection Authority, 2019.

Model Waste Not Development Control Plan Chapter 2008, (former) NSW Department of Environment and Climate Change, 2008.

NSW Waste Avoidance and Resource Recovery Strategy 2014-2021, NSW Environment Protection Authority, 2014.