ITEM 2 PUBLIC EXHIBITION - WOLLONGONG DEVELOPMENT CONTROL PLAN 2009 CHAPTER E15 - WATER SENSITIVE URBAN DESIGN

Wollongong is uniquely positioned between the escarpment and the coast, resulting in distinct climatic and hydrological conditions. The steep topography of the escarpment causes water to move rapidly through these zones, increasing runoff velocity and reducing soil infiltration opportunities. In contrast, the coastal floodplains are almost entirely flat, leading to slow water movement and prolonged retention times.

This variation in landscape requires highly specialised water management approaches. Additionally, the region's soil profiles, often dominated by sandy or fine sediments, are highly erodible, further complicating stormwater and erosion control. These combined factors make WSUD in Wollongong critically important.

The *Lake Illawarra Coastal Management Program 2020-30* recognises that development in certain areas of this catchment, especially in the West Dapto Urban Release Area have the potential to cause significant adverse impact upon the local environment and amenity. Action WQ1 of the program relates to implementation of a Risk Based Stormwater Management Framework for the Lake Illawarra catchment. The *Lake Illawarra - Applying a Risk-Based Framework for Improving Water Quality* report was completed by the Department of Climate Change, Energy, the Environment and Water in 2024. The report recommends that Council update the planning controls and the existing pollution reduction targets in Wollongong Development Control Plan (DCP) 2009 to better protect the water quality of the Lake. Utilising grant funding under the Coastal and Estuary Program, Council has undertaken a review of its planning controls and technical guidebook.

Wollongong DCP 2009 Chapter E15 - Water Sensitive Urban Design (WSUD) has been reviewed and updated to reflect the best available knowledge to protect Lake Illawarra as well as incorporating industry best practices, feedback and learnings since the DCP Chapter was first adopted.

It is recommended that Council resolve to exhibit the revised draft Wollongong DCP 2009 Chapter E15 - Water Sensitive Urban Design.

RECOMMENDATION

The draft Wollongong Development Control Plan 2009 Chapter E15 - Water Sensitive Urban Design (Attachment 1) be exhibited for a minimum period of 28 days.

REPORT AUTHORISATIONS

Report of: Chris Stewart, Manager City Strategy
Authorised by: Linda Davis, Director Planning + Environment - Future City + Neighbourhoods

ATTACHMENTS

1 draft Wollongong Development Control Plan Chapter E15 - Water Sensitive Urban Design
2 Summary of Key Changes to Wollongong Development Control Plan - Chapter E15 - Water Sensitive Urban Design
3 Alignment of the draft Wollongong DCP Chapter E15 – Water Sensitive Urban Design (WSUD) with Wollongong City Council's strategic frameworks

ACRONYMS USED IN REPORT

Abbreviation	Meaning
DCP	Development Control Plan
LEP	Local Environmental Plan
LGA	Local Government Area
LICMP	Lake Illawarra Coastal Management Program
LIRBF	Lake Illawarra Catchment: Applying a Risk Based Framework for Improving Water Quality

Abbreviation	Meaning
MEMS	Marines Estate Management Strategy
WDURA	West Dapto Urban Release Area
WSUD	Water Sensitive Urban Design

BACKGROUND

Wollongong Development Control Plan (DCP) 2009 Chapter E15 - Water Sensitive Urban Design was adopted on 15 December 2009 and commenced on 1 March 2010 following the commencement of the Wollongong Local Environmental Plan (LEP) 2009. This Chapter was introduced to mitigate the negative impacts of development on water quality and the health of our local waterways. The Chapter provides stormwater quality performance targets to be achieved for certain types of new developments through the implementation of WSUD.

Since the adoption of the existing E15 Chapter, 15 years ago, significant advancements in knowledge and technology have emerged, offering more cost-effective, environmental sensitive and sustainable approaches to water-sensitive urban design. For example, innovative design and construction methods now enable more efficient management of land and supports best-practice WSUD implementation.

In addition, urban development across the LGA (particularly in our greenfield areas) has increased the volume and impact of stormwater runoff on our waterways, environment, and community.

A comprehensive review of Chapter E15 has been undertaken to strengthen our approach to WSUD. The revised draft Chapter incorporates feedback gathered during internal and external consultations and aims to reduce risks to Council, protect the environment, and enhance community resilience. A detailed list of the changes made to the existing DCP is provided in Attachment 2.

To ensure the Chapter remains current and effective, new research findings and key updates have also been incorporated. The draft Chapter E15 - WUSD has also been aligned with several key Council strategic plans, these including but not limited to -

- The Illawarra Shoalhaven Regional Strategy 2041.
- The Lake Illawarra Coastal Management Program 2020–2030.
- The Lake Illawarra – Applying a Risk-Based Framework for Improving Water Quality 2024.
- Other Council DCP Chapters, ie Chapter A2 – Ecologically Sustainable Development, Chapter E14 – Stormwater Management and Chapter E23 – Riparian Land Management.

A detailed list of the draft Chapter's alignment with Councils key strategic plans and policies can be found in Attachment 3.

PROPOSAL

It is proposed to exhibit the revised draft Wollongong DCP Chapter E15 Water Sensitive Urban Design (Attachment 1) for a minimum period of 28 days. The Chapter has been substantially rewritten and adopts the new standard DCP format. Comments received from stakeholders and in particular the development industry during the public exhibition process could inform further changes to the Chapter. The outcomes of the exhibition process will be reported to a future Council meeting.

CONSULTATION AND COMMUNICATION

A major component of the Chapter's review process involved conducting in depth internal consultation with relevant Council Divisions to incorporate operational considerations in the revised draft E15 Chapter.

This consultation has identified opportunities to enhance the effectiveness of the Chapter to guide the design, construction, and maintenance of WSUD measures. The development of supporting documents to assist with the practical implementation of the updated provisions has also been undertaken as part of the review process.

The table below outlines the internal Council Divisions that were consulted during the review process -

• Development Assessment & Certification	• City Strategy	• Subdivisions
• Regulation & Enforcement	• City Maintenance	• Open Space & Environmental Services
• People & Culture	• Project Delivery	• Landscape Services
• City Works	• Information Management & Technology	• Community Culture & Economic Development
• Risk & Insurance	• Transport & Infrastructure Planning	• Design & Technical Services

Initial consultation has also been undertaken with external stakeholders and local developers. The table below outlines the organisations that participated in the consultation process, noting that a number of private companies also participated in the process.

• Stormwater NSW	• Blacktown City Council	• Wollondilly Shire Council
• Kiama Municipal Council	• Shoalhaven City Council	• Shellharbour City Council
• Mid-Coast Council	• Property Council of Australia	• Water NSW
• Melbourne Water	• Sydney Water	• Transport for NSW
• NSW Environment Protection Authority	• Department of Climate Change, Environment, Energy & Water	• Illawarra Shoalhaven Joint Organisation
• Clear Water NSW	• West Dapto landowners	• Local land development consultants
• External stakeholders / product suppliers		

In addition to the initial consultations, the community and stakeholder feedback gathered over the past 15 years, since the existing Chapter E15 was first adopted has played a key role in shaping the proposed updates. This includes opportunistic inputs received through various Council events, engagement sessions, and public submissions. The table below summarises the key community engagement activities where feedback was received –

• Council led planting days and Lake Illawarra clean-up events	• Rise and Shine engagement events	• Community information sessions at Dapto and Windang
• Community Engagement sessions for the Lake Illawarra Entrance Options Study	• Lake Illawarra Information Sessions	• Community members engaged during field work

If the report recommendation is supported by Council, the revised draft Chapter E15 will be exhibited for a minimum of 28 days. The outcomes of the exhibition process will be reported to Council for further consideration.

PLANNING AND POLICY IMPACT

This update to the existing Chapter E15 supports the delivery of the Our Wollongong Our Future 2035 Goal 1 – “We are a sustainable and climate resilient city”, Goal 2 – “We have well planned, connected, and liveable places” and Goal 4 – “We have a healthy, respectful, and inclusive community”, specifically contributing to the following strategic outcomes found in the table below –

Community Strategic Plan 2035	Delivery Program 2025-2029
Strategy	**Service**
1.1 We are a Sustainable and climate resilient city. 1.2 Manage and improve the cleanliness health, biodiversity of land and water including creeks, lakes, waterways and oceans. 1.7 Manage our coastal environments including Lake Illawarra, to protect and enhance environmental sustainability, social, cultural and economic values.	Land Use Planning
2.1 Urban areas are planned and well maintained to provide a healthy and safe environment for our community to live, work and play. 2.2 Facilitate ecologically sustainable development that considers the current and future needs of our community and environment. 2.3 Deliver high quality, fit for purpose and sustainable infrastructure to support a growing and resilient city. 2.6 The growth of West Dapto urban release area is well planned with facilities, spaces and educational institutions to support the growing community.	
4.2 Provide a variety of quality and accessible public spaces and opportunities for sport, play, leisure, recreation, learning and cultural activities in the community.	

SUSTAINABILITY IMPLICATIONS

The revised draft Chapter E15 reinforces Council's commitment to sustainable, integrated, and holistic water management across the LGA and has considered alignment with a range of other relevant DCP chapters, including Chapter A02, B01, B03, B04, B05, B06, B07, D16, D21, E06, E13, E14, E19, E22, E23, to support the following key sustainability outcomes identified in Council's strategic planning framework -

- Integrating floodplain and stormwater management early in urban development planning.
- Preserving the natural functions of floodplains, waterways, and riparian corridors.
- Protecting surface and groundwater quality from the impacts of urban development.
- Enhancing the natural environment and biodiversity across the LGA.
- Ensuring sustainable stormwater infrastructure in growth areas such as the WDURA.
- Promoting sustainable development of floodplains and adjacent areas.
- Protecting receiving waters and Lake Illawarra over the long term.
- Encouraging the use of vegetation and water for urban cooling and climate resilience.
- Enhancing community liveability and amenity through efficient and sustainable water use.
- Reducing long-term maintenance and infrastructure costs.

RISK MANAGEMENT

The revised draft Chapter E15 will deliver broad benefits while mitigating key risks for Council, developers, and the community. These include –

Financial risks	• The use of MUSIC-link and standardised modelling tools will reduce time and costs associated with development application assessments and hydrological modelling for both developers and internal development assessors. • Clear guidance and standardised WSUD procedures will help developers avoid design and construction mistakes, reducing the likelihood of expensive rework or non-compliance systems. • Improved design and construction standards will ensure WSUD systems are more durable reducing maintenance costs for Council. Consideration of potential resourcing implication for Council to monitor and regulate private devices will be included in any decision about the installation of such devices such as rain gardens.

Environmental risks	• Updated development standards will better protect surface and groundwater from stormwater pollutants, reducing the risk of environmental degradation and Lake Illawarra from the impacts of urban development. • Encouraging non-proprietary, nature-based solutions will reduce reliance on hard infrastructure and support ecosystem health and lessen environmental impacts.
Community risks	• Cleaner waterways and reduced urban runoff will contribute to healthier environments and improved public amenity. • Incorporating localised native vegetation as part of a water-sensitive design will help mitigate urban heat, improving comfort and wellbeing in public spaces. • Clearer guidelines will provide the community with greater confidence in Council's planning process and outcomes.
Safety risks	• Enhanced floodplain and stormwater design standards aim to improve the performance of systems and reduce environmental and property damage during storm events. • Improved maintenance and safety standards will help ensure WSUD systems perform reliably, reducing the risk of system failure and negative effects to the community and the environment.
Legislative risks	• The update ensures consistency with the Wollongong LEP 2009, other relevant DCP chapters, and recent changes to State and Federal legislation, thereby reducing the risk of legal challenges and ensuring compliance with statutory obligations.

FINANCIAL IMPLICATIONS

The revised draft Chapter E15 - Water Sensitive Urban Design has the potential to deliver measurable financial benefits and reduce long-term costs for both Council and land developers. Whilst detailed financial modelling has not been undertaken, the anticipated key outcomes are summarised in the table below -

Modelling and Assessment	• Streamlined water modelling using MUSIC-link has the potential to simplify the modelling process for land development and assist with the timely assessment of development proposals. • MUSIC-link minimises the risk of developers using incorrect data, outdated climate inputs, or inappropriate water quality targets.
Clearer guidance	• The Technical Guidebook and Engineering Series will provide clear, consistent guidance, reducing ambiguity and assist with the appropriate design of WSUD systems. • Detailed instructions for construction, and maintenance will improve system durability.
Sustainable and low-maintenance WSUD options	• Encouraging contemporary WSUD methods reduces reliance on expensive and heavily engineered proprietary systems. • Environmentally sensitive and low-maintenance WSUD solutions which are less costly and simpler to maintain aligns with existing Council budgets and resources.

CONCLUSION

The revised draft Chapter E15 - Water Sensitive Urban Design promotes best-practice design, construction, and maintenance of WSUD systems, ensuring they perform will over time and are easier to

manage. It reflects Council's strong commitment to sustainability, innovation, and responsible urban planning.

To further support landowners, consultants and the community, a series of technical resources have been developed to coincide with the proposed DCP updates. These documents include WSUD Technical Guidebook for Developers 2025, WSUD Engineering Series 2025 and a range of factsheets, checklists and case studies.

It is recommended that Council endorse the revised draft Chapter E15 - Water Sensitive Urban Design for formal exhibition. A further report will be provided to Council detailing the outcomes of the exhibition process and make recommendations relating to finalisation of the review project.

Part E General Controls – Environmental Controls
Chapter E15 Water Sensitive Urban Design

Contents

Figures

DOCUMENT CONTROL

Rev No.	Adoption Date	In Force Date	Revision Details
0	15 December 2009	3 March 2010	E15 DCP Chapter adopted by Council
1		TBA	Update of information, controls and new water quality targets based on community feedback and updates to technology and research into water sensitive urban design.

1. INTRODUCTION

This chapter of the Wollongong Development Control Plan (DCP) outlines the requirements for the incorporation of Water Sensitive Urban Design (WSUD) for development and redevelopment within the Wollongong Local Government Area (LGA).

Water is a precious and finite resource that must be carefully managed to meet our current and future needs. Wollongong is uniquely positioned between the escarpment and the coast, resulting in distinct climatic and hydrological conditions. The steep topography of the escarpment causes water to move rapidly through these zones, increasing runoff velocity and reducing infiltration opportunities. In contrast, the coastal floodplains are almost entirely flat, leading to slow water movement and prolonged retention times.

This variation in landscape requires highly specialised water management approaches. Additionally, the region's soil profiles, often dominated by sandy or fine sediments, are highly erodible, further complicating stormwater and erosion control. These combined factors make WSUD in Wollongong critically important.

Urban development significantly alters how water moves through our city and can increase pollution in stormwater runoff. To address these challenges, Council applies WSUD, which is a holistic approach to managing stormwater that integrates the urban water cycle with planning and design. WSUD aims to replicate natural systems to reduce negative impacts on the water cycle and protect receiving waterways, including the ocean and Lake Illawarra.

Over the next 20 years, our population is projected to increase by nearly 70,000 people. To support this growth sustainably, integrating WSUD into urban planning and development will deliver substantial benefits for both the environment and the community, including:

- Improved water quality, helping to protect downstream waterways, the ocean, and Lake Illawarra.
- Reduced erosion and sedimentation, minimising the environmental impact of new developments.
- Lower demand for drinking water, through rainwater harvesting and reuse.
- Cooling the region, by mitigating the urban heat island effect.
- Enhanced biodiversity, by supporting local wildlife and expanding natural habitats.

Sustainable and resilient development is a key priority in Wollongong. We encourage developers to reduce the use of underground systems to manage stormwater and adopt environmentally sensitive stormwater management solutions that also offer co-benefits. For example, open green spaces can be designed to hold and treat stormwater while also providing recreational areas for the community and habitat for fauna. Constructed wetland systems are another notable example, they help manage water, support biodiversity, and can include walking tracks, shade, and seating for people to enjoy the natural surroundings.

2. WSUD OBJECTIVES AND PRINCIPLES

a) The key objectives and principles of this chapter are to:

i) Minimise any adverse impacts of stormwater runoff and diffuse stormwater pollution downstream of new development.

ii) Ensure that development minimises the impact of stormwater runoff on adjoining properties, native bushland, riparian land, receiving waters, groundwater dependent ecosystems and groundwater systems.

iii) Integrate stormwater management systems into the landscape in a manner that provides multiple benefits, including environmental and water quality protection, the enhancement of

ecological processes, habitat and biodiversity, flood mitigation, recreational value, visual amenity, and urban heat mitigation.

iv) Integrate WSUD and stormwater management early in the development and design processes to ensure that WSUD treatment measures are incorporated and that both stormwater and floodplain management issues are adequately addressed.

v) Maintain the health of Lake Illawarra, the ocean, or any receiving waterways.

vi) Ensure the sustainable and appropriate development of the floodplains, the West Dapto Urban Release Area, and Lake Illawarra catchment area.

vii) Reduce the demand for potable water through water efficient fittings, rainwater harvesting and reuse.

viii) Improve liveability and community amenity by managing water in a holistic, environmentally sensitive, and integrated way.

3. DEVELOPMENT TO WHICH THIS CHAPTER APPLIES

The incorporation and implementation of appropriate WSUD measures are required for the following types and scales of development listed in sections a), b) and c) below.

a) The General and Stormwater Quality Development Controls in this chapter apply to the following forms of development:

i) Residential land subdivisions involving 20 or more proposed allotments.

ii) Medium density housing involving 20 or more dwellings.

iii) Residential apartment buildings involving 20 or more residential apartments.

iv) Mixed use developments involving 20 or more residential apartments or a gross floor area of 3,000 square metres or more (whichever the lesser).

v) Serviced apartment or hotel developments.

vi) Industrial developments (including major alterations and additions to existing industrial buildings) involving a gross floor area of 4,000 square metres or more.

vii) Industrial subdivisions involving five or more proposed allotments, or a site area of 4,000 square metres or more (whichever is the lesser).

viii) Business parks and commercial office developments involving a gross floor area of 10,000 square metres or more.

b) The Groundwater Development Controls in this chapter apply to the following forms of development:

i) All Development Applications proposing excavation for below ground structures such as basements must demonstrate whether they will encounter groundwater. Where groundwater will be encountered, the WSUD strategy 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.

c) The Erosion and Sedimentation Development Controls in this chapter apply to the following forms of development:

i) All development, or activity that will involve disturbance of the soil surface, or that includes the cut or placement of fill or storage of materials.

4. COMPLIANCE PATHWAYS

New developments must comply with, and address Council's WSUD requirements, including the Development Controls in this chapter, the *Coastal Management Act 2016,* and the *State Environmental Planning Policy (Resilience and Hazards) 2021*.

As part of an applicant's Water Cycle Management Plan, a WSUD Strategy must be included in accordance with this chapter and other relevant guidelines, such as:

- Council's WSUD Guidebook for Developers 2025 (as amended or superseded),
- Council's WSUD Engineering Series 2025 (as amended or superseded), and
- any other relevant local and state regulations.

All electronic files related to, or included as part of a WSUD strategy must be submitted alongside the corresponding documentation, hereinafter referred to as a 'WSUD strategy'.

Note: A pre-lodgement meeting with Council is highly recommended at an early stage in the application process to discuss and agree on the overall design approach before a detailed WSUD strategy is completed. In cases where a pre-lodgement meeting is not held upfront on a proposed WSUD strategy, or the parameters determined by Council are not met in the WSUD strategy, Council may either require a major redesign of the WSUD design at the development application stage or may decline to accept the dedication of the WSUD asset to Council.

4.1 MUSIC-link

MUSIC-link streamlines both the development and assessment of MUSIC models by incorporating our specific modelling parameters. Applicants using MUSIC-link can generate a detailed report demonstrating how well their model meets the Council's stormwater treatment requirements. This report can then be submitted along with the WSUD strategy.

5. ACCEPTED WSUD OPTIONS

A WSUD measure, device or system refers to any, or all the components of a stormwater management system. These components can include, but are not limited to, devices, infrastructure assets, technologies or strategies designed to manage the quantity and quality of stormwater runoff from impervious areas. This may include methods such as rainwater tanks, permeable surfaces, wetlands, bio-retention systems, GPTs, swales, and, or other infrastructure that work together to reduce runoff, enhance water quality, ensure sustainable and integrated water management practices.

Table 1 sets out the WSUD options for different scales of development, which are acceptable to Council, where the WSUD measure or asset is intended to be handed over to Council following the maintenance period. Where the WSUD measure or asset is not intended to become Council's asset (and will not be located on Council land), alternative measures may be considered.

Table 1 - Accepted WSUD options for developments

Accepted WSUD measure	Lot scale	Street scale	Subdivision scale	Neighbourhood scale
Rainwater tanks				
Raingardens				
Passively watered street trees				
Porous pavement				
Infiltration pits and trenches				
Traditional or vegetated swales and buffer strips				
Manual litter removal				
Street stormwater garden				
Urban forests				
Sediment forebay				
Bioretention basins				
Constructed wetlands and ponds				
Detention basins and ephemeral parks				
Level spreaders				
Gross pollutant traps (GPTs)				

Key: Accepted WSUD measure

5.1 Proprietary WSUD measures

Where WSUD measures will be returned to Council responsibility after an establishment and maintenance period, proprietary cartridge, and filter WSUD systems should not be used as a treatment option for pollutant removal. However, Council may accept some proprietary gross pollutant trap systems such as those listed below:

- non-blocking high performance continuous deflection separation units, and
- non-blocking vortex separator systems.

Note: Council may consider supplementary proprietary measures where independently peer-reviewed research demonstrates their effectiveness, or where applicants are able to statistically demonstrate that the selected system has lower environmental impacts, lifecycle costs and maintenance requirements compared to the options listed above.

6. DEVELOPMENT CONTROLS

6.1 General

1) The activation of any WSUD measures must only commence once 80% of the development's dwellings are completed, or upon receiving the Subdivision Certificate. This ensures that the WSUD measures are not commissioned until most of the development's infrastructure is completed, and the landform is stabilised.

2) Any WSUD element must not contribute to any increased flooding risk and must be designed in accordance with the requirements of Council's *DCP Chapters E14 Stormwater Management and E13 Floodplain Management.*

3) All components of an applicant's WSUD measure, including subsoil drainage, must be located entirely within the property boundary.

4) Adequate spacing must be provided for the installation, accessibility, and long-term maintenance of WSUD systems. To utilise land efficiently and provide co-benefits, WSUD systems must be appropriately incorporated into the development and not squeezed into leftover areas. Designs that limit the system performance, co-benefits, maintenance access, or safety will not be accepted by Council, and developers will be required to revise the design accordingly.

5) In cases where WSUD measures become redundant, due to changes in surrounding development, upstream improvements, or the installation of centralised WSUD systems, Council may decommission those systems as needed to maintain overall water quality.

6) The measures listed in Sections 5 and 5.1 have been selected to ensure that development activities align with Council's planning policies, resourcing, WSUD planning and best practice water management strategies.

7) The stormwater quality performance targets set in Table 2 may be adjusted by Council at its discretion. This is particularly applicable to developments located in sensitive catchments, such as the Lake Illawarra catchment. Furthermore, Council may require proponents to include additional analytes and related performance criteria in WSUD strategies for specific developments, such as those on land affected by soil or groundwater contamination.

8) Detailed maps of Zone A (the priority area for applying the Risk-Based Frameworks water quality targets in Lake Illawarra catchment) are available through the Council's interactive online map service, IntraMaps. This platform allows users to explore comprehensive and key information related to the City's infrastructure, zoning, land use, and other relevant data.

9) A requirement for a positive covenant may be imposed by a condition of consent, requiring the maintenance and/or repair of a new, or existing WSUD measure, and an associated easement for this purpose may also be required to be registered on title, in accordance with sections 88, 88B and 88BA of the *Conveyancing Act 1919*. The positive covenant will be binding on all subsequent property owners and registered with the appropriate land authority. The covenant will ensure the ongoing maintenance of the WSUD system(s) in perpetuity if applicable, or as specified in the development conditions. Where required, the applicant must ensure that the covenant complies with the requirements set out in the Council's WSUD guidebook for developers, as well as any relevant local, state, or national laws governing land use, environmental protection, and water management.

6.2 Stormwater quality

A key initial step in preparing a WSUD strategy is to confirm the appropriate objectives and pollution reduction targets that apply to your development site. All developments must achieve a minimum percentage (%) reduction of the post development pollutants in accordance with Table 2 and Figures 1 and 2.

Table 2 - Minimum post development pollution reduction targets (%)

Pollutant	Zone A	Zone B
Gross Pollutants (GP)	90%	90%
Total Suspended Solids (TSS)	82%	85%
Total Phosphorus (TP)	78%	60%
Total Nitrogen (TN)	67%	45%

Note: The percentages listed in Table 2 represent the reduction in pollutant loads that must be achieved through WSUD treatment measures and demonstrated through MUSIC modelling.

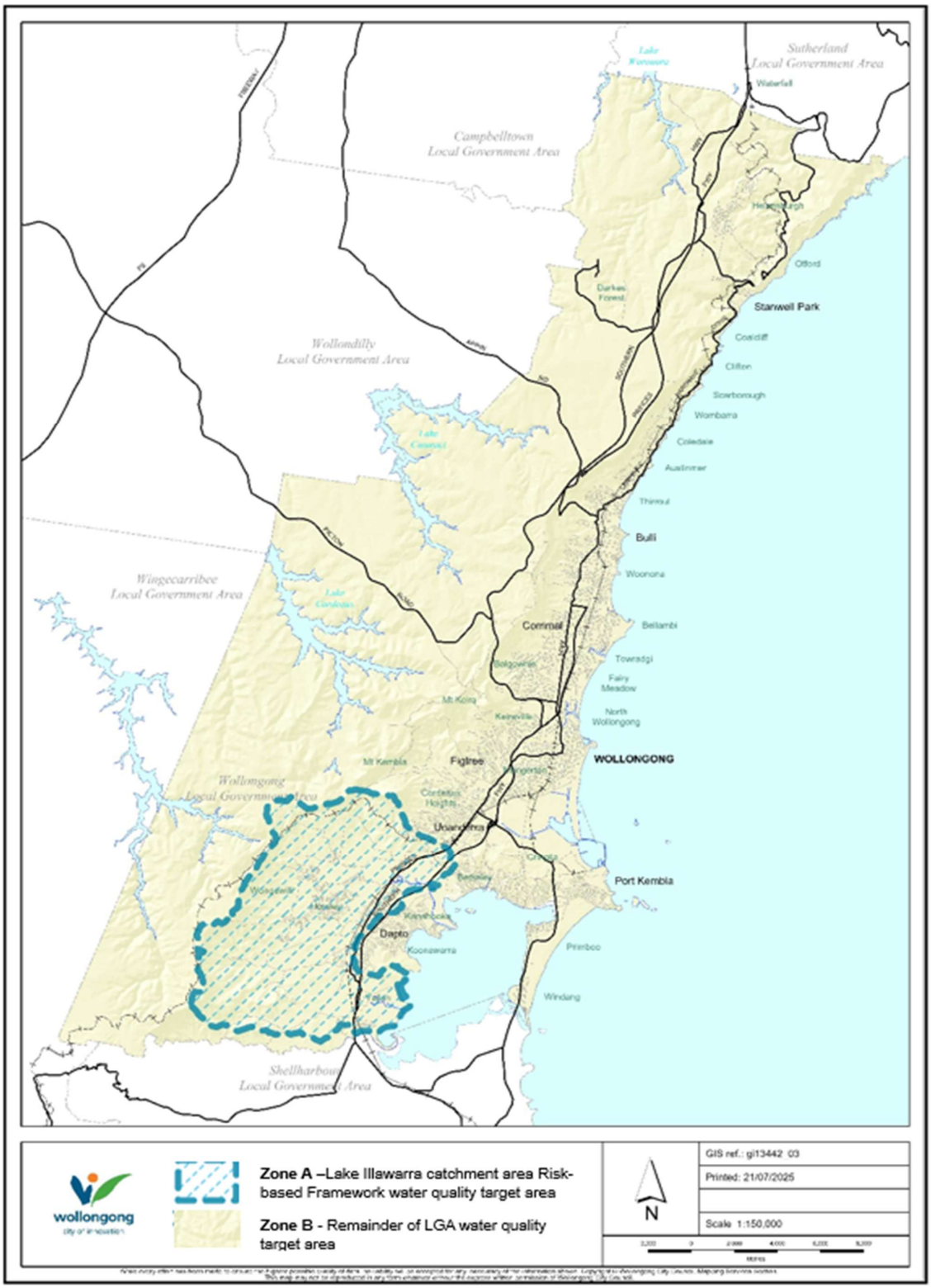

Figure 1 - LGA-wide map showing the water quality target areas, including Zone A (the NSW Government's Risk-based Framework water quality target area) and Zone B (the remainder of the LGA).

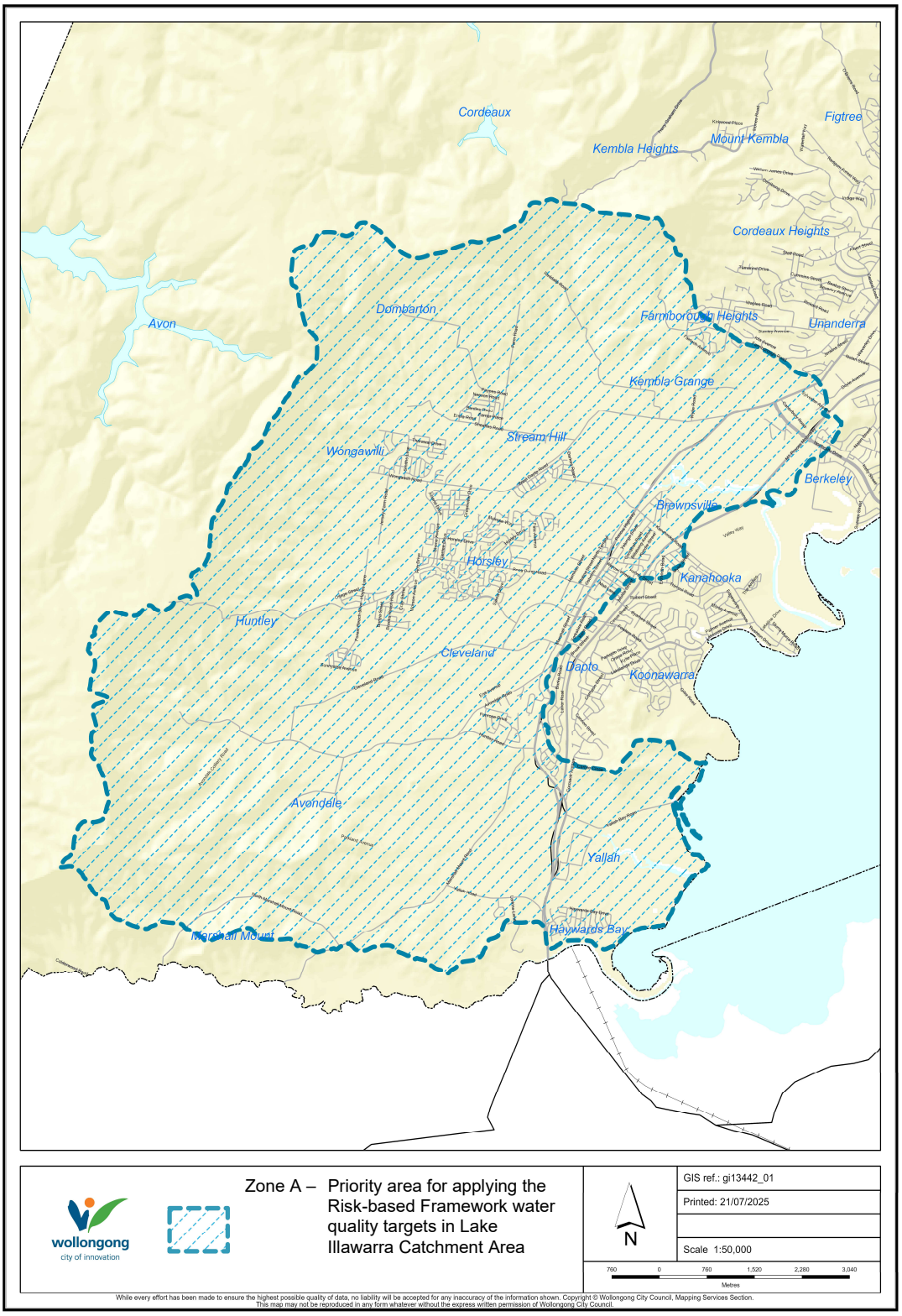

Figure 2 - Zone A – Priority area for applying the Risk-based Framework's pollution reduction targets for improving water quality (DCCEEW, 2024).

6.3 Stormwater reuse and efficiency

1) The percentage of proposed roof area directed to a rainwater tank must be maximised to increase the effectiveness and reliability of any reuse systems. Rainwater tanks should be connected to irrigation, car washing, toilets, water features, washing machines and cooling towers.

2) Buildings not subject to BASIX that are installing any water use fittings must ensure compliance with the minimum standards defined by the Water Efficiency Labelling and Standards (WELS) Scheme.

3) Industrial, commercial, and business developments must supply 80% of their non-potable demand using non-potable water sources. For industrial and business development, rainwater shall be the primary source and only supplemented by potable, or recycled water when rainwater cannot meet 80% of the demand.

4) Rainwater harvesting and reuse 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.

6.4 Stormwater retention

1) All WSUD measures must be designed to retain, treat, and gradually release all stormwater runoff up to the four (4) month EY (98.17% AEP) design storm event (as defined in ARR 2019 terminology). This design ensures that around 90% of the long-term stormwater runoff volume is treated, with only ten percent (10%) bypassing, or overflowing the WSUD measure during larger rainfall events. For higher flows, such as those associated with up to a one percent (1%) AEP event, additional dedicated detention storage may be required to significantly reduce flow rates and mitigate the impact of stormwater from the development.

2) Any changes in the flow rate and flow duration within the receiving watercourses, or connections to stormwater infrastructure due to the development, must be limited to post-development levels to prevent erosion and reduce the burden on the stormwater system.

Note: For Council's requirements about on-site stormwater detention (OSD), refer to Council's *DCP 2009 Chapter E14 – Stormwater Management.*

6.5 Groundwater

Where a desktop groundwater assessment indicates potential interaction with groundwater, or groundwater dependent systems, a groundwater management plan must be submitted with an applicant's WSUD strategy, and must address the following conditions:

1) The applicant must demonstrate that there will be no adverse impacts on groundwater, or groundwater dependent ecosystems, including:

   i) Impacts resulting from changes in groundwater behaviour, or groundwater dependent ecosystems due to the chosen construction method.

   ii) No changes in groundwater behaviour in the surrounding area resulting from the design of groundwater management system. Consultation with the NSW Government is necessary if dewatering is proposed before submitting the development application.

2) If below-ground structures are within three metres of each other, the design must accommodate natural groundwater flow through perimeter, or drainage systems to prevent flow restrictions. If construction methods, or the size of a below-ground structure impede natural flow paths, artificial drainage must be implemented.

3) The groundwater regime must be maintained as close as possible to pre-development conditions during both construction and operational phases.

4) Any proposed groundwater management systems must be designed for a minimum lifespan of 100 years. For construction on hillsides involving permanent structures (other than piles or footings below the water table), the method of construction must be clearly outlined in a WSUD strategy and approved by Council.

5) All groundwater management activities, including monitoring, must align with the *Guide to Groundwater Management in NSW (Department of Planning and Environment, 2023*), be outlined in a WSUD strategy and approved by Council.

6) Groundwater management systems must be designed so that they are safely and easily accessible and maintainable.

7) Council prohibits the discharge of intercepted groundwater into waterways, Lake Illawarra, Council's stormwater infrastructure, or the ocean if it could have an adverse environmental impact, including the discharge of highly saline groundwater. In such cases, the groundwater must be directed to the sewer through a trade waste agreement (subject to approval from Sydney Water and Council).

8) For constructions on hillsides involving permanent structures (other than piles or footings below the water table), the method of construction must be clearly outlined in an applicant's WSUD strategy and approved by Council.

9) Where feasible, construction techniques must be employed that minimise or eliminate the need for dewatering.

10) All groundwater management activities, including monitoring, must comply with the approved groundwater assessment and management plan, as agreed upon with Council as part of an applicant's WSUD strategy.

6.6 Erosion and sedimentation

1) During the construction of WSUD measures, applicants must comply with the actions and recommendations listed in the latest version of *Managing Urban Stormwater: Soils and Construction* (the Blue Book) prepared by Landcom.

2) During the post-construction phase of the development, the WSUD measures implemented by the developer must be designed and executed to effectively control and direct stormwater runoff in a manner that prevents erosion of natural waterways. The selected measures must ensure that the flow of water is responsibly managed to avoid any adverse impacts on surrounding water courses, including the risk of increased sedimentation, bank instability, or degradation of aquatic habitats.

3) Any run-off entering directly to waterways or bushland is to be avoided or treated to reduce erosion and sedimentation, nutrient, and seed dispersal.

4) Development is to minimise site disturbance, including impact on vegetation and significant trees. Construction, particularly on larger developments, are to stage site disturbance 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.

5) 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.

6) Council expects developers to adopt an environmentally sensitive and sustainable approach to prevent erosion and maintain the site's natural hydrology. This includes minimising the amount of cut and fill proposed for the site by:

i) ensuring designs follow the existing site contours,

ii) using pier and beam foundations instead of slab-on-ground construction to minimise ground and tree root disturbance,

iii) designing driveways to contour around slopes, and

iv) using grassed swales to direct flow towards vegetated areas at regular intervals (every three metres) to reduce water volume and allow for smaller depressions in driveway profiles.

7. HANDOVER OF WSUD ASSETS TO COUNCIL

This section applies to WSUD assets that are intended to be transferred to Council following the completion of the establishment and maintenance periods.

Council will not accept transfer of land containing WSUD infrastructure or assume responsibility for any WSUD assets unless all the following conditions are met:

1) Before the issue of any subdivision certificate, occupation certificate or upon completion of works, all relevant certificates and plans must be lodged in accordance with Council's requirements and in formats acceptable to Council.

2) All WSUD measures are constructed and operate in full compliance with the approved design specifications, parameters, and any other design agreements previously entered with Council.

3) The performance of the WSUD measures has been validated through the submission of a water quality validation report confirming their operational effectiveness.

4) Where applicable, any build-up of sediment has resulted in no more than a 10% reduction in operational volume (e.g. in the pond, settling basin, or constructed wetland).

5) A comprehensive handover inspection has been carried out to identify defects, and any such defects have been rectified to the satisfaction of Council.

6) The WSUD infrastructure is structurally, or geotechnically sound, supported by documentation certifying such from suitably qualified professionals.

7) Works as Executed (WAE) drawings for all WSUD infrastructure have been submitted, in a format and level of accuracy deemed acceptable by Council. Works as executed drawings are required for all WSUD measures. Such drawings must include storage capacities and finished and invert levels of the constructed system. All works as executed drawings must be submitted as per Council's most recent issue Design and Technical Services Drafting Standards (Ref 513).

8) Where built systems vary significantly from approved design plans, a suitably qualified engineer shall certify that the constructed system satisfies Council's requirements as per the WSUD Strategy, WSUD Guidebook for Developers and WSUD Engineering Series 2025 and shall submit all supporting calculations leading to this assertion.

9) Relevant digital files, including design drawings, surveys, bathymetry, models, and other pertinent documentation, have been provided in formats acceptable to Council.

10) Landscape designs, particularly those detailing the distribution of functional vegetation (i.e. vegetation that contributes to water quality improvement), have been submitted.

11) Where applicable, the condition of the infrastructure and the associated land is satisfactory to Council, which includes well-maintained open space, boardwalks, viewing platforms, and other related features.

12) Where applicable, bio-filter media infiltration rates are within 10% of the design parameters specified for the filtration system (e.g. bio-retention system, permeable pavement).

13) The vegetation establishment period, as specified in the development consent, has been successfully completed (typically three (3) years).

14) Vegetation as part of a WSUD system has been installed as per Council's requirements.

15) The presence of exotic vegetation does not exceed more than 15 per cent per square metre (15% p/m^2) in bio-retention, vegetated swales, wetlands and other vegetated WSUD elements.

16) No trees or shrubs have been installed or have naturally established within a two-metre radius of a WSUD access/maintenance area, pipe inlets and/or outlets.

17) Must meet Council's maintenance and access requirements as outlined in the latest versions of Council's WSUD Guidebook for Developers and the WSUD Engineering Drawing Series.

18) Outlet pipes leading to the WSUD asset are below the low flow zone.

19) Prior to the handover of any WSUD asset to Council, a finalised operation and maintenance manual will be required for each WSUD measure. The operation and maintenance manual must include all controls necessary to ensure future maintenance activities do not require discrete approvals processes (e.g. a review of environmental factors) under the codes and legislation at the time of design. At a minimum, the operations and maintenance manual shall address the following:

    i) access from the roadside,

    ii) traffic and pedestrian management requirements,

    iii) the measures taken to ensure public safety (including any signage and the type and locations of any fall protection measures),

    iv) SiD risk assessment for maintenance activities,

    v) unauthorised access prevention,

    vi) environmental constraints,

    vii) vehicle movements plan for maintenance (plan to show all dimensions, levels, grades, pavement type and surface treatments of areas to be subject to vehicle movements), and

    viii) past maintenance measures (including cleaning frequency, kilograms of sediment materials removed from the site, costings to maintain and manage the WSUD measures over the three (3) year maintenance period).

20) Any development consent conditions relating to the WSUD measure have been complied with.

21) There are ponding, pooling or backflow issues.

22) Where post-construction water quality monitoring results do not achieve the levels predicted in the approved MUSIC modelling, whether due to system maturation, vegetation establishment or other factors associated with the implemented WSUD measures, Council reserves the right to require rectification works to ensure compliance with relevant Council guidelines, standards, or performance targets. Council also retains the discretion to decline to accept transfer of ownership, maintenance, or liability of WSUD assets where performance outcomes do not align with the approved WSUD Strategy or Council's requirements.

8. REFERENCES /ACKNOWLEDGMENTS

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Key Summary of Changes

Wollongong City Council

Development Control Plan 2009

Draft Chapter E15 Water Sensitive Urban Design (WSUD)

Table Key =

- **Re-positioned section**
- **Updated section**
- **Removed section**
- **Added section**

Existing Section	Change Summary	Justification	Explanation
General:	Updated DCP layout, style, and colour theme (from blue to green).	The Development Control Plan (DCP) has been refreshed with a new layout, updated formatting, and a colour scheme change from blue to green.	New styles of the DCP chapters are being rolled out across in Wollongong as they are reviewed and is in line with the colours of the goals in the Our Wollongong Our Future 2035 document.
	Added Document control table.	A document control table has been included to help users easily track changes and updates over time.	The document control table will allow for easier tracking of revisions, ensuring that all stakeholders are using the most up-to-date version of the DCP guidelines.
Section 1:	Updated The introduction section.	The introduction has been revised to better reflect Council's planning priorities and sustainable approach to development. It now clearly outlines Council's expectations for development from the outset and includes contemporary information.	The updated introduction provides important background on the role of Water Sensitive Urban Design (WSUD) and why it matters. This helps readers understand the reasoning behind the DCP and supports better compliance and implementation of WSUD principles.
Section 2:	Updated structure and content by combining 'objectives and principles' sections.	The 'Objectives and Principles' sections have been updated and combined to reduce confusion caused by overlapping content in Sections 2 and 3.	Objectives and principles have now been updated. The revised section highlights the broader benefits of WSUD such as urban cooling and co-benefits to encourage developers to consider these outcomes early in the design process.
Section 3:	Merged WSUD Principles into Section 2.	The former 'Section 3, WSUD Principles' has been combined into Section 2. This change reduces the total number of sections in the DCP and improves its overall structure.	Updates to the wording and layout help streamline the document, making it easier to navigate and understand. This enhances the logical flow of information and supports a more user-friendly experience.

Existing Section	Change Summary	Justification	Explanation
Section 4:	Section moved and retitled.	The section previously titled *'Development to which this policy relates'* has been moved to Section 3 and renamed *'Development to which this chapter applies'*. This change aligns with the restructuring of the DCP following the integration of WSUD principles into Section 2. While the types of development covered by this chapter remain mostly unchanged, the section now includes additional controls for groundwater protection and better erosion and sediment management.	Introducing controls around developments that may impact groundwater or groundwater-dependent ecosystems helps ensure Council's planning aligns with the water quality actions outlined in the Lake Illawarra Coastal Management Program (LICMP)
	Added new Compliance Pathways Section (Section 4)	A new section has been added to outline the approved pathways developers can follow to meet Council's WSUD planning requirements. This section provides clear direction on how to ensure development proposals align with Council's expectations. The section references key supporting documents, including the *WSUD Guidebook for Developers* and *Council's WSUD Engineering Series*, helping applicants understand how to apply WSUD principles in line with Council's broader planning framework and environmental legislation.	These updates make the application process more transparent and help ensure consistent, high-quality WSUD outcomes across all developments. The inclusion of the MUSIC-Link tool provides a streamlined and standardised method for preparing water cycle management strategies. This reduces the risk of incorrect or inconsistent information being used and ensures alignment with Council's planning policies and local environmental conditions.
Section 5:	Removed section 5	The previous Sections 5 to 8, which included detailed technical content on stormwater treatment trains, selection of treatment measures, and types of WSUD systems, have been removed. These sections were considered too detailed for the Development Application stage and more appropriate for the Construction Certificate phase. Detailed information on WSUD measures, their compatibility, sizing, and effectiveness has been	This change reduces the volume of technical content in the DCP, making it more focused, accessible, and relevant to the early stages of the development process.

Existing Section	Change Summary	Justification	Explanation
		moved to the WCC WSUD Guidebook and fact sheets.	
	Addition of Accepted WSUD Options List.	A list of accepted WSUD options has been added to guide developers in preparing proposals that align with Council's expectations. The list considers Council's internal maintenance capabilities, budget constraints, and available resources. This ensures that proposed WSUD measures are not only environmentally effective but also practical and sustainable in the long term.	By providing clear, approved options, this addition supports more consistent, efficient, and integrated stormwater management outcomes across the city, while aligning with Council's operational planning and resource management.
	Addition of Accepted Proprietary Systems Section	A section has been added to address the use of proprietary stormwater and water quality improvement systems within Wollongong. While these systems are increasingly popular among developers, many do not align with Council's long-term maintenance capabilities, budgets, or resourcing. Rather than removing them entirely, Council has identified a list of proprietary systems that can be maintained or repaired using existing resources.	This approach ensures fairness and that only acceptable proprietary systems are installed, reducing the risk of non-compliant or unsustainable infrastructure. It also supports Council's long-term vision for functional, maintainable, and resource-aligned WSUD infrastructure across the city.
Section 6:	Removed: Section 6	The previous Sections 5 to 8, which included detailed technical content on stormwater treatment trains, selection of treatment measures, and types of WSUD systems, have been removed. These sections were considered too detailed for the Development Application stage and more appropriate for the Construction Certificate phase. Detailed information on WSUD measures, their	This change reduces the volume of technical content in the DCP, making it more focused, accessible, and relevant to the early stages of the development process

Existing Section	Change Summary	Justification	Explanation
		compatibility, sizing, and effectiveness has been moved to the WCC WSUD Guidebook and fact sheets.	
	Added: Detailed 'Controls' Section	A comprehensive 'Controls' section has been added, covering the following key areas – • General. • Stormwater Quality (Including new water quality targets and maps). • Stormwater Reuse. • Stormwater Retention. • Groundwater. • Erosion and Sedimentation. These specific controls provide clear guidance for developers, improving compliance and strengthening the overall effectiveness of the DCP. The controls align with Council's strategic goals to protect and enhance local waterways, soils, groundwater systems, and the broader environment, including Lake Illawarra and the ocean.	This section clearly communicates Council's expectations for development in the city. The controls ensure alignment with Council's environmental strategies, community values, and long-term planning for climate resilience and promote sustainable growth. **Note**: There is an option to add or remove a Positive Covenant under General Controls. (Refer to the text in Section 6 of the updated DCP for exact wording.) Adding a Positive Covenant helps ensure that future property owners are aware of existing WSUD systems, especially in cases where properties are sold and no new consent conditions apply. This measure supports long-term compliance, and helps manage potential pollution incidents, future-proofing the DCP and reinforcing environmental accountability.
Section 7:	Removed: Section 7	The previous Sections 5 to 8, which included detailed technical content on stormwater treatment trains, selection of treatment measures, and types of WSUD systems, have been removed. These sections were considered too detailed for the Development Application stage and more appropriate for the Construction Certificate phase. Detailed information on WSUD measures, their compatibility, sizing, and effectiveness has been moved to the WCC WSUD Guidebook and fact sheets.	This simplifies the DCP by removing technical clutter while ensuring developers still have access to detailed information through the Guidebook and other resources. It enables developers to focus on the broader design principles within the DCP while having access to detailed guidance as needed.

Existing Section	Change Summary	Justification	Explanation
	Updated handover section	The 'Handover' section has been revised following detailed analysis and consultation. The updates clearly outline the responsibilities of developers in delivering compliant WSUD solutions. The revised section places the onus on applicants to provide fully compliant WSUD systems before handover. This reduces Council's financial and operational risks and ensures that only systems meeting Council's standards are accepted.	By clarifying expectations and responsibilities, the updated section streamlines the process for both developers and internal stakeholders. It eliminates previous ambiguities, making the handover process more efficient and transparent. These changes ensure that WSUD systems are delivered to a standard that supports long-term functionality, reduces maintenance burdens, and aligns with Council's environmental and operational goals.
Section 8:	Removed: Section 7	The previous Section 7 has been removed, with relevant content now incorporated into the main WSUD principles in Section 2.	By grouping all WSUD principles together in one section, the DCP now follows a more logical and cohesive structure. This makes it easier for users to understand the intent and application of WSUD from the outset. This change reduces duplication and improves the overall readability of the document, helping developers and stakeholders navigate the DCP more efficiently.
Section 9:	Moved to Section 6	The stormwater quality performance targets and associated development controls have been relocated to Section 6 of the updated DCP.	This change ensures that all development controls are grouped in one section, improving the logical flow of the document. Consolidating all controls into a single section streamlines the DCP and makes it easier for developers, planners, and stakeholders to interpret and apply the requirements.
Section 10:	Section 10 content moved:	The content from the former Section 10, which covered pre-lodgement consultation for proposed WSUD strategies, has been relocated. Relevant notes have been integrated under the new water quality targets section and within the *WSUD Technical Guidebook for Developers*. This change ensures the information remains accessible and relevant without occupying a full section of the DCP. By placing it earlier in the document and within supporting materials, it is now more visible during the initial stages of development planning.	Cross-references in other WSUD materials ensure developers are aware of the correct procedures when considering WSUD, supporting better planning outcomes and alignment with Council processes.
Section 11:	Relocation of Section 11	This change ensures the DCP focuses solely on information required at the	By shifting detailed post-application content to the Guidebook, developers can access the right information at the right stage of the process,

Existing Section	Change Summary	Justification	Explanation
		planning and Development Application stage, making it more concise and user-friendly for developers.	supporting better planning and implementation of WSUD principles.
Section 12:	Removed Section 12 title (Post Development consent phase).	The former Section 12, which covered the *Post Development Consent Phase*, has been removed from the DCP. This content has now been incorporated into Council's WSUD Guidebook for Developers and Construction Certification requirements, where it is more appropriately addressed. Developers are encouraged to consult with Council's planning team for guidance at that stage.	This update improves the clarity and usability of the DCP by keeping it focused on the Development Application stage. It reduces unnecessary complexity and helps developers better understand what's required at each step of the process by : • Making the DCP more concise and easier to navigate, • reducing confusion by clearly separating planning and post-consent requirements, • supports quicker decision-making and better WSUD outcomes, and • clarifying Council's role in overseeing compliance during construction.
Section 13	Update to Section 13 – References	Section 13 has been revised to include current and relevant sources that support the updated content of the DCP chapter.	Ensuring that all references are up to date improves the accuracy and credibility of the DCP. It also ensures alignment with the latest planning policies, technical standards, and environmental guidelines.

Attachment 3: Alignment of the draft Wollongong DCP Chapter E15 – Water Sensitive Urban Design (WSUD) with Wollongong City Council's strategic frameworks

Table 1: Alignment of the draft Wollongong DCP Chapter E15 – Water Sensitive Urban Design (WSUD) with Wollongong City Council's strategic frameworks

Document	Action
Our Wollongong, Our Future Community Strategic Plan 2035	1.1 We are a Sustainable and climate resilient city. 1.3 Manage and improve the cleanliness health, biodiversity of land and water including creeks, lakes, waterways and oceans. 1.7 Manage our coastal environments including Lake Illawarra, to protect and enhance environmental sustainability, social, cultural and economic values. 2.1 Urban areas are planned and well maintained to provide a healthy and safe environment for our community to live, work and play. 2.2 Facilitate ecologically sustainable development that considers the current and future needs of our community and environment. 2.3 Deliver high quality, fit for purpose and sustainable infrastructure to support a growing and resilient city 2.6 The growth of West Dapto urban release area is well planned with facilities, spaces and educational institutions to support the growing community 4.2 Provide a variety of quality and accessible public spaces and opportunities for sport, play, leisure, recreation, learning and cultural activities in the community.
Council's Sustainable Wollongong - A Climate Healthy City - 2030	Priority Area – A City whose Council shows leadership in - • Environmental and climate leadership underpins Council decisions making and service delivery and inspires the same in others. Priority Area – A City in harmony with our environment - • Our ecosystems and waterways are enhanced, our urban areas a cooler and greener and that our community is connected to our natural environment. Priority Area – A climate and water resilient City -

Document	Action
	• Our infrastructure and community can adapt to the impacts of a changing climate and water is valued as a vital natural resource.

Document	Action
Council's Climate Change Mitigation Plan 2023-2030	Objectives - 1 Demonstrate leadership in climate change adaptation planning and action. 2 Identify and understand the risks to council infrastructure, services and operations. 3 Acknowledge the work that Council is already doing to adapt to climate change. 4 Set out what Council can do in coming years and decades to prepare for and adapt to climate change.
Council's Draft Urban Heat Strategy – 2023	Goal 1: Minimise the impacts of heat on the Wollongong community. Goal 2: Minimise the impacts of heat on the local environment. Goal 4: Plan, design and manage urban infrastructure to reduce the UHI effect, create cooler microclimates and support indoor thermal comfort.
Lake Illawarra Coastal Management Program 2020-2030	**Strategy 1: Improve Water Quality (WQ)**
	• WQ1 Implement a Risk Based Stormwater Management Framework for the Lake Illawarra catchment.
	• WQ2 Upgrade existing stormwater quality management measures, or install new devices, which may include water sensitive urban design or other design that will improve water quality as well as enhance habitat and natural values
	• WQ3 Review and prioritise maintenance and cleaning regime for existing stormwater quality devices.
	• WQ4 Design and implement targeted catchment input monitoring as required for developments resulting in a large-scale change or intensification of land use.
	• WQ5 Reduce sediment load to the Lake by improving compliance with erosion & sediment controls for development sites.

Document	Action
	• WQ6 Reduce the impact of sewer overflows.
	• WQ7 Implement water quality monitoring programs for estuary health, recreational use and physico-chemical and bacteriological indicators in the Lake and its catchment.
	• WQ8 Improve litter management.
	• WQ9 Investigate and manage potential pollution sources including contaminated sites that contribute to poor water quality in the lake.
	Strategy 2: Improve planning and management arrangements for the Lake (PM)
	• PM1 Commence integration of key objectives and strategies from the CMP into relevant planning and policy documents of both Councils.
	• PM2 Provide ongoing coordinated management of the Lake, which will require ongoing support for existing staff resources.
	• PM3 Develop and implement a community engagement and participation strategy that enhances the community's knowledge of, skills in, and commitment to, protecting Lake Illawarra.
	• PM4 Establish a Lake Illawarra Asset Management Working Group that provides co-ordination service for agencies that manage assets around the Lake Illawarra foreshore.
Lake Illawarra - Applying a Risk-Based Framework for Improving Water Quality 2024	**Steps 1-6 -** ***Step 1: Establish context -*** • Identify land-use activity/issue. • Identify locally derived waterway objectives (values and uses, indicators, numerical criteria). • Identify potential types and scale of risks to the waterway from land-use activities. ***Step 2: Effects-based assessment and Step 3 – Compare against waterway objectives -*** • Assess how land-use activity will affect the indicator. • Assess effectiveness of proposed management responses. • Assess risk of impact by comparing against waterway objectives.

Document	Action
	Step 4: Strategic impact assessment (evaluating risks based on feasibility) - • Assess feasibility of achieving management responses, for example, cost effectiveness or benefit analysis. ***Step 5: Design and implementation (including monitoring and review) -*** • Develop specific design and implementation plans to achieve the management responses chosen. • Plans should be developed in consideration of other aims/goals or issues for the waterway, for example, flooding, viability. ***Step 6: Implement the recommended water quality parameters into Council's planning and policy documents*** • Update Council's planning and policy documents to include the pollution reduction targets for sensitive catchment areas of Lake Illawarra.